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Technology**

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Co-Editors

Jerry D. Belloit
Clarion University of Pennsylvania (retired)

Norman C. Sigmond
Kutztown University of Pennsylvania

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Editors Page

Throughout the 46-year history of the NABET/APUBEF Conference, we have striven to compile and publish the authors' papers which were presented at each of the respective conferences. Since 2013, the Proceedings has been upgraded to peer-reviewed status. Throughout the history of the NABET/APUBEF Proceedings, we have benefited from the services performed by an exceptional group of reviewers and editors.

The editors acknowledge the dedication, hard work and the excellent result in which the reviewers' efforts resulted. The reviewers of the 2023 NABET Peer-Reviewed Conference Proceedings are:

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National Association of Business, Economics and Technology

NABET 2023

CONFERENCE PROCEEDINGS

INTRODUCTION

The National Association of Business, Economics and Technology is in its forty-sixth year of existence. It was formerly known as APUBEF, the Association of Pennsylvania University Business and Economics Faculty. It was founded by a group of economics and business professors from the fourteen state universities comprising the Pennsylvania System of Higher Education. Their goal was to provide a platform for sharing and encouraging scholarly work among the business faculty of the fourteen state universities. As a result of their efforts, the organization has grown and has sponsored an academic conference each year for the past 46 years.

Since 2006 NABET was regional in scope and has become national in scope since the 42nd Annual Meeting. At the 46th Annual Meeting, the scholarly work of authors from thirteen states, and the countries of China, Portugal, Spain and Sweden representing 42 colleges and universities were presented.

At NABET, we encourage conference presenters to complete their papers and submit them for publication for this Peer-Reviewed Proceedings publication. Of the 86 papers, presented at the 46th Annual Meeting, the following pages contain those papers that were completed by the authors and submitted to the Proceedings editors. Each paper has gone through a thorough review/edit process. *The Official Conference Program* of the 46th Annual Meeting including the abstracts of each paper that was presented at the conference is also included.

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THE IMPACT OF RFID TECHNOLOGY ADOPTION ON ECONOMIC PERFORMANCE IN VARIOUS INDUSTRIES

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ABSTRACT

This paper investigates the relationship between the adoption of Radio-Frequency Identification (RFID) technologies and the economic performance in various industries. By examining sales or profits as dependent variables, we aim to assess the relative economic performance of NAICS industries in relation to their adoption of RFID technologies.

Using a comprehensive dataset encompassing various NAICS industries, we employ statistical techniques such as regression analysis and control variables to analyze the influence of RFID adoption on economic indicators. The study also considers industry-specific characteristics, firm size, and market competition as potential moderating factors.

RFID use has grown rapidly in different economic sectors. In the retail sector, major clothing retailers have implemented RFID technology to improve inventory accuracy and reduce stockouts, resulting in increased sales and improved customer satisfaction. In healthcare, many hospitals implemented RFID systems to enhance asset tracking and management, leading to reduced equipment loss, improved efficiency, and cost savings.

The findings of this research will contribute to existing literature by revealing the effects of RFID technology adoption in disparate industries. The results will inform industry stakeholders, policymakers, and investors about the strategic implications and potential returns on investment associated with RFID implementation.

INTRODUCTION

In an era marked by technological advancements and data-driven decision-making, the Internet of Things and associated Radio-Frequency Identification (RFID) technology have emerged as pivotal technologies that are transforming industries across the spectrum (Sullivan et al., 2023).

RFID's potential to revolutionize inventory management, enhance supply chain visibility (Romagnoli et al., 2023), and streamline operations has made RFID adoption a focal point for businesses seeking to bolster their economic performance. It also provides the ability to enhance the many digital transformation efforts firms are currently undergoing (Chakraborty and Kar, 2023).

RFID technology has been around for at least 50 years. It uses electromagnetic fields and radio waves to transmit data for object identification and consists of three components:

RFID Tags – onboard sensors, antenna, microchips.

RFID Reader – a machine that identifies RFID tags by using radio waves, transferring the tag status to an RFID application or software.

RFID Application/Software – controls and monitors the tags.

This paper explores a research agenda to measure the impact of RFID technology adoption on economic performance across various industries.

RFID ADOPTION USE CASES

RFID is used in IoT-based systems, along with GPS, intelligent sensors, and cameras for locating and identifying objects. Some of the common uses are:

- Healthcare – RFID implants are given to patients in intensive care to record health data and update it in EHR systems. Hospitals and healthcare facilities have deployed RFID systems to track and manage assets efficiently (Patnaik and Prasad, 2023). This has led to reduced equipment loss, streamlined operations, and substantial cost savings, ultimately contributing to improved economic performance. Also, RFID and the IoT are used to monitor consumables.
- Intelligent Transportation – Smart fleets in cities around the world use RFID tags to control traffic, read passenger data and make transport systems aware of system updates:

- Manufacturing – Temperature and moisture control sensors
- Automotive – anti-theft devices, agile production planning, inventory management
- Retail Industry - In the retail sector, RFID technology has experienced widespread adoption. Prominent clothing retailers have harnessed RFID to enhance inventory accuracy, reduce stockouts, and optimize supply chain operations. The result has been increased sales, improved customer satisfaction, and higher profitability.

Weather monitoring – RFID use has been documented in the monitoring of earthquakes (Tomaneng et al., 2022) and other naturally occurring weather phenomena.

MODEL AND METHODOLOGY

Dependent Variables: Sales and Profits

To measure economic performance, we have chosen sales and profits as our dependent variables. These metrics are paramount in assessing the financial health and vitality of businesses operating within different industries.

Independent Variable: RFID Technology Adoption

Our primary independent variable is the degree of RFID technology adoption. We will quantify this by examining the extent to which RFID technology has been integrated into the operations of businesses within different NAICS industries. We will also examine organizational resources and processes used to deploy, maintain, and use IOT technologies in the firm. Next, we will measure the level of top management support, found to be vital to the success of most types of new systems.

Last, complementary IT systems, such as Enterprise systems, data warehouses, data lakes etc. are included as a moderating variable in the model to evaluate its impact on both the deployment of IoT technologies and relevant organizational processes.

See Figure One, below.

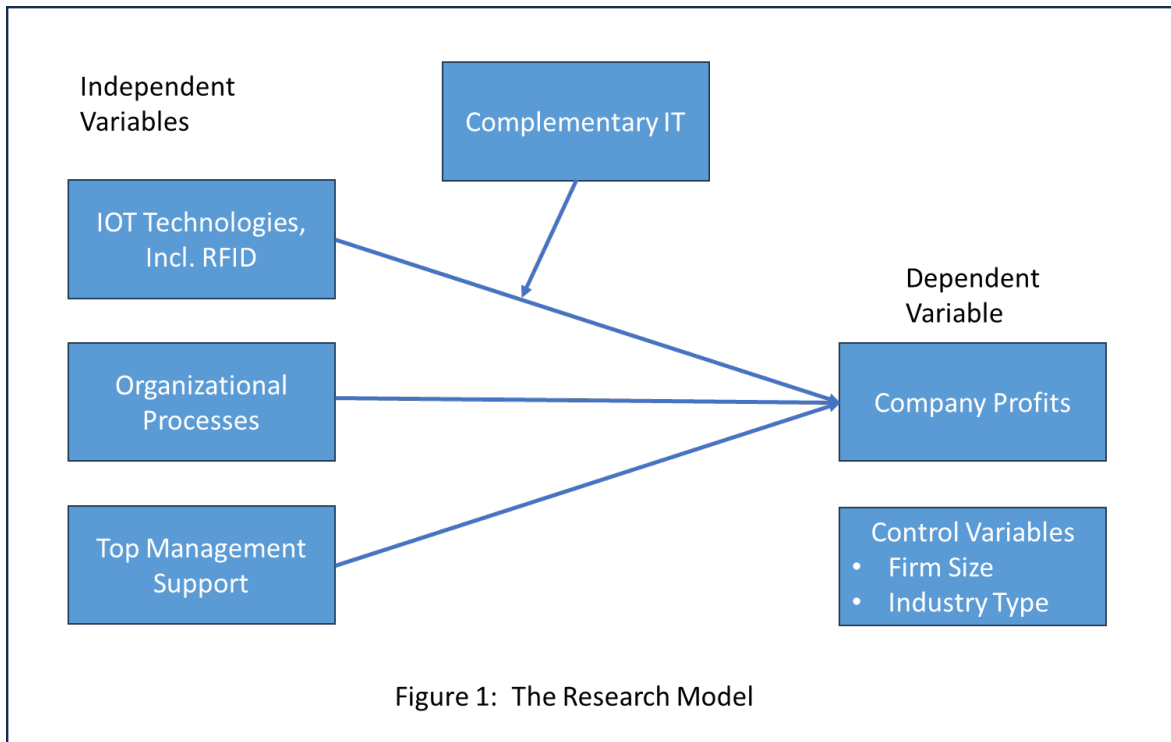


Figure 1: The Research Model

Control Variables

In our analysis, we will account for several control variables, including industry-specific characteristics, firm size, and market competition. These variables are essential to ensure that observed effects can be attributed to RFID technology adoption rather than external factors.

Statistical Techniques: Regression Analysis

To examine the relationship between RFID technology adoption and economic performance, we will employ advanced regression techniques, including multiple linear regression and panel data analysis. This extended analysis will delve into the dynamics of the relationship, investigating potential nonlinear effects and interaction terms.

PLAN OF RESEARCH

Data Collection

Our research will rely on a comprehensive dataset encompassing various NAICS industries. This dataset will include information on RFID adoption, economic performance metrics, industry-specific characteristics, firm size, market competition, and additional variables such as technological innovation and market volatility.

Data Preparation

Prior to conducting regression analysis, we will meticulously clean and preprocess the data. This extended data preparation phase will include addressing not only missing values and outliers but also data imputation techniques and advanced data transformations.

Regression Analysis

Using state-of-the-art statistical software, we will conduct a robust regression analysis. This extended analysis will evaluate the relationship between RFID adoption and economic performance while exploring complex interactions, potential mediation, and moderation effects.

DISCUSSION

Potential Implications

The findings of this extended research hold significant implications for a multitude of stakeholders. Industry leaders can gain insights into the strategic advantages of RFID adoption, potentially guiding their decisions to invest in this technology. Policymakers can use this information to formulate policies that encourage technology adoption, and investors can assess the potential returns on investment associated with RFID technology more comprehensively.

Limitations and Challenges

We acknowledge that there may be limitations and challenges associated with our study. These include potential endogeneity issues, data availability, and the complexity of assessing economic performance comprehensively. In this extended discussion, we will delve deeper into these limitations and offer nuanced approaches to mitigate them, such as propensity score matching and instrumental variable techniques.

CONCLUSIONS

While the regression analysis is yet to be executed, this paper has outlined a robust research plan to investigate the impact of RFID technology adoption on economic performance across various industries. As RFID technology continues to reshape businesses, understanding its economic implications is paramount. This extended exploration promises to contribute valuable insights to the existing literature, benefiting industry stakeholders, policymakers, and investors alike, by offering a more comprehensive view of the multifaceted relationships.

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VARIATION IN A MID-ATLANTIC'S STATE OPIOID RESPONSE SERVICES

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ABSTRACT

As opioid overdose mortality and morbidity continue to rise in recent years, many states have pursued State Opioid Response (SOR) programs to facilitate access to opioid use disorder treatment. This study characterizes access to care and variation in a federally funded SOR program operating in a Mid-Atlantic state since 2014. The Mid-Atlantic state has experienced high and rising opioid-involved overdose deaths, especially among its Black residents. This paper explores the equity of opioid treatment, referral services, and discharge in the Mid-Atlantic state's SOR program using data from the Mid-Atlantic's 53 jurisdiction level service providers combined with information on demographic, economic, and social characteristics within a 10-mile radius of the SOR service providers.

From October 2020 through May 2022, Mid-Atlantic's jurisdiction level SOR providers served 8,659 adult clients. Mid-Atlantic's rate of service receipt (per 100,000 population) was higher for adult men, at 260, compared with adult women, at 110. The rate of service receipt of 248 among Black adults was higher compared with the rate of 186 among White adults. Black SOR service users were especially common at ages when Social Security Disability Insurance benefits are most common; 49% of Black adults served were aged 45 to 64, in contrast with just 21% of White adults served. In conclusion, access to treatment and recovery services are relatively equitable across the White and Black race groups. Since rates of opioid-involved overdose deaths continue to grow fastest among Black Mid-Atlantic residents, future research should examine whether opioid treatment correlates with a decline in opioid-involved deaths, and if there is any difference in the quality of SOR provider services delivered by race as well as by type of program.

INTRODUCTION

The opioid crisis began in the late 1990s, mainly among non-Hispanic White individuals in suburban and rural areas in relation to prescription opioid use and misuse. In the mid-2000s, opioid overdose deaths began to affect all populations. In recent years, opioid-related overdose deaths have been concentrated in large metropolitan areas, particularly among minority groups (Lippold & Ali, 2020), and heroin or illegally manufactured synthetic opioids, like fentanyl, contribute to most of these deaths. Minority groups face significant obstacles in opioid use disorder (OUD) treatment due to limited access to qualified healthcare providers (Santoro & Santoro, 2018).

Within the Mid-Atlantic State, opioid-involved deaths remain high. In 2018, 2,087 people died due to opioid overdose in the Mid-Atlantic State, a rate of 33.7 deaths per 100,000, which far exceeds the national rate of 20.7 deaths per 100,000 (NIDA, 2020). According to Opioid Operational Command Center 2021 second-quarter report, Black –Mid-Atlantic death increased by 12.5 percent while White Mid-Atlantic's death declined by 8 percent. In addition, the Mid-Atlantic State's State Opioid Response (SOR) program, funded under the Substance Abuse and Mental Health Services Administration (SAMHSA) since 2014, aims to address the statewide need for enhanced prevention, intervention, and support services for people with OUDs. In 2014, The Mid-Atlantic SOR program launched enhanced services to prevent and treat OUDs. Such services include screening and enrolling referred individuals for eligibility for services, referral to treatment, increased access to medications for OUD, and related services. Individuals with OUD with a stimulant use disorder diagnosis or both are screened; the MAT services upon program enrollment include treatment with Methadone, Suboxone/Buprenorphine, and Naltrexone (Vivitrol).

A recent study shows that since 2017 in the Mid-Atlantic state, White opioid-involved death rates have declined while Black opioid-involved death rates are increasing (KFF, 2021). However, OUD-related deaths remain high in the Mid-Atlantic state, and in 2018, synthetic opioids (i.e., illicit fentanyl) were involved in 90 percent of Mid-Atlantic's opioid-involved deaths (NIDA 2020). Fentanyl is far more lethal than opioids like heroin or commonly prescribed opioids like hydrocodone or oxycodone.

In addition, while Mid-Atlantic's overdose trend follows national trends, Mid-Atlantic has the highest rate of opioid overdose deaths among non-Hispanic Black adults (SAMHSA, 2020). Further, research shows that synthetic opioids are affecting the opioid death rates of Black populations more than other populations, which could require modifications to the treatment of OUD among Black adults with OUD (SAMHSA, 2020).

To curb opioid overdose deaths in the Mid-Atlantic, the SOR program strives to take a comprehensive approach to achieve the following goals: prevent overdose fatalities by supporting a range of programs, including screening, referral to treatment, walk-in services, and recovery support; increased early identification of substance use through education and training of school personnel; expanding access to recovery services through peer support and recovery housing; enhancing public and provider awareness of causes of and resources available for opioid use disorder; and enhancing the availability of medication for opioid use disorders (MOUD), crisis walk-in centers, crisis beds and safe stations for individuals with OUD.

To understand how Black and White populations in the Mid-Atlantic state have accessed SOR program services, we combined a comprehensive literature review to understand what is known regarding racial differences in OUD treatment and changes in opioid-involved overdose with analyses of administrative data on SOR program clients. While comprehensive standardized program models are essential strategies for addressing the opioid crisis, treatment needs vary. Thus the treatment response should vary to address ethnic and racial differences among adults who need OUD treatment (SAMHSA, 2020). Therefore, this research explores whether there are disparities in SOR service receipt by race, sex, ethnicity and other related factors in the Mid-Atlantic, where overdose trends diverge by race.

This paper is organized into four sections. Section 2 reviews relevant literature on opioid use disorder (OUD) and opioid-involved deaths, focusing on variation across states and by race. Section 3 describes our data and methodology. Section 4 presents the results, followed by a discussion in Section 5. Finally, Section 6 presents the conclusion and future research.

LITERATURE REVIEW

We reviewed studies of racial differences in overdose and opioid use disorder treatment in the social science and clinical literature that covers US national data, regional, and specific target populations such as Veterans and Blacks, focusing on the last five years to shed light on the current literature.

Pyra et al. (2022) analyzed a nationally representative cross-sectional random sample of 1,161 U.S. respondents who completed the AmeriSpeak survey between October 22 and October 26, 2020. The survey consisted of fifty items. Pyra et al. (2022) analyzed how political affiliation, racial attitudes, and opioid stigma influence public support for public health responses to address opioid use disorder (OUD). Attitudes around race play an essential role in public support for public health responses to the opioid epidemic. Pyra et al. found that race-conservative attitude, as well as Republican affiliation, were associated with lower support for: (1) Medicaid expansion, (2) increased government spending to address the OUD epidemic, or (3) expanding naloxone availability. The stigma around OUD was also associated with decreased support for Medicaid expansion, naloxone availability, and government spending to address OUD. Pyra et al. also found racial and ethnic differences in support for naloxone distribution; Black participants displayed lower support for Medicaid expansion, increased government spending on OUD, and naloxone availability compared with non-Hispanic White support. Such differences suggest that one source of differences in treatment capacity or approach across racial and ethnic groups is the support for these.

Santoro and Santoro (2018) conducted a literature review evaluating racial disparities in opioid use, opioid use disorders, and opioid use treatment in the U.S. Racial disparities in the prescription of opioid-containing compounds are dramatic, with non-white individuals receiving prescription opioid medication at half the rate of white individuals. Historical and cognitive biases and limited access to medical care may have limited exposure to prescription opioids among racial and ethnic minorities. Physician bias, media portrayal of OUD, and governmental regulations form multi-factorial roots of racial inequality in response to the opioid epidemic. An example of such government regulation is President Ronald Reagan signed the 1986 Anti-Drug Abuse Act. In 1988, the Omnibus Anti-Drug Abuse Act expanded the law to allow harsher criminalization of crack cocaine users, disproportionately affecting Black populations, while the many White individuals using other forms of cocaine received no significant sanction for their substance use.

Essien et al. (2020) assessed the association of race and ethnicity with prescribing opioids and medications for opioid use disorder (MOUDs) after a non-fatal opioid overdose. The participants in the study were patients prescribed ≥ 1 opioid from July 1, 2010, to September 30, 2015, who experienced a non-fatal opioid overdose in the Veterans Health Administration (VA). The authors conducted difference-in-difference analyses using multivariable regression to assess whether the change in opioid prescribing from before to after an overdose event differed by race and ethnicity. Essien et al. also used multivariable regression to test whether MOUD prescribing after overdose differed by race and ethnicity. They concluded that in a national cohort of patients with non-fatal opioid overdose treated in the VA health system, there were no racial or ethnic differences in opioid prescribing following overdose. Although, in this study, Black and Hispanic patients were more likely than White patients to receive MOUD 30 days after overdose, less than 4% of patients in any group received such therapy.

Larochelle et al. (2021) conducted research as part of the HEALing Communities Study, which aims to significantly reduce opioid-related overdose deaths by helping communities implement evidence-based practices to treat OUD and reduce other harms associated with opioid use in New York, Massachusetts, Kentucky, and Ohio. This study, the most prominent addiction implementation study conducted to date, was part of the National Institute on Drug Abuse and Substance Abuse and Mental Health Services Administration Helping to End Addiction Long-term Initiative. The authors collected data from death certificates for 2018 and 2019 across 67 communities with a population of more than 8.3 million people in the four states participating in the HEALing Communities Study. The researchers calculated rates and trends of opioid overdose deaths for each state and then further analyzed trends by race and ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other). Overall, the investigators observed no change in the opioid overdose death rate in these states from 2018 (38.3 deaths per 100,000 people) to 2019 (39.5 deaths per 100,000 people). However, the researchers observed a 38% overall increase in the opioid overdose death rate for non-Hispanic Black individuals from 2018 to 2019 across these four states. There were no changes overall among the other racial and ethnic groups. The size of the increase in overdose among non-Hispanic Black individuals varied by state; the highest was in Kentucky (a 46% increase) and Ohio (a 45% increase). The study did not observe a significant increase in Massachusetts among non-Hispanic Black individuals. While opioid overdose death rates were unchanged for non-Hispanic Black individuals in New York, there was an 18% decline among non-Hispanic White individuals, suggesting that non-Hispanic Black individuals have not benefitted equally from prevention and treatment efforts.

Alexander et al. (2018) investigated trends in Black and White Opioid Mortality in the United States from 1979 to 2015 using multiple causes of death data. They calculated age-standardized mortality rates involving opioids, by race and opioid type, for the U.S. resident population. Alexander et al. also analyzed trends in mortality rates using join point regression. Their results indicate that Black and White's populations underwent three successive waves. In the first wave, from 1979 to the mid-1990s, the epidemic affected both populations and was driven by heroin. In the second wave, from the mid-1990s to 2010, the increase in opioid mortality was caused by natural/semi-synthetic opioids (e.g., codeine, morphine, hydrocodone, or oxycodone) among White populations, while there was no increase in mortality for Black populations. In the current wave, increases in opioid-involved mortality for both people have been driven by heroin and synthetic opioids (e.g., fentanyl and its analogues). Heroin rates are increasing at 31% per year for White individuals and 34% for Black individuals. Concurrently, mortality involving synthetic opioids are growing at 79% and 107% annually for White and Black people, respectively. They concluded that since 1979, the nature of the opioid epidemic has shifted from heroin to prescription opioids for the White population to increasing heroin and synthetic opioid deaths for both Black and White people.

Lippold and Ali (2020) investigated the trends in opioid-involved overdose deaths across racial and ethnic groups in metropolitan and non-metropolitan areas. They used joinpoint regression, composed of several distinct linear phases over time divided by cut points, to examine the mortality trends from 1999 and 2017. As expected, the result shows that overdose death rates increased across metropolitan and nonmetropolitan areas for all racial and ethnic groups from 1999 to 2017. Nevertheless, the findings from this study indicate significant heterogeneity in the rates of opioid-involved overdose deaths and their rates of increase for diverse populations. Death patterns in non-Hispanic White persons align with the increase in opioid-involved overdose death rates observed over the past two decades. Non-Hispanic Black and Hispanic adults in large metropolitan areas displayed minimal increases in overdose death rates between 1999 and 2012 but startling increases following the emergence of synthetic opioids into the illicit market around 2013 and 2014. These findings support the existence of sub-epidemics in the ongoing opioid overdose crisis and point toward the need for culturally tailored interventions to address opioid-involved deaths in diverse populations.

In a related publication characterizing racial and ethnic differences in overdose death, the Substance Abuse and Mental Health Services Administration (SAMHSA, 2020) reported that synthetic opioids affect opioid death rates among non-Hispanic Black populations more than others. Synthetic opioids accounted for nearly 70 percent of opioid-related overdose deaths and 43 percent of the total drug overdose deaths for non-Hispanic Blacks in 2017 (CDC, 2019). The same report states that death rates involving synthetic opioids increased by 818 percent and were the highest for non-Hispanic Black persons compared to all other racial and ethnic groups. Regarding prescription opioids, it has been proposed that Black/African Americans may be insulated from the fast-raising rate of opioid misuse and overdose deaths due to a lack of access to these medications. The lack of access to prescription opioids is rooted in misperceptions and biases in the healthcare system, including the undervaluing of Black/African American self-reporting of pain and stereotyping by providers (SAMHSA, 2020). According to the Kaiser Family Foundation (2018) opioid-related overdose death rates by state in 2018 were highest in the Mid-Atlantic and Midwest regions.

Regarding Social Security Disability Insurance (SSDI) or Supplemental Security Income recipients' use of opioids, there is limited evidence. Wu et al. (2021) examined the prevalence of opioid use in a sample of initial-level SSDI applicants using data from the Social Security Administration's Structured Data Repository, Disability Analysis File, and Numerical Identification from 2007 through 2017. Their findings indicate that more than 30 percent of SSDI applicants reported using one or more opioids.

Overall, the literature review exposes mixed findings regarding racial differences in access to treatment for OUD or the intent to address OUD in each community. However, there is a clear consensus in the literature that the opioid crisis, which initially started as a "White" crisis, is increasingly spreading to urban and minority areas. Furthermore, the literature agrees that policymakers have handled the opioid crisis since 2000 very differently than before drug crises, like the 1980 crack cocaine epidemic, which primarily affected urban and inner-city minority populations. For the 1980s crack cocaine crisis, policy maker's response included long prison sentences and criminalization of the public health crisis. In contrast, for the recent opioid crisis, policymakers treat OUD as a chronic illness and allocate more funds to fight opioid use disorder. Our empirical research aims to shed light on the racial differences in the opioid crisis and the prevalence of opioid use in a Mid-Atlantic state to add to the evidence base for refining the policy response to the opioid crisis in the Mid-Atlantic to the affected population groups.

METHODOLOGY AND DATA

The study employs a standard data science method used by Sarker (2021) to collect, curate, and integrate the data that come from different sources to characterize differences in OUD treatment and overdose by race, ethnicity, age, sex, and among individuals likely to be vulnerable to health consequences of OUD because they are homeless.

There are two levels of data and analysis performed in this paper: individual level and community level. At the individual level, this paper examines individual clients receiving State Opioid Response (SOR) services residing in the Mid-Atlantic State as the study population. Specifically, the sample includes client referrals by providers and clients who opted into receiving the SOR services. At the community level, the paper explores the association between SOR service measures aggregated at the community level (defined below) and community-level demographics, economic and educational measures (defined below). For this paper, the study population consists of all communities with census tracts within a 10-mile radius (concentric neighborhoods) of SOR providers that need SOR services in the Mid-Atlantic State. The 53 service providers located in 18 counties of the Mid-Atlantic state and are designed and implemented to serve residents in the state. The sampled population is those communities who were targeted to receive SOR services.

DATA SOURCES

Our empirical analysis uses two primary data sources: a Mid-Atlantic State's SOR data from the state and the American Community Survey conducted by the U.S. Census Bureau of Labor Statistics.

The State Opioid Response (SOR) Data

There are 53 jurisdiction-level service providers across the Mid-Atlantic State participating in the SOR programs providing treatment and recovery services to state residents whose progress report data was included for the purpose of this study. A few service providers were not included because corresponding data was not available from ACS due to address information. The 53 service providers report monthly data on overall counts of enrolled individuals

receiving services, breaking out counts by different demographic characteristics and by service provider yielding total referral, screening, services while enrolled, and discharge services provided. Each of the 53 organizations that provide services under the State’s SOR program submits monthly progress reports to one of the State’s 18 SOR counties. Thus, each observation of SOR data represents a monthly count of clients receiving different services – treatment, and recovery from a service provider. We use SOR data spanning October 1, 2020, to May 30, 2022, from all 53 Service Providers.

First, we focus on four SOR program outcomes of interest, also called SOR Measures. Based on SOR data as of May 30, 2022, we measure 1) referrals, the total number of unique individuals referred by self, family or friend, medical provider, or other referral sources to the State’s SOR program, 2) clients, or the total number of unique individuals enrolled in services in the SOR program (a subset of referrals); 3) MOUD starts, or the total number of individuals receiving medications for opioid use disorder (MOUD) through the State’s SOR, including Suboxone/Buprenorphine, Methadone, or Naltrexone (Vivitrol), and 4) MOUD referrals following discharge or the total number of individuals referred to MOUD services following discharge or release.

Next, we describe the population served by each SOR service provider, characterizing the overall race, age, ethnicity, and other characteristics of the clients in the SOR dataset. The individual characteristics used to describe recipients of SOR program service receipt are age (less than 18, 18-24, 25-44, 45-64, greater than 64); sex (female versus male); race (White, Black or African American, Hawaiian or Pacific Islander, Asian, American Indian or Alaska Native, more than one race, and Unknown); Ethnicity (Hispanic or Latino versus non-Hispanic or Latino); indicators for whether a client is currently homeless, pregnant or a veteran; and indicators for the jurisdiction or county of residence. In practice, many counts of SOR service receipts for the Asian, Hawaiian or Pacific Islander, American Indian, or Alaska Native populations will be suppressed due to small sample sizes. Finally, the chi-square independence test is used to determine if there are significant differences in the proportion of services given to different groups of individuals.

RESULTS

The SOR program data is drawn from counties across the state. For this paper, data originate from 18 jurisdictions or counties. For simplicity, we refer to the counties defining each jurisdiction when presenting jurisdiction or county-level information. The data are based on monthly progress reports submitted by 53 service providers. These service providers are dispersed across the county jurisdictions to serve residents across the state, as indicated in Table 1. Table 1 shows that the service providers in Jurisdiction J3 have the highest number of State Opioid Response clients, 3,351 (38.7% of the total) served. However, Jurisdictions J2 and J5 have the most service providers (seven each). Jurisdiction J3, where the majority of the clients reside, is served by just three service providers.

Table 1. Number of State Opioid Service Providers & Unduplicated Clients by County during October 1, 2020, to May 30, 2022

County	Number of Service Providers	Unduplicated Clients Served	%
J1	1	78	0.90
J2	7	1631	18.84
J3	3	3351	38.70
J4	2	94	1.09
J5	7	595	6.87
J6	2	30	0.35
J7	3	377	4.35
J8	1	932	10.76
J9	2	78	0.90
J10	2	7	0.08
J11	6	213	2.46
J12	3	249	2.88

J13	2	95	1.10
J14	2	269	3.11
J15	3	103	1.19
J16	2	422	4.87
J17	3	90	1.04
J18	2	45	0.52
Total	53	8,659	100

Clients Served by Race and Ethnicity

The SOR program served 8,659 unique individuals (clients) from October 1, 2020, to May 30, 2022 . Table 2 displays a breakdown of clients served by race. About 53 percent of the clients admitted for opioid treatments are White, 40 percent are Black, and the remaining 7 percent of clients reflecting individuals with more than one race, Asian, American Indian, and Hawaiian populations. The race-specific population rate of service receipt per 100,000 residents aged 18 and older is significantly higher among Black adults (248) than White adults (186). This higher population-based rate of SOR service receipt mirrors the trend of faster growth in opioid use disorders, overdose, and death among Black adults in the state.

Table 2. Individuals Receiving State Opioid Response Services, October, 2020 through May, 2022

Race	Number of Unduplicated Clients (UC)	Percent	Population Rate of Service Receipt Per 100,000 residents (UC/MP)* 100,000
White	4,585	52.95	186
Black	3,476	40.14	248
Unknown	472	5.45	168
More than 1 Race	77	0.89	25
Asian	35	0.40	10
American Indian	*	*	*
Hawaiian	*	*	*
Total	8,659	100.00	180

*numbers suppressed due to small numbers of American Indian and Hawaiian or Pacific Islander individuals served by the state’s State Opioid Response program. The population rate of service recipients is significantly higher for Black residents of the state than White residents ($\chi^2 = 152.3, p < 0.0001$).

Table 3 presents the population rate of service receipt per 100,000 adults living in the state by ethnicity: non-Hispanic or Latino (195) residents were significantly more likely to receive services than Hispanic or Latino residents (50). Service receipt among Hispanic or Latino residents differ dramatically by sex, with a 5 to 1 ratio of males to females receiving SOR program services compared to 2 to 1 for non-Hispanic residents.

Table 3. Individual Served from October 2020 through May 2021, by Ethnicity

Race	Number of Clients (NC)			Population Rate of Service Receipt Per 100, 000 residents (UC/MP)* 100,000
	Total	Male	Female	
Non-Hispanic or Latino	8,412	5,883	2,544	195
Hispanic or Latino	247	206	42	50

The population rate of service recipients is significantly higher for residents of the state who are non-Hispanic or Latino compared with Hispanic or Latino residents ($\chi^2 = 493$, $p < 0.0001$).

Clients Served by Sex, Age, and Race

Table 4 presents the distribution of individuals served by sex and race. The population rate of service receipt per 100,000 adult males (260) is significantly higher than that for females (110). Furthermore, for each White female client, there are two White male clients served, and for each Black female, there are three Black male clients who received treatment services. More Black men, compared to White, are receiving treatment services as well.

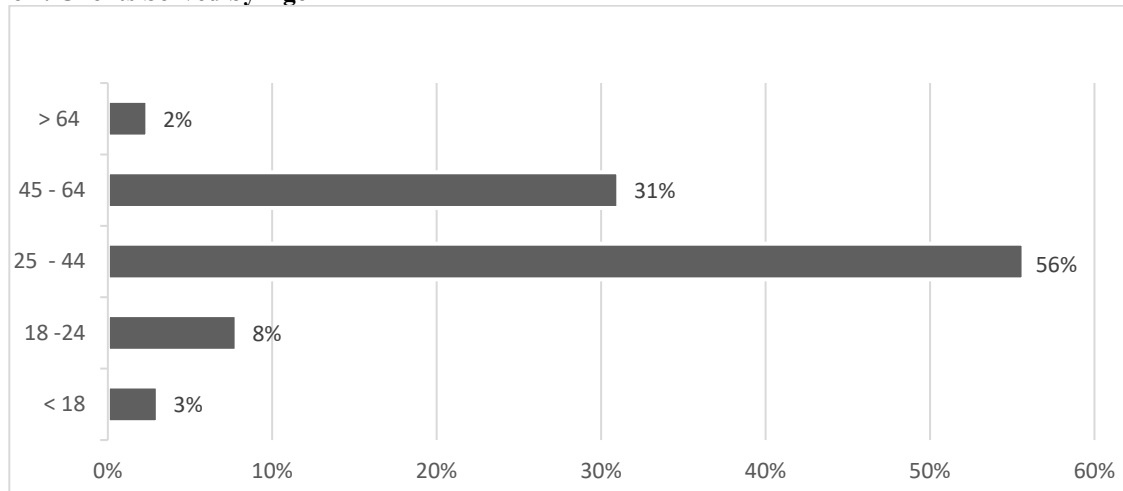
Table 4. Clients Distribution by Sex and Race

Race	Male	Female
White	2,907	1,678
African American	2,627	840
Unknown	320	152
More than one race	53	24
Asian, Hawaiian and American Indian	*	*
Total Clients Served	5,944	2,706
Population rate per 100,000 the state residents age 18 and above	260	110

*Counts suppressed due to small numbers. Differences in the population rate of recipients by sex of 150 per 100,000 are statistically significant ($\chi^2 = 1454.5$, $p < 0.0001$).

Figure 1 shows the distribution of SOR clients by age by the end of May 2022. Most clients (56 percent) are aged 25-44, with an additional 31 percent aged 45-64. Very few clients are over 65 or under age 18, and just 8 percent are 18 – 25. Population rates of SOR service receipt per 100,000 by age group are presented in Table 5.

Figure 1. Clients Served by Age



Considering ages when Social Security Disability Insurance benefits are most common, 45 to 64, among Black adults, 45% of service users were 45 to 64 years old, in contrast to just 21% of White service users (Table 5).

Table 5. Distribution of Clients Receiving the Mid-Atlantic’s State Opioid Response Services, By Age and Race

Race	Age, N (row percent)					Total*, N
	< 18	18 -24	25 - 44	45 - 64	> 64	
White	63(1%)	453(10%)	3,074(67%)	952(21%)	43(1%)	4,585
Black	146(4%)	183(5%)	1,430(41%)	1,568(45%)	149(4%)	3,476
More than One Race	17(22%)	*	38(49%)	10(13%)	*	77
Unknown Race	34(7%)	27(6%)	242(51%)	153(32%)	16(3%)	472
Total*	263(3%)	678(8%)	4,822(56%)	2,688(31%)	208(2%)	8,659
Population- Rate of clients served Per 100, 000 in the age group	20	127	300	165	22	143

* The percentage adds up to 100% across age columns, and raw (age groups) sum to the raw count in the “Total” column. The table does not show Asian, Hawaiian or Pacific Islander, or American Indian due to small cell sizes.

Individuals Receiving SOR Services in Homeless Populations

To understand how the SOR serves an especially vulnerable population of adults in Maryland, homeless populations, we computed the race, and sex-specific estimated clients served among the homeless population, for whom the consequences of OUD and any barriers to treatment may be especially important. Table 6 shows homeless SOR program clients separately by sex and race. Nearly 23% of SOR clients are homeless. Nearly 18% of Black clients are homeless compared to 27% of White clients. Furthermore, most homeless clients, 85%, are male.

Table 6. Homeless Clients Served by Sex and Race

Race	Clients Served			All Clients	Percent of Clients who Are Homeless
	Homeless Male	Homeless Female	Homeless Total		
White	1,030	227	1,257	4,585	27%
Black	581	58	639	3,476	18%
Unknown Race	43	6	49	472	10%
Total	1,679	296	1,975	8,659	23%

*Counts for Asian, Hawaiian, American Indian, and More than Race are suppressed due to small cell sizes.

Discussion

We find that, per population, a Mid-Atlantic state’s SOR program delivers slightly more services to Black adults living in the state than White adults. The access to SOR program providers Black adults is expected in the context of opioid overdose death trends in the literature, which document an increasing number of Black adults with opioid and related addictions as the death rate continued to rise among Black residents while falling for White residents in the first year of the pandemic, or the 12 months through 2nd quarter 2021 (MOOCC Q2, 2021). The State’s Opioid Operational Command Center report findings are similar to Alexander et al. (2018) because the Black opioid-overdose death rate is increasing while White opioid overdose death rates are declining. Hence, the State’s SOR programs are serving Black communities in line with the way the opioid crisis has intensified for Black residents in recent years. Any beneficial effect of access to the State’s SOR providers among the Black population could take time to appear in official reports.

Understanding the treatment patterns for OUD is important not only due to the public health threat of the opioid crisis, overdose, addiction, and the many related negative consequences of opioid disorders but because it affects adults likely to need income and health support from public programs like SSDI and Medicare (with or without additional coverage from Supplemental Security Income and Medicaid). The rapidly rising overdose death rates among Black residents of the State suggest that the SOR program, even with more access for Black adults, is not yet meeting treatment needs. About half of the Black clients in the State’s SOR program and one-quarter of White clients were aged 45 and older, and thus reaching ages when applying for and receiving SSDI is most common. The description of service providers revealed that just three providers serve a county with the most SOR clients (compared with seven service providers each for two other counties in the State). Further, there were drastically different rates of take up (the ratio of clients to referrals and MOUD starts to referrals) of SOR services comparing Black and White adults. These differences suggest there may be more unmet treatment needs among Black adults referred to a SOR provider, while some referrals of White patients yield fewer benefits. Attention to the targeting of referrals and identification of OUD needs could help make more efficient use of SOR program resources. Finally, more work needs to be done to understand the efficacy of these programs. If effective, it is hard to reconcile the accelerating rates of overdose, especially in the Black population, which is currently the population most likely to receive the SOR services. If effective, programs like the State’s SOR program could dampen the need for income support and health insurance as people reach older working ages.

Sadly, the Center for Disease Control and Prevention (CDC)’s report in July 2022 indicates that nationally, the overdose crisis involving opioids persists across many racial groups. Black Americans experienced a rise in overdose death of 44 percent; the rise was 39 percent for American Indian and Alaska Native people and 22 percent among White individuals compared with 2019 (CDC 2022). This suggests that lessons learned in a Mid-Atlantic State may be needed in many more communities and states as deaths continue to rise.

CONCLUSION

The SOR program in a Mid-Atlantic State was designed to deliver identification, referral, and treatment service to residents of the State suffering from OUD. We found that the population rate of treatment and recovery services recipients are similar among Blacks and White residents, contributing over 90 percent of the clients served by the

State's SOR program. Although the State's SOR treatment program offers access to the Black population in-line with individuals from other racial groups, overdose death rates are stubbornly high and rising for Black men. This research raises the question whether SOR service provision is effective or not. If effective, for whom? Future work could investigate the location of treatment needs (overdose deaths and rates of OUD) and the capacity of SOR service providers to improve the efficiency of targeting for outreach and capacity-building efforts in the state. The composition of clients served by race varies across different SOR programs, with some programs serving primarily Black or primarily White clients. Future research should examine differences by program. Furthermore, future research should examine whether opioid treatment correlates with a decline in opioid-involved deaths, and if there is any difference in the quality of SOR provider services delivered by race as well as by type of program.

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THE EFFECT OF POSITIVE AND NEGATIVE COVID-19 ANNOUNCEMENTS ON THE U.S. STOCK MARKETS

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ABSTRACT

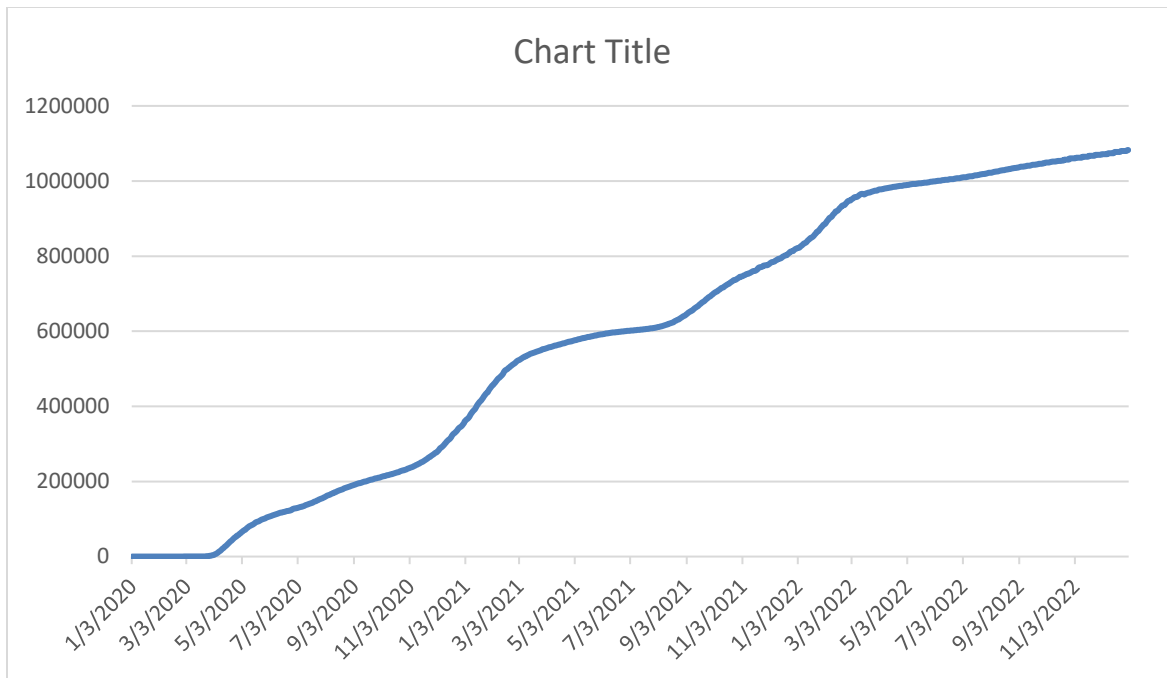
World Health Organization formally announced on 31 December 2019, that an unknown virus found in Wuhan City in China. On 20 January 2020, 282 confirmed cases of COVID-19 and 6 deaths reported from four countries, including China, Thailand, Japan and the Republic of Korea (WHO, 2020). On February 25, 2020, the Centers for Disease Control (CDC) announced COVID-19 heading to be pandemic. On the 11th March 2020, officially, WHO declared that COVID 19 characterized as pandemic disease. The White House announced Covid 19 as a national emergency on March 13th, 2020. On Dec 11th, 2020, FDA publicly announced its Emergency Use Authorization (EUA) for the first Covid 19 vaccine, the Pfizer-BionTech Covid vaccine. On Dec 18th, 2020, EUA was announced for the second vaccine, Moderna Covid-19. On Feb 27th, 2021, FDA approved the EUA for the third vaccine, Janssen Covid-19 vaccine and on July 13th, 2022, they announced the EUA for the fourth vaccine, Novavax. The COVID 19 outbreak on global stock markets was staggering. Our research in this paper has been to look at the short-term market reaction to such media announcements regarding both the onset of Covid 19 and the successful testing and emergency use availability of covid vaccines in the U.S. markets. In this paper, we will look at these eight key dates and explore the short-term reaction of stock markets to these public announcements using the thirty companies from Dow Jones Industrial Average index as the proxy for the stock market. We expect negative market reaction to the first four Covid disease onset announcements, 31st Dec 2019, Feb 25th, 2020, March 11, 2020, and March 13th, 2020, and short-term positive market reaction to the four vaccine emergency approval announcements, Dec 11th, 2020, Dec 18th, 2020, Feb 27th, 2021 and July 13th, 2022. Since markets were closed being Saturday on Feb 27th, 2021, we have run the event study analysis on the following business date, March 1st, 2021.

INTRODUCTION

In this paper, we will look at these eight critical calendar dates – Dec 31, 2019, Feb 25th, 2020, March 11th, 2020, March 13th, 2020, Dec 11th, 2020, Dec 18th, 2021, Feb 27th, 2022 and July 13th, 2022 and explore the short term reaction of stock markets to these public announcements using the thirty companies from Dow Jones Industrial Average index as the proxy for the stock market. We expect negative market reaction to the first three Covid disease onset announcements, 31st Dec 2019, Feb 25th, 2020, March 11, 2020, and we expect short term positive market reaction to the last four EUA vaccine approval announcements.

USING SAS FOR DATA MANIPULATION

We have used Tableau and WHO website together to extract and visualize some Covid data. This is to give a visual picture of how serious COVID 19 was and how rapidly it spread like a pandemic throughout the United States. As a first step we went to WHO website to download data pertaining to cumulative number of deaths in each country in the world due to Covid in the year 2020. The reason we chose year 2020 is that's the year Covid was spreading across the entire 50 states of the U.S and in the absence of a vaccine the number of deaths was rising alarmingly. We pulled the data from WHO and then selected only USA and the deaths by calendar dates in the year 2020. We then imported this data into SAS studio to run a graph and the graph is as shown below.



LITERATURE REVIEW

The effect of COVID19 on the economy felt across the country and or in the world. COVID 19's effect on the US stock market was also tremendous in March 2020 the Dow Jones index fell sharply to 19,173 from its peak of 29,500 in mid-February 2020 (that is 35% decline). Izzeldin et al. (2021) investigates the impact of Covid-19 on stock markets across G7 countries and their business sectors. They highlight the synchronicity and severity of this unprecedented crisis. They used data that comprises daily prices of the aggregate and sector equity indices for the G7 economies (Canada, France, Germany, Italy, Japan, UK and US). All indices are value-weighted and exclude dividends. The data source is Datastream and covers the period from 24/4/2018–24/4/2020. Using a novel smooth transition heterogenous autoregressive model (ST-HAR) to identify transition between regimes. Their results show a non-linear transition to a crisis regime for all countries and sectors. Their findings are that the Healthcare and Consumer Services sectors were the most severely affected, with Telecommunications and Technology the least. Financial markets in the UK and the US took the largest hits, yet with high response heterogeneity across business sectors. Baig et. al (2021) investigates the impact of COVID-19 pandemic on the microstructure of US equity market. They collected stock market information for the S&P 500 constituent stocks is obtained from Thomson Reuters DataStream. Their data is a firm-day panel that consists of all the constituent stocks of the S&P 500 index for the period January 13th, 2020, to April 17th, 2020. Their results suggest that increases in confirmed cases and deaths due to coronavirus are associated with a significant deterioration of market liquidity and stability. Similarly, public fear and the implementation of restrictions and lockdowns seem to contribute to the illiquidity and instability of the markets.

Event Study

An event study is a statistical method of an empirical investigation of the relationship between security prices and economic events (Dyckman et al., 1984). Most event studies have focused on the behavior of share prices to test whether their stochastic behavior is affected by the disclosure of firm-specific events. Furthermore, “in a corporate context, the usefulness of event studies arises from the fact that the magnitude of abnormal performance at the time of an event provides a measure of the unanticipated impact of this type of event on the wealth of the firms’ claimholders” (Kothari and Warner 2006).

EMPIRICAL MODEL

Methodology

This study employs a standard event study methodology, using Eventus from WRDS and we fit a standard market model to measure the presence of any abnormal short term market returns resulting from the Covid announcements.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \quad \text{where } E(\varepsilon_{it}) = 0 \text{ and } \text{var}(\varepsilon_{it}) = \sigma_{\varepsilon t}^2 \quad (1)$$

Each sample calendar date is converted to event time by defining the date of the NRRS announcement date (and the implementation date) as event date 0. So, for the announcement date, event date 0 is the same trading day. The regression coefficients α_i and β_i are estimated in an ordinary least squares (OLS) regression during the estimation period one year (255 trading days) prior to the event period (event days -300 through -46). The event period consists of 61 trading days centered on NRRS announcement date (-30 through +30). We define four event windows based on the event date, [-30,-2], [-1, 0], [+1, +2], [+2, +5] and [+6, +30]. As proxy for the return for the market portfolio R_{mt} , both the CRSP value weighted index and the CRSP equal weighted index are used.

Under standard assumptions, OLS is a consistent estimation procedure for the market model parameters. Under the assumption that asset returns are jointly multivariate normal and independently and identically distributed (iid), OLS is also efficient. The prediction errors, PE_{it} , which represent abnormal returns, are simply the OLS residuals, $\hat{\varepsilon}_{it}$.

$$PE_{it} \equiv \hat{\varepsilon}_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \quad (2)$$

with

$$\hat{\sigma}_{\varepsilon t}^2 = \frac{1}{255 - 2} \sum_{\tau=t-299}^{t-46} (R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau})^2 \quad (3)$$

The prediction error, PE_{it} is used as an estimator of the abnormal return. In other words, the abnormal return is the residual term of the market model calculated on an out of sample basis. Let $AR_{it}, \tau = t - 30, t - 29, \dots, t + 29, t + 30$ be the sample of 61 abnormal returns for firm i in the event window. Under the null hypothesis, conditional on the event window market returns, the abnormal returns will be jointly normally distributed with a zero conditional mean and conditional variance:

$$AR_{it} \sim N(0, \sigma^2(AR_{it})) \quad (4)$$

The conditional variance $\sigma^2(AR_{it})$ has two components. The first component is the disturbance $\hat{\sigma}_{\varepsilon t}^2$ from (3), and the second component is additional variance due to sampling error in estimating the market model parameters α_i and β_i :

$$\sigma^2(AR_{it}) = \sigma_{\varepsilon t}^2 + \frac{1}{255} \left[1 + \frac{(R_{m\tau} - \bar{R}_m)^2}{\hat{\sigma}_m^2} \right] \text{ where } \bar{R}_m = \frac{1}{255} \sum_{\tau=t-299}^{t-46} R_{m\tau} \quad (5)$$

Since the estimation window is large (255 trading days), I assume that the contribution of the second component to $\sigma^2(AR_{it})$ is zero.

To draw inferences about the average price impact of an event, abnormal return observations must be aggregated across securities and through time. Average abnormal returns AAR_{τ} are formed by aggregating abnormal returns AR_{it} for each event period $\tau = t - 30, t - 29, \dots, t + 29, t + 30$. Given N events (for our sample, $N = 147$),

$$AAR_{\tau} = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (6)$$

Under the assumption that average abnormal returns are independent across securities, the asymptotic variance equals to

$$Var(AAR_{\tau}) = \frac{1}{N^2} \sum_{i=1}^N \sigma_{\varepsilon\tau}^2 \quad (7)$$

The average abnormal returns are aggregated through time to give the cumulative average abnormal return,

$$CAAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AAR_{i\tau} \quad (8)$$

Setting the covariance terms to be zero,

$$var(CAAR_i(\tau_1, \tau_2)) = \sum_{i=1}^N var(AAR_{i\tau}) \quad (9)$$

$$\text{Hence } CAAR_i(\tau_1, \tau_2) \sim N(0, var(CAAR_i(\tau_1, \tau_2))) \quad (10)$$

This can be used to test the null hypothesis that the abnormal returns are zero.

The estimated variance of AAR_{τ} is.

$$\hat{\sigma}_{AAR}^2 = \frac{\sum_{\tau=t-299}^{t-46} (AAR_{\tau} - \overline{AAR})^2}{255-2} \quad \text{where } \overline{AAR} = \frac{\sum_{\tau=t-299}^{t-46} AAR_{\tau}}{255} \quad (11)$$

The portfolio test statistic for day τ in event time is.

$$t = \frac{AAR_{\tau}}{\hat{\sigma}_{AAR}^2} \quad (12)$$

Assuming time series independence, the test statistic for $CAAR_i(\tau_1, \tau_2)$ is.

$$t = \frac{CAAR_i(\tau_1, \tau_2)}{\sqrt{(\tau_2 - \tau_1 + 1)\hat{\sigma}_{AAR}^2}} \quad (13)$$

The abnormal return estimators often have different variances across firms. A common way of addressing this problem is the standardized residual method (Patell, 1976). Define the *standardized abnormal return*, $SAR_{i\tau}$ as

$$SAR_{i\tau} = \frac{AR_{i\tau}}{\hat{\sigma}_{MLE_{i\tau}}} \quad (14)$$

Where?

$$\hat{\sigma}_{MLE_{i\tau}} = \hat{\sigma}_{\varepsilon\tau}^2 \left(1 + \frac{1}{T} + \frac{(R_{m\tau} - \bar{R}_m)^2}{\sum_{\tau=t-299}^{t-46} (R_{m\tau} - \bar{R}_m)^2} \right) \quad (15)$$

Is the maximum likelihood estimate of the variance. Under the null hypothesis each $SAR_{i\tau}$ follows a student's t distribution with T-2 degrees of freedom. Summing the $SAR_{i\tau}$ across the sample yields

$$ASAR_{i\tau} = \sum_{i=1}^N SAR_{i\tau} \quad \text{where } ASAR_{i\tau} \sim N(0, Q_{\tau}) \quad (16)$$

The Z-test statistic for the null hypothesis that $CAAR_i(\tau_1, \tau_2) = 0$ is.

$$Z(\tau_1, \tau_2) = \frac{1}{\sqrt{N}} \sum_{i=1}^N Z_i(\tau_1, \tau_2) \text{ where } Z_i(\tau_1, \tau_2) = \frac{1}{\sqrt{(\tau_2 - \tau_1 + 1) \frac{T-2}{T-4}}} \sum_{\tau=\tau_1}^{\tau_2} SAR_{i\tau} \quad (17)$$

The two test statistics so far discussed use the variance estimate from the market model during the estimation period to estimate the variance of the abnormal return estimator. But frequently, events increase the variance of returns, so that the event period variance is greater than the estimation period variance. The portfolio test statistic for day t in event time is.

$$t = \frac{AAR_t}{\hat{\sigma}_{AAR_t} / \sqrt{N}} \text{ where } \hat{\sigma}_{AAR_t} = \frac{1}{N-1} \sum_{i=1}^N (AR_{i\tau} - \frac{1}{N} \sum_{i=1}^N AR_{i\tau})^2 \quad (18)$$

We use the above equation to calculate *Adjusted-t*.

We used event study method to analyse the effect of COVID 19 announcements on the Dow Jones Industrial Average. We used four negative announcements dates of COVID 19 and four positive FDA public announcements of availability and emergency use authorization of vaccines. The following eight tables are the main results from the research.

See Table 1, below.

Table 1: Dec 31st, 2019: WHO first announcement from Wuhan

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2) 3.021**	30	-3.50%	-3.61%	7:23<<	-1.226	-2.898**	-
(-1,0) 5.213***	30	-0.89%	-0.87%	1:29<<<	-1.187	-2.655**	-
(+1,+2)	30	-0.25%	-0.21%	16:14	-0.333	-0.630	0.265
(+2,+5) 3.021**	30	-1.31%	-1.38%	7:23<<	-1.238	-2.979**	-
(+6,+30)	30	0.45%	0.50%	13:17	0.168	0.429	-0.830

The symbols \$, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or >) etc. correspond. to \$, * and show the direction and significance of a generic one-tail generalized sign test.

Table 2: Feb 25th, 2020: CDC announcement

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2)	30	-0.87%	-0.69%	11:19(-0.335	-0.584	-1.542\$
(-1,0)	30	-1.44%	-1.47%	7:23<<	-2.112*	-4.758***	-
(+1,+2)	30	-1.38%	-1.44%	5:25<<<	-2.029*	-4.669***	-
(+2,+5)	30	-1.03%	-1.13%	12:18	-1.066	-2.586**	-1.177
(+6,+30)	30	10.73%	10.41%	25:5>>>	4.452***	9.541***	3.571***

The symbols \$,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or > etc. correspond. to \$,* and show the direction and significance of a generic one-tail generalized sign test.

Table 3: March 11th, 2020: WHO announces Covid 19 as pandemic.

Market Model Abnormal Returns, Equally Weighted Index

Generalized Days Sign Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	
(-30,-2) 0.443	30	-0.15%	-0.40%	14:16	-0.064	-0.351	-
(-1,0) 2.479**	30	1.72%	1.96%	22:8>>	2.820**	6.568***	
(+1,+2) 2.844**	30	3.67%	3.89%	23:7>>	6.009***	13.057***	
(+2,+5) 2.844**	30	9.22%	8.44%	23:7>>	10.668***	20.004***	
(+6,+30) 2.634**	30	-6.75%	-6.37%	8:22<<	-3.122***	-6.036***	-

The symbols \$,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or >), > etc. correspond. to \$,* and show the direction and significance of a generic one-tail generalized sign test.

Table 4: March 13th, 2020:White House announces Covid 19 as national emergency.

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2)	30	1.76%	1.74%	17:13	0.784	1.546\$	0.669
(-1,0)	30	3.78%	3.98%	24:6>>>	6.422***	13.445***	3.225***
(+1,+2)	30	0.76%	0.33%	17:13	1.296\$	1.102	0.669
(+2,+5)	30	-1.69%	-2.24%	14:16	-2.032*	-5.347***	-0.427
(+6,+30)	30	0.08%	0.39%	16:14	0.039	0.368	0.304

The symbols \$,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or >) etc. correspond. to \$,* and show the direction and significance of a generic one-tail generalized sign test.

Table 5: Dec 11th, 2020, FDA announces EUA for Vaccine 1

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2)	30	-3.27%	-3.54%	12:18	-0.668	-1.860*	-0.953
(-1,0)	30	-0.52%	-0.51%	3:27<<<	-0.406	-1.012	-
4.240***							
(+1,+2)	30	-0.46%	-0.38%	12:18	-0.359	-0.755	-0.953
(+2,+5)	30	-1.03%	-0.87%	10:20<	-0.565	-1.235	-
1.683*							
(+6,+30)	30	-6.87%	-7.15%	6:24<<<	-1.512\$	-4.044***	-
3.144***							

The symbols \$,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or > etc. correspond. to \$,* and show the direction and significance of a generic one-tail generalized sign test.

Table 6: Dec 18th, 2020, FDA announces EUA for Vaccine 2

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2) 3.512***	30	-5.92%	-6.21%	5:25<<<	-1.184	-3.236***	-
(-1,0) 1.686*	30	-0.72%	-0.63%	10:20<	-0.550	-1.251	-
(+1,+2) 3.147***	30	-1.11%	-1.09%	6:24<<<	-0.845	-2.162*	-
(+2,+5) 2.782**	30	-0.91%	-0.82%	7:23<<	-0.491	-1.150	-
(+6,+30) 4.608***	30	-9.15%	-9.60%	2:28<<<	-1.971*	-5.384***	-

The symbols \$, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or >) etc. correspond to \$, * and show the direction and significance of a generic one-tail generalized sign test.

Table 7: March 1st, 2021, FDA announces EUA for Vaccine 3

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2) 2.584**	29	-5.02%	-5.23%	7:22<<	-0.994	-2.603**	-
(-1,0) 2.212*	29	-1.23%	-1.26%	8:21<	-0.927	-2.390**	-
(+1,+2)	29	1.23%	1.23%	20:9>	0.930	2.334**	2.247*
(+3,+20)	29	8.09%	7.96%	25:4>>>	2.032*	5.024***	4.106***

The symbols \$,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or >) etc. correspond. to \$,* and show the direction and significance of a generic one-tail generalized sign test.

Table 8: July 13th, 2022, FDA announces EUA for Vaccine 4

Market Model Abnormal Returns, Equally Weighted Index

Days Z	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Portfolio Time-Series (CDA) t	Uncorrected Patell Z	Generalized Sign
(-30,-2) 2.459**	30	-4.81%	-4.84%	8:22<<	-1.466\$	-3.328***	-
(-1,0) 3.189***	30	-0.99%	-0.99%	6:24<<<	-1.153	-2.601**	-
(+1,+2)	30	1.17%	1.18%	23:7>>	1.361\$	3.093***	3.019**
(+3,+20)	30	-1.05%	-0.85%	16:14	-0.407	-0.744	0.463

The symbols \$,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001. levels, respectively, using a generic one-tail test. The symbols (< or >) etc. correspond. to \$,* and show the direction and significance of a generic one-tail generalized sign test.

RESULTS

Table 1 in the first panel presents the result of Dec 31st announcements of WHO that a virus of significance has been found in Wuhan, China. Since this was a very preliminary stage of the Covid 19, we didn't expect this announcement to have any significant negative impact on stock markets. Our results show a very small -0.89% statistically significant return in the (-0,1) window which is our interval of interest as "0" is the day of the announcement and +1 is the immediate day after the announcement. Tables 2 and 3 measuring the immediate after effect of the CDC announcement and the WHO announcement show a significant negative 1.44% and a significant negative 1.72% return in the same window. Surprisingly, the White House announcement immediately after the WHO announcement on March 13th shows a positive 3.78% return in that same event window. This result is a little bit surprising.

Tables 5,6,7 and 8 deal with the immediate impact of FDA public announcements on emergency use authorization of the various vaccines that were under trial. Surprisingly we see negative 0.52% abnormal return in table 5 pertaining to the EUA of the first vaccine, negative 0.72% abnormal return in table 6 pertaining to the second vaccine, negative 1.23% abnormal return for table 7 pertaining to the third vaccine EUA announcement and finally negative 0.99% abnormal return for table 8 pertaining to the 4th vaccine. All these are either mildly or strongly statistically significant.

EXPLANATION AND CONCLUSION

We started this research under the assumption that public announcements of significance move markets as investors normally tend to react positively to good news and negatively to bad news. Positive reaction usually translates to a higher demand and buying spree in the market and a negative reaction leads to selling. Covid 19 has been the most significant event in recent history after perhaps the Second World War. It has resulted in huge losses in lives, layoffs, small businesses filing for bankruptcy etc. It took the entire world by storm and turned everything upside down. We chose four announcement dates pertaining to the onset of Covid and it being declared as a pandemic. We also chose four dates when the Food and Drug Administration (FDA) publicly announced the emergency use authorization of 4 different vaccines under trial at that time. These last four announcements were assumed to have a positive short-term impact on the financial markets. Our results don't show that. One explanation could be the build up to these positive vaccine EUA announcements took the element of surprise out of the picture as investors already expected these EUAs to come at some point. FDA and the entire medical research community had been extremely vigilant and kept the entire world UpToDate with news on the vaccine trials etc. The other explanation could be that instead of looking at EUA announcements we ought to look at the official FDA announcements on full successful availability of these vaccines.

In conclusion, this was a great exercise in asking the question whether negative Covid announcements move markets to which we found to some extent it does. In response to the vaccine EUA announcements, we did not get satisfactory results unfortunately. More research may be needed in this direction with different dates and a different market index like the S&P 500 which is a much broader index comprising of 500 big companies rather than the Dow Jones Industrial Average which is comprising only 30 companies.

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AN INVESTIGATION OF INTERPERSONAL AND EMOTIONAL INTELLIGENCE COMPETENCIES FOR EARLY-CAREER INSURANCE PROFESSIONALS ACROSS MUTUAL INSURANCE COMPANIES

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ABSTRACT

A problem exists between employers and individuals they seek to hire with non-technical skills, adding value and leadership to their companies. These skills are hard to define and identify when interviewing candidates. The researcher further defined, clarified, and explored interpersonal and emotional intelligence competencies among early-career insurance professionals. Goleman's research on emotional intelligence in the workforce provides a theoretical framework for this study (Goleman, 1998). Goleman's research determined that emotional intelligent employees consistently outperformed their more intelligent coworkers, lacking in emotional intelligence (Goleman, 1998). A review of literature surrounding the early stages and benefits of emotional intelligence followed by emotional intelligence in leaders and the insurance industry will be shared. The research was conducted through semi-structured interviews with 16 insurance executives and two focus groups consisting of five insurance executives in the mutual insurance industry. These executives were selected and volunteered from Pennsylvania mutual insurance companies. Interviews were transcribed and coded to find recurring themes. This research benefits employers in their hiring practices and in identifying insurance professionals for leadership and promotion opportunities.

BEGINNINGS OF EMOTIONAL INTELLIGENCE

Emotional intelligence is a term appearing around 1990 (Caruso, Bhalerao, & Karve, 2016; Seal et al., 2006; Zeidner, Matthews, & Roberts, 2004). Two psychologists, Mayer and Salovey are credited with coining the term emotional intelligence into a comprehensive theory (Chopra & Kanji, 2010; Mayer, Caruso, & Salovey, 1999; Seal et al., 2006). Their initial definition involved regulating and controlling one's emotions and using feelings to guide thoughts and actions (Goleman, 1998; Mayer & Salovey, 1993).

While the term emotional intelligence is attributed to modern society, the concept is seen in writings by Aristotle, the classic Greek philosopher during the Classical period in Ancient Greece. His definition of emotional intelligence before the term existed was "to be angry with the right person, to the right degree, at the right time for the right purpose, and in the right way" (Goleman, 2006, p. xiii). Goleman (2006) also wrote that Aristotle conceptualized the art of emotional skillfulness as a desired character. Erasmus, the Dutch Renaissance humanist, believed in the importance of education, especially emotionally literacy and the socio-economic benefits of education (Goleman, 2006). Emotional intelligence has been defined as the "interconnection between feeling and thinking process" (Chopra & Kanji, 2010, p. 972). Zigler (1998), even as far back as 20 years ago, wrote that emotional literacy is beneficial for an individual's character and catapults them in their life in areas of promotion.

This competitive advantage is seen in leaders of organization, as well (Wallace & Rijamampianina, 2005). Chief executive officers (CEO) will delineate themselves as superior along with their company when they exhibit and practice emotional intelligence and soft skills (Wallace & Rijamampianina, 2005). When an organization's leader demonstrates emotional maturity, the strategic culture innovates and changes to satisfy the demands of the health and growth of an organization (Wallace & Rijamampianina, 2005). As a result, a company profits (Wallace & Rijamampianina, 2005).

The U.S. spends approximately \$1.5 trillion (11% of GDP) on human capital development (Carnevale & Smith, 2013). This expenditure includes elementary and secondary schools, as well as colleges and universities. The human capital development comprises formal and informal training, such as internships and job shadowing. Employer-based training is also involved in this statistic (Carnevale & Smith, 2013). Carnevale and Smith (2013) displays in Table 2-1 the top four knowledge competencies, and Table 2-2 shows the top 12 skills competencies respected in the U.S. economy.

Table 2-1. Top Four Knowledge Competencies

Skills	Description
Customer and Personal Service	Works well with patrons, communicating effectively

Skills	Description
English language	Good working command of grammar and writing skills
	Understanding of analytical concepts
Mathematics	Communicates in a respectful and clear manner
Computers and Electronics	

Note: Adapted from Carnevale, A. P., & Smith, N. (2013).

Table 2-2. Top 12 Skills Competencies

Skills
Active listening
Critical thinking
Speaking
Reading comprehension
Monitoring
Coordination
Social perceptiveness
Judgment and decision making
Writing
Time management
Complex problem solving
Active learning

Note: Adapted from Carnevale & Smith (2013).

To fully understand emotional intelligence, it is important to understand what it is not. Emotional intelligence is not simply being nice. Rather it means to control one’s emotions so individuals can work together to complete projects and promote positive organization development (Goleman, 1998). It means confronting conflicts and individuals in sharing truths in a controlled manner to solve problems and resolve conflicts (Goleman, 1998).

The perception that women are smarter than men in the field of emotional intelligence is a common myth about these skills (Goleman, 1998). Each individual has their own personal strengths and weaknesses (Goleman, 1998). However, it was found that women are more aware of their own emotions, showing more empathy to people, and are more proficient in interpersonal skills (Goleman, 1998). Men were found to be more self-confident and adapting easier to stress (Goleman, 1998). The final misconception is the amount of emotional intelligence is not determined genetically, nor is it cultivated solely in early childhood (Goleman, 1998).

To understand emotional intelligence and the benefits at an advanced level, it is important to understand each part separately. Emotions are “brief, organized sets of responses that optimize how individuals address the challenges and exploit the opportunities that arise in the events that one encounters” (Côté, 2014, p. 461). Emotions help individuals handle circumstances in an appropriate manner. “Intelligence is typically defined as ability or capacity” (Côté, 2014, p. 460). Intelligence usually is involved in solving complex problems (Mayer et al., 1999).

Self-awareness is the first component in emotional intelligence (Goleman, 1998). Self-awareness is not a new concept. Since it is a complex and difficult principle to grasp and perfect, a person needs to constantly be evolving in this important aspect of one’s life. Goleman (1998) argues that emotional intelligence may be more essential than intellectual intelligence or IQ with business professionals. It is thought that some professionals who are highly intelligent cannot grasp the concepts of everyday business tasks and cannot connect with their employees, thinking that they are superior to everyone. These individuals with a high IQ do not listen to others and supersede their ideas over everyone, missing valuable insights and ideas of others.

The next step in becoming more self-aware, is reflection and introspection. As an individual reflects on oneself and internalizes their past experiences and feelings, one is better able to face challenges head on instead of brushing them aside. As these individuals develop into leaders and become more transparent, their vulnerability will evolve into a trusting individual, capable of healthy, human connections with others with whom they work (George, 2015). Self-awareness is not complete without accepting oneself. As one becomes more self-aware, the ability to know what one believes and seeing oneself clearly improves. Centering shields one from being hurt by past mistakes or circumstances and confidently facing fears to follow one's dreams and passions (George, 2015).

Individuals who are self-aware, are also confident and comfortable with themselves (George, 2015; Wheeler, 2016). Self-awareness was shown to be one of the most important aspects of emotional intelligence among business professionals in a New Zealand study (Gill, Ramsey, & Leberman, 2015). Self-aware individuals understand themselves, know their strengths and weaknesses, use their strengths to improve their environments, and surround themselves with strong people in their weak characteristics.

As one grows in self-awareness, they do not waste time chasing external motivations, but can control their fears, regulate their emotions, and avoid impulsive reactions when feeling threatened or fearful. As leaders and professionals grow in their emotional intelligence, they can focus on their job at hand and be a more productive leader rather than wasting time on their insecurities.

BENEFITS OF EMOTIONAL INTELLIGENCE

At present, emotional intelligence has gained respect and is close to being on the level of standard or general intelligence (Caruso et al., 2016; Seal et al., 2006; Shipley, Jackson, & Segrest, 2010). Bradberry and Greaves (2019) claimed that the higher the emotional intelligence, the more successful people are in their workplaces and life, in general.

Emotional intelligence has been shown in recent studies to be an important psychological term to be considered in the current education curriculum in secondary and higher education institutions (Cherniss, Extein, Goleman, & Weissberg, 2006; Ellis, Kislring, & Hackworth, 2014; Seal et al., 2006; Yan et al., 2018). There is considerable evidence of a positive relationship between emotional intelligence and success in the workplace (Abraham, 1999; Cherniss et al., 2006; Downey, Roberts, & Stough, 2011; Seal et al., 2006; Shipley et al., 2010; Suifan, Abdallah, & Sweis, 2015; Zeidner et al., 2004). There is a positive relationship between job stress and job performance with emotional intelligence as the variable (Yozgat, Yurtkoru, & Bilginoğlu, 2013).

Measuring emotional intelligence is extremely important in the selection process of quality individuals in the business industry (Shipley et al., 2010). Chopra and Kanji (2010) sought to quantify and measure emotional intelligence through modelling. For this research, these measures will not be examined because it is not related to the research purpose.

A large part of emotional intelligence is controlling emotions (Kunnanatt, 2004; Mayer & Salovey, 1993). One of Steve Jobs' crowning attributes was his control of emotions (Côté, 2014). He was able to understand and grasp his customers' needs and wants better than his competitors (Côté, 2014). This positive characteristic made him successful in making technology that suited the general public. The information technology industry desires individuals who possess emotional intelligence (Hendon, Powell, & Wimmer, 2017). Individuals will be productive in teamwork and relationship building to benefit one's organization (Hendon et al., 2017).

Individuals who have high emotional intelligence have been proven to be placed in leadership and higher management positions (Prati et al., 2003; Edelman & van Knippenberg, 2018). Emotional intelligence contains certain behaviors such as self-awareness and regulation, emotional control, charismatic, effective team member, decision making, creativity, and personal efficacy (Prati et al., 2003). Several studies found that a higher measure of emotional intelligence distinguished high potential managers from average or regular managers (Dries & Pepermans, 2007; Langhorn, 2004).

In recent years, the business world has implemented teamwork to accomplish projects which has increased organization effectiveness and culture, especially in service organizations such as the insurance industry (Othman & Abdullah, 2012). Emotional intelligence has a huge impact on the value of the teams. As team members are more emotionally intelligent, they bring emotional maturity to the teams to solve problems and complete projects successfully to the benefit of an organization (Othman & Abdullah, 2012).

The top competencies listed in employment advertisements are shown in Table 2-3.

Table 2-3. Top Six Skills Listed in Advertisement Classifications

Attribute	Description
Human relations	Demonstrates interpersonal skills within the whole organization
Team player	Works well within groups of individuals with relevant and positive contributions
Self-learner	Initiates new concepts and self-development
Expressive	Communicates in a respectful and clear manner
Independent	Works effectively with little direction
Service oriented	Displays good listening skills with empathy for customers

Note: Table taken from Lavy & Yadin (2013). Soft Skills – An important key for employability in the “shift to a service driven economy” era.

Goleman shares in Table 2-4 the top competencies wanted by employers in their new hires.

Table 2-4. Top Skills Required by Employers

Skills
Listening and verbal communication
Adaptability and creative responses to setbacks and obstacles
Personal management, confidence, motivation to work toward goals, a sense of wanting to develop one’s career and take pride in accomplishments
Group and interpersonal skills, cooperativeness and teamwork, skills at conflict resolution
Effectiveness in the organization, wanting to make a contribution, leadership potential.

Note: Adapted from Goleman (1998).

Goleman’s adaption of the emotional intelligence definition includes five social and emotional competencies of self-awareness, self-regulation, motivation, empathy, and social skills (Goleman, 1998; Wheeler, 2016). Self-awareness is understanding one’s present feelings and using that to monitor one’s actions and thoughts specifically in decision making (Zeidner et al., 2004). Self-awareness also includes assessing one’s abilities and being confident in oneself (Goleman, 2006). Mindfulness has emerged as a practice which guides an individual to becoming more self-aware.

Self-regulation controls an individual’s emotions in helping undertakings as opposed to obstructing progress. Self-regulation embraces delayed gratification while achieving ambitions, and handling times of trauma with ease and acceptance (Goleman, 1998; Zeidner et al., 2004).

Motivation involves using one’s desires to persevere in pursuing goals even when setbacks occur. There is a constant desire to improve and presence of initiative (Goleman, 1998; Zeidner et al., 2004). Empathy is a keen sense of understanding people’s feelings and mindsets. One who has empathy can put themselves in another person’s context to support and show kindness. This achieves rapport and understanding of diversity which is extremely important in today’s society (Goleman, 1998).

Social skills are seen in people who can adapt smoothly in adverse situations, negotiating and persuading to a compromising, successful solution. Individuals who have good social skills can interact with diverse populations.

They can also network well and be attuned to many different social situations. They are excellent team members (Goleman, 1998).

Gladwell (2008) studied many successful people and groups of people from all walks of life to uncover their secret to their success. In his investigation, he set out to prove that successful people did not come from nothing; that there was something that contributed to their success (Gladwell, 2008). He concluded that an IQ of a human being does not determine their success (Gladwell, 2008). Success is achieved by a combination of opportunity, circumstances, and one's social skills (Gladwell, 2008).

Côté (2014), divided emotional intelligence into five branches. The first branch is The Perceiving and Expressing Emotions. This branch covers how an individual expresses their emotions, identifying and detecting the onslaught of these emotions. This branch is important in an employee in an organization who can accurately anticipate reactions to certain situations within an organization. This branch is seen in their own individual emotions as well as others in their work environment.

The second branch is The Using Emotions Branch (Côté, 2014). This branch helps employees solve problems effectively using possible risks and creativity. Individuals who harness their emotions and use them to critically think and think of solutions and bring innovation to a company are invaluable.

The third branch is The Understanding Emotions Branch. Persons who encompass this branch can accurately identify future problematic emotionally charged events and be able to combat them intelligently. This branch conversely causes people to look back at past events with the correct emotion giving credence to the people affected (Côté, 2014).

The fourth branch is The Regulating Emotions Branch which is basically self-explanatory through its name (Côté, 2014). These individuals control their emotions strategically (Côté, 2014). This concept means that they can increase, decrease, or keep constant their emotions. They can assess if their current emotions need to be adjusted.

Individuals who collectively have these traits in each branch are integral to the success of an organization. According to a 2015 research project by Burning Glass Technologies, Baseline Skills across occupation groups are organized strategically as they show their importance in the business world. Baseline skills encompass the characteristics seen in Figure 2-1. In this research, there are six different clusters of skills, which are defined and categorized succinctly. Note that these skills include more than the typical soft skills. Most business schools require a Business Communications course which covers many of these skills.

See Figure 2, below.

Figure 2-1. Baseline Skill Requirement Across Job Families (Burning Glass Technologies, 2015)

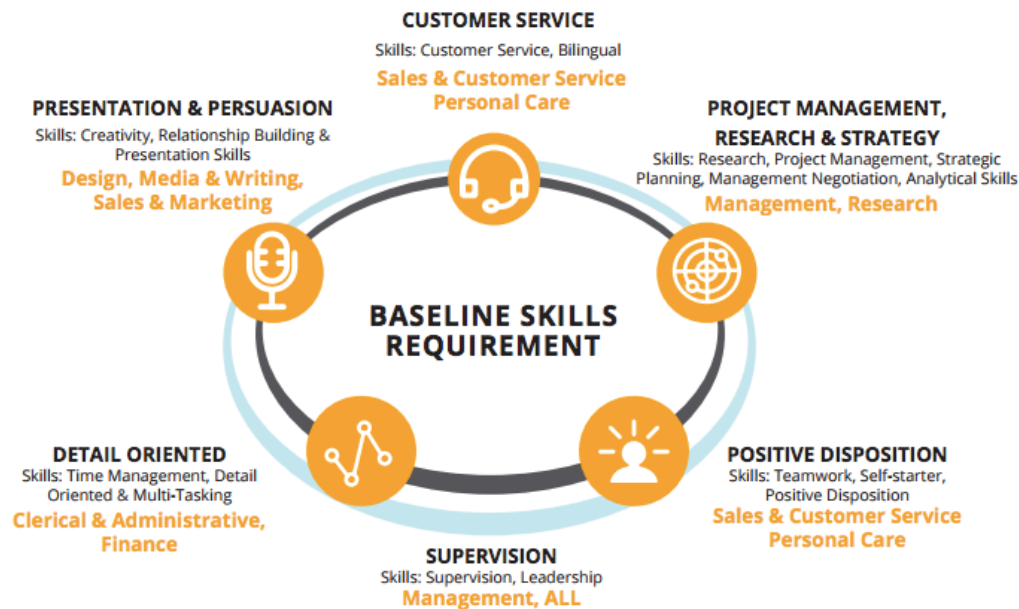


Figure 2-1. Baseline Skill Requirement Across Job Families (Burning Glass Technologies, 2015)

The Presentation and Persuasion cluster includes presentation skills, otherwise known as platform skills. Presenting in a persuasive way, maintaining eye contact, connecting with the audience, and clearly communicating the goals of the topic, are key components of competent presentation skills. These skills are used in marketing, sales, arts, and creative areas.

The Customer Service cluster is seen in the financial industry, especially financial planning and retail banking. Personal care is a main component of this cluster as seen in the healthcare industry.

The Attention to Detail Cluster includes time management skills, multi-tasking, and attention to detail. The finance industry, especially accounting and auditing, require these traits. All clerical, administrative, hospitality, sales, and retail banking positions demand these competencies. Knowing a second language is an advantage to the individual in this sector.

Newport’s (2016) book, *Deep Work*, shares practical and specific ways to manage one’s time successfully. As a tenure-track professor in his early career, he was able to publish a multitude of quality, peer-reviewed articles using the techniques he shared in his book. Time management, without distractions, was key for him to successfully receive tenure in a short amount of time while managing a young family.

The Positive Disposition cluster is seen in positions dealing with the public such as sales, healthcare, and customer service. As employees learn how to effectively connect with the customers and public, long-term bonds occur benefiting the organization. A positive disposition is necessary in any organization, helping the organization’s culture (Burning Glass Technologies, 2015).

Project Management, research, and strategy is an integral cluster and require unique talents that integrate negotiation and analytical skills. Project management, in this study, had the largest skills gap out of all of the clusters. Project management skills encompass strategic and research planning, as well (Burning Glass Technologies, 2015). These skills in particular really pinpoint and set apart employees who will advance in their career into upper-level management positions and those who will not.

The Supervisory Skill cluster is another group that has a skills gap particularly in the finance industry (Burning Glass Technologies, 2015). This cluster involves leadership, supervisor, and management skills.

EMOTIONAL INTELLIGENCE IN LEADERS

Emotional intelligence can be developed in business professionals in leadership positions (Edelman & van Knippenberg, 2018; Groves, McEnrue, & Shen, 2008; Kermis & Kermis, 2010). Emotional intelligence can be a learned behavior and continues to mature as one’s life experiences develop (Groves et al., 2008). In today’s business culture, the demand for quick response and extreme flexibility is greater than it has ever been, which has created the need for leaders who have the skills to lead businesses to new heights of effectiveness and success. Leadership qualities include emotional competencies and self-confidence (Anand & UdayaSuriyan, 2010; Edelman & van Knippenberg, 2018; Kunnanatt, 2004).

Anand and UdayaSuriyan (2010) completed specific research analyzing the relationship of leadership practices and emotional intelligence. They concluded that the success of leaders directly correlates to their level of emotional intelligence. They, along with other similar research showed from their highest findings that emotional intelligence has a positive effect on modeling the leadership skills for business employees and improving their behavior and problem solving, self-awareness, flexibility, empathy, and stress management have a significant effect on leadership skills (Anand & UdayaSuriyan, 2010; Chopra & Kanji, 2010; Downey et al., 2011; Edelman & van Knippenberg, 2018; Greenockle, 2010; Riggio & Lee, 2007; Wallace & Rijamampianina, 2005).

For example, a contemporary leader of our time is Rudolph Giuliani. He, as mayor of New York City during 9/11, showed unprecedented leadership tenacity in leading the country during one of the worst nightmares in U.S. history. His thoughts on what competencies he used during this time were astounding. Many of these competencies are the interpersonal or soft skills afore mentioned. He shared that it is essential for leaders to suppress and control their emotions in times of extreme stress (Giuliani, 2002). Preparing relentlessly was another key component he emphasized in his book during the tragedy of 9/11. His quick decisions within minutes after the first strike of 9/11, had lasting ramifications of saving countless lives and showing poise under pressure kept New York City and the financial industry from total ruin.

Exploring the relationship between emotional intelligence and transformational leadership, 60 managers were surveyed using a leadership questionnaire and an emotional intelligence inventory (Barling, Slater, & Kelloway, 2000). In leadership research theory, there has emerged two types of leadership: charismatic and transformational leadership.

Charismatic leadership is a model that is visionary and used in crisis-based scenarios. Transformational leadership is more of a leader-follower model and was used in this specific research (Barling et al., 2000). Traits of transformational leadership were positively associated with emotional intelligence in this research (Barling et al., 2000). Transformational leadership in this particular study is defined as “idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration” (Barling et al., 2000, p. 157). As George (2015) revealed in his book, True North, one important aspect of a leader in the professional world is self-awareness. Figure 2-2 below shows that self-awareness is at the center.

Figure 2-2. Personal development of a true leader George (2015).

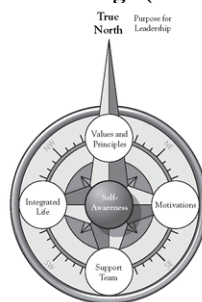


Figure 2-2. Personal development of a true leader George (2015).

This research will attempt to further define these skills in understandable language which employers can further quantify, and university professors may use to interlace into their curriculum.

EMOTIONAL INTELLIGENCE IN THE INSURANCE INDUSTRY

Insurance research in the field of emotional intelligence and interpersonal competencies is scarce. The insurance industry is a service industry. It is a little-known gem that many college business graduates do not understand and are not aware of the strengths. The insurance industry is a stable industry because in low economic times, individuals and companies still need insurance. The United States is ranked number one in the world in the insurance industry ahead of China and the United Kingdom (UK Commission for Employment and Skills, 2014).

The insurance industry is summarized by the following:

Insurance, including reinsurance, is an integral part of the economy, performing a variety of important functions. Not only do insurers provide financial security and peace of mind to households and businesses, but they are a vital source of long-term capital, providing stability to financial markets and the overall economy. Insurance is a necessary precondition for many economic activities that would not—or could not—take place otherwise. Without the guarantee of insurance (and reinsurance), most businesses could not operate as they do today, and construction projects could not go forward. Most consumers would not be perceived as good credit risks and could not borrow money from lending institutions. Indeed, the list of contributions made by the insurance industry is extensive, benefiting all aspects of the U.S. and global economy. (“A firm foundation: How insurance supports the economy,” n.d. p. 1)

The insurance industry lends itself to interacting with customers on a daily basis. Several research studies have shown that there is a strong correlation between emotional intelligence and job performance, specifically in the area of self-management and self-awareness (Chan et al., 2015). Emotional intelligence brings the top performing professionals to the top compared to average performers (Chan et al., 2015).

With over two million jobs in the insurance industry, this study shows that there is a dire need for more collaboration between the insurance industry and higher education institutions to increase readiness of college graduates for the workforce in the insurance industry, especially in the area of verbal and listening proficiencies, as well as ethics (Cassidy, Marshall, & Hollman, 1998; Carvalho, & Rabechini, 2015). As these verbal and listening proficiencies are refined and perfected, the workforce will be a prosperous place. Employees will collaborate with their coworkers, projects will be completed well, and the interworking of the workforce will work like a well-oiled machine.

Property and casualty mutual insurance companies have a unique and rich history dating back to the 18th century with the establishment of The Philadelphia Contributorship by Benjamin Franklin and his fellow firefighters. Mutual insurance companies are owned by their policyholders. Any profits from the companies are distributed to policyholders in the form of dividends or a premium reduction. The mission of a mutual insurance company is to provide insurance to its policyholders. Most of the earliest U.S. insurers were mutual insurance companies. The founding of mutual insurance companies sustained that trust beginning with Franklin’s local firefighters and Grange organizations to a unique service to mankind, where policyholders come together to share risk, knitting their companies into the fabric of their grassroots communities. The story is a 260-year-old mutual insurance industry rich in history.

The insurance industry is a large part of the financial sector. Finance research shares a number of studies that link emotional intelligence with success in the managerial positions in the finance industry (Rana & North, 2007; Tsai, Tsai, & Wang, 2011; Yozgat, Yurtkoru, & Bilginoğlu, 2013). Emotional stability is a byproduct of emotional intelligence in finance research (Rana & North, 2007). The banking industry, a foundational part of the financial sector plays an integral part in the temperature of the economy (Tsai et al., 2011). As the economy experiences highs and lows the industry’s workplace and workforce experience high levels of stress. Workplaces in finance are not for the weak and feeble employee.

CHAPTER SUMMARY

This chapter reviewed the literature to provide a foundational background for this research. A methodology of the literature review was shared to establish credibility for the research and future publications. Literature concerning the

beginnings of emotional intelligence were examined followed by the research surrounding the benefits of emotional intelligence and interpersonal competencies in the workforce to support the conceptual framework for the study. There was little research concerning interpersonal competencies in the business workforce, therefore emotional intelligence was investigated in successful leaders and professionals in the business and insurance industry.

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COMPARATIVE ANALYSIS OF HEALTHY WORKPLACE CONCEPT

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ABSTRACT

The development of a healthy and safe workplace protects employees from workplace bullying. Employers have a responsibility to maintain a safe workplace environment. An offensive work environment needs to be considered in light of reports of workplace bullying. Currently, bullying does not constitute a violation of anti-discrimination laws. According to a United States District Court decision in the Eastern District of New York, the civil claim of alleged workplace bullying was dismissed because the victim failed to demonstrate that the bullying was motivated by discriminatory intent. Several states have introduced workplace bullying legislation that would enable victims to claim abusive work environment without demonstrating discrimination. The interpretation of these statutory provisions by employers may present uncertainty because of recent court decisions and a multitude of scenarios. Prior research to examine the variances in the provisions associated with healthy workplace legislation within the United States has been limited. To address this gap in the literature, this paper will examine healthy workplace legislative trends including abusive work environment, civility policies, reporting mechanisms, intervention training protocol, anti-bullying policies, immunity provisions, complaint procedures and prevention policies.

COMPARATIVE ANALYSIS OF HEALTHY WORKPLACE CONCEPT

This paper presents a literature review and critique of a specific aspect of healthy workplace legislation to understand the employment relations trends. Under existing federal law in accordance with the Civil Rights Act of 1964, employers are expected to address discrimination in the workplace and workplace harassment. The employee has a right to be treated with dignity and respect. In addition to federal regulations that are enforced by the United States Equal Employment Opportunity Commission and the Department of Labor, state and local laws also address the rights of employees to safe and healthy terms and conditions of employment in the workplace environment. States, county governments and municipalities have promulgated healthy workplace protocol measures as a tool to protect public and private employees. However, the applicable laws lack uniformity in stipulating the assignment of the responsibilities to prevent abusive workplace conduct. This study evaluates the various state statutes, county and municipal codes and summarizes the similarities and differences of the anti-bullying laws that have been adopted. This paper attempts to examine important aspects of current legislation that enables employers and employees to function in a safe and healthy workplace environment. In addition, the paper investigates further provisions to expand the healthy workplace model to enable broader protections for employees and benefits for employers.

Existing Regulatory Framework

The approach to workplace conduct differs in two dimensions, including healthy workplace and anti-bullying provisions. In order to review the healthy workplace or anti-bullying models, this paper reviews the relevant regulatory provisions in various jurisdictions, involving state, county and municipal standards. In addition, many jurisdictions imply these principles but require other elements along more traditional lines that are linked to discriminatory harassment, intentional infliction of emotional distress, defamation, intentional assault, or tortious interference with an employment relationship. Since the scope of the healthy workplace or anti-bullying models differ among the jurisdictions, for purposes of this investigation the paper will survey and critique the legislation specifically dealing with abusive conduct in the workplace.

Civil Rights Act of 1964

In a relevant part of Title VII of the Civil Rights Act of 1964, it is an unlawful employment practice for an employer to discriminate against an individual with respect to their compensation, terms, conditions, or privileges of employment because of the individual's race, color, religion, sex, or national origin (42 USC 2000e-2(a)(1)). The U.S. Equal Employment Opportunity Commission website indicates that harassment is a form of employment discrimination in violation of Title VII. If an employer knows of misconduct and fails to take corrective action, the employer may be responsible for acts of discriminatory harassment between the employees (29CFR 1604.11d). Court cases have recognized that an abusive working environment and workplace harassment may constitute prohibited discrimination under Title VII.

Center for Disease Control and Prevention

The National Institute for Occupational Safety and Health conducts frequent research on methods to promote productive workplaces (NIOSH). One aspect of interest involves workplace violence between worker-on-worker relationships. According to the findings of the Institute, this type of violence commonly occurs as verbal and emotional abuse which involves unfair, offensive, vindictive, humiliating, or bullying behavior. NIOSH defines bullying as repeated, unwanted harmful actions that are intended to humiliate, offend, harm, undermine or degrade another. According to NIOSH research, the consequences of repeated bullying leads to physical and psychological damage to the person. Examples of bullying are hostile remarks, verbal attacks, threats, taunts, intimidation, and lack of support.

Colorado Chamber of Commerce Guidance

In June 2023, Colorado enacted a law that is entitled the Protecting Opportunities and Workers' Rights Act (SB23-172). The legislation protects Colorado workers against discriminatory employment practices or unfair employment practices. These practices include unwelcome conduct directed at an individual in a protected class. According to the law, the conduct of the offender is no longer required to be severe or pervasive to constitute a discriminatory practice. Workplace bullying is not specifically mentioned in the law. The Colorado Chamber of Commerce spokesperson expressed an interesting viewpoint. The Colorado Chamber of Commerce was committed to seeking a compromise legislative bill that balanced the interests of the employers and employees but avoided creating a more litigious workplace environment (Birkeland, B., 2023). The law specifically excludes behavior that is considered "petty slights, minor annoyances, and lack of good manners" (SB23-172).

Prior Recourse to Judicial Intervention

Victims of offensive workplace behavior have advanced various approaches to address abusive working conditions. To seek redress, an employee may assert a discriminatory harassment claim under Title VII of the Civil Rights Act of 1964, intentional acts of assault, intentional infliction of emotional distress, or tortious interference with an employment relationship. Cases have raised the question whether workplace harassment violates Title VII of the Civil Rights Act. According to the EEOC Guidelines, sexual harassment is a form of sex discrimination prohibited by Title VII (29 CFR 1604.11a). Courts may entertain an employment discrimination action against the employer under Title VII of the Civil Rights Act of 1964 for sexual harassment created by an abusive working environment.

In determining the applicability of the federal statute, the Supreme Court of the United States addressed the necessary threshold for demonstrating inappropriate behavior. The Supreme Court considered the social context and the social impact of workplace behavior in harassment cases. Only behavior that was "so objectively offensive" as to alter the conditions of the victim's employment was considered prohibited sexual harassment (*Oncale v Sundowner Offshore Services*). Conduct violated Title VII where the workplace was permeated with "discriminatory intimidation, ridicule, and insult" that was "sufficiently severe or pervasive" to alter the conditions of employment, creating an abusive working environment (*Harris v Forklift System, Inc.*).

The Supreme Court of the United States found an employer vicariously liable for the conduct of a supervisor that abused his supervisory authority (*Faragher v City of Boca Raton*). Although definitive rules have been limited, the Supreme Court required the offensive conduct to be "extreme" for a harassment claim.

According to the facts, in the case *Herrera V City of Baldwin Park* (2023 Cal. App. Unpub. LEXIS 2939), a police officer submitted an internal complaint with his department alleging bullying, harassment, and violence toward him. After an internal investigation, the police department found that the allegations of misconduct were unsubstantiated. Regarding the workplace bullying incident, the officer claimed that another officer "cursed, berated, screamed, ridiculed, yelled and was discourteous, disrespectful, and unprofessional" toward him. However, the initial department complaint never mentioned sexual harassment. Thereafter, the officer filed another internal complaint alleging gender-based harassment. After a right-to-sue letter was issued, the officer filed a lawsuit against the city. At the civil trial, the Court granted summary judgment in favor of the city because the egregious conduct did not rise to the level for a sexual harassment claim.

The United States District Court for the Eastern District of New York dismissed a claim by a former flight attendant for workplace bullying (*Daniels v American Airlines Inc.*). The employee asserted that “members of the management team bullied him, disabled his company email accounts, and withheld his work-based duties.” The victim did not cite any statutory authority for the allegations of workplace bullying and hostile work environment. The Court ruled that to establish a hostile work environment, the person must demonstrate that the conduct occurred because of the employee’s membership in a protected class. Because there was no generalized remedy prohibiting workplace bullying, the mere incidence of workplace bullying was not enough to support a hostile work environment claim.

Various jurisdictions have reviewed claims referring to workplace bullying. An expert on workplace bullying was permitted to testify in a civil trial on behalf of an employee alleging an assault in the workplace setting (*Raess v Doescher*). According to the targeted individual, the aggressor had become angry, yelled and walked toward him with “balled fists”. The behavior caused him to think he would be hit by the aggressor. At trial, a “workplace bullying” expert expressed the opinion that the altercation was an episode of workplace bullying and that the aggressor was a workplace abuser. The Court of Appeals ruled that the testimony of the expert at trial was unfairly prejudicial and reversed the jury verdict (*Raess v Doescher*).

On further review, the Supreme Court of Indiana awarded compensatory damages to the injured party for the alleged assault involving the verbal altercation. The other claims for intentional infliction of emotional distress and intentional interference with the employment relationship were unsuccessful. The court found that the behavior of the aggressor was very much an issue in the case. Furthermore, a reference to the phrase of workplace bullying as a general term by the injured party was entirely appropriate to characterize the behavior of the aggressor (*Raess v Doescher*).

In a case involving a claim for intentional infliction of emotional distress, the Minnesota Appeals Court reviewed the evidence to explain the conduct of the parties and upheld the lower court finding (*Kearney v Orthopaedic & Fracture Clinic*). At the district court trial, the former employee described the conduct of his colleagues at work prior to his termination. The employee experienced bullying and ostracism consisting of “isolating behavior, insensitive comments, and hostile and unpleasant conversations.” According to the ruling, in order to prove the claim, all of the elements of intentional infliction of emotional distress must be demonstrated. The district court dismissed the claim because the conduct was not extreme and outrageous. Even though the employment relationship was strained, the behavior was not outrageous or atrocious.

The trial court also excluded the proposed testimony from a psychologist who was regarded as an expert on workplace bullying. The judge observed that workplace bullying was commonplace and not a new or novel concept. Therefore, the court recognized that an expert opinion was unnecessary because a trier of fact would understand that an individual may experience extreme and physical ramifications from workplace bullying.

In alleging defamation, the employee also claimed that the employer damaged his reputation by making a false statement in a report to the Labor Department and defamed him by banning him from flight duty. According to New York case law, defamation exposes a person to public hatred, shame, ridicule, contempt, degradation, or disgrace (*Daniels v American Airlines Inc.*). The Court determined that the written report by the employer was privileged communication and could not be the basis for a libel suit.

The issue of workplace bullying was alleged in a case before the United States District Court for the Southern District of Texas (*Devalentino v Houston Indep. Sch. Dist.*). The former employee, an Assessment Administrator asserted that the supervisor “fabricated information, scolded her for sending an unapproved email, chastised her for attending a training program and denied part of her requested vacation time.” The supervisor had issued a memorandum regarding a failure to timely complete tasks and failure to follow instruction with specific directives for improvement. The employee disputed the appraisal and filed a Workplace Bullying Complaint. The Court noted that there was no allegation that bullying was based on her race. The Court determined that the employer had a legitimate, nonretaliatory reason to terminate the employee’s employment.

COMPARISON OF HEALTHY WORKPLACE AND ANTI-BULLYING CONCEPTS

Legislative bodies have promulgated measures that address the topic of abusive conduct in the workplace setting in different ways. The various approaches involve harassment behavior, a healthy and safe workplace environment, anti-bullying behavior, abusive conduct, and harassment training. These alternative approaches have a few common denominators. An ordinance may also apply a combined approach addressing both anti-bullying measures and the promotion of a healthy and safe environment.

Features of the Healthy Workplace and Anti-bullying Concept Legislation

Numerous abusive conduct laws have been enacted by states, counties, and municipalities to establish standards and regulate employment practices in order to protect the health and safety of employees and to ensure that the employees understand the workplace expectations. Abusive conduct may cause serious negative employment outcomes. Therefore, several county and municipal legislative bodies have intervened and enacted laws to regulate the implementation of these preventive practices. The healthy workplace statutes and local ordinances have many similarities and unique specific provisions. In this paper, the statutory distinctions for public and private organizations are documented for comparative analysis and interpretation.

Policy Purpose

Most legislative bills contain a general-purpose clause. The conduct policy of the Westmont Village Ordinance (62-82) is to treat all employees with courtesy and respect. The stated purpose of the Warner Robins Ordinance (2-7) is to promote and maintain a healthy working environment where individuals are treated with civility and respect. The objective of the Eagle Pass Ordinance (2-31) is to provide a healthy, safe, and respectful work environment. The purpose of the Godfrey Ordinance (2-238) is to promote a healthy workplace culture that enables employees to work in an environment free of bullying behavior. The Utah Statute (67-26-201) indicates the purpose of the legislation is to provide and maintain a work environment free from abusive conduct. According to the California Statute (12950.1), employers are required to include the prevention of abusive conduct as a component of their training and education programs.

According to the Carlyle City Ordinance (22-10-1), the anti-bullying policy promotes productivity and a safe work environment. The Winnebago County Ordinance (62-25) strives to maintain a working environment that fosters mutual employee respect and promotes harmony and productivity. The Effingham County Ordinance (2-425.20.1) seeks to allow all employees to work in an environment free of bullying.

Definition of Abusive Conduct

The definition of abusive conduct varies among the different jurisdictions. The statutory provisions demonstrate the workplace bullying issue from the aspect of a healthy workplace environment. The Utah Statute (67-26-102) addresses abusive conduct rather than bullying. The Utah Public Employees Healthy Workplace Act defines abusive conduct as verbal, nonverbal or physical conduct. According to the California Statute (12950.1), abusive conduct includes offensive verbal or physical conduct. The Tennessee Healthy Workplace Act considers abusive conduct to be verbal, nonverbal, or physical acts (Tennessee Statute (50-1-502)).

Other local laws tend to specifically address the traits of workplace bullying. The Godfrey Ordinance (2-238) and Carlyle City Ordinance (22-10-2) encompass physical or verbal acts of bullying behavior. According to the Winnebago County Ordinance (62-25), bullying includes physical or verbal acts or otherwise. The Westmont Village Ordinance (62-82) addresses inappropriate behavior conducted by a person.

Illustrative Examples

The statutes and ordinances describe various examples of offensive behavior. According to the Tennessee Statute (50-1-502), abusive behavior may include derogatory remarks, insults, and epithets. The Carlyle City Ordinance (22-10-2) illustrates various types of behavior. The list encompasses harassment, threats, intimidation, stalking, physical violence, sexual harassment, sexual violence, pushing, shoving, kicking, poking, tripping, assaults, public humiliation, destruction of property and retaliation.

The Winnebago County Ordinance (62-25) contains a comprehensive listing of the types of workplace bullying behavior. The details include categories of verbal communication, manipulating the work environment, and psychological manipulation. The Warner Robins Ordinance (2-7) and the Westmont Village Ordinance (62-82) describe verbal, physical, gesture or exclusion types of behavior as examples of bullying. The Godfrey Ordinance (2-238) provides an extensive variety of unacceptable behavior that may constitute workplace bullying. Some examples include staring, glaring or other non-verbal demonstrations of hostility. Other behaviors, such as micro-managing, ignoring or interrupting an employee or excessive monitoring are also mentioned. The Eagle Pass Ordinance (2-31) also encompasses mobbing that entails collective unjustified accusations, humiliation, general harassment, or emotional abuse.

Levels of Abuse

The statutes and ordinances impose a threshold regarding the intensity of unprofessional behavior. According to the Tennessee Statute (50-1-502) and Utah Statute (67-26-102), the magnitude of abusive conduct is based on the severity, the nature, or the frequency of the behavior. To constitute abusive conduct involving a single act, the California Statute (12950.1) requires the evidence to demonstrate severe and egregious behavior. The Winnebago County Ordinance (62-25), the Godfrey Ordinance (2-238), and the Carlyle City Ordinance (22-10-2) describe the conduct of workplace bullying to be severe or pervasive mistreatment.

Causative Factors

The standard for the interpretation of harm varies by jurisdiction. To demonstrate abusive conduct under the Utah Statute (67-26-201), the behavior causes the employee to experience intimidation, humiliation, or unwarranted distress. According to the Tennessee Statute (50-1-502) and California Statute (12950.1), a reasonable person would consider the abusive conduct to be threatening, intimidating, or humiliating. The acts may also result in gratuitous sabotage or undermining of a person's work performance. According to the Carlyle City Ordinance (22-10-2), the effect of bullying places the employee in reasonable fear of personal harm. According to the Effingham County Ordinance (2-425.20.1), the Warner Robins Ordinance (2-7), the Godfrey Ordinance (2-238), and Winnebago County Ordinance (62-25), the act of bullying harms, intimidates, offends, degrades, or humiliates an employee. The Eagle Pass Ordinance (2-31) describes bullying that demeans, intimidates, or humiliates others.

Substantiality Criteria

The burden of proof element varies among the jurisdictions. The victim is required to demonstrate substantial physical or psychological harm as a result of abusive conduct (Utah Statute (67-26-102)). The Carlyle City Ordinance (22-10-2) has a substantiality threshold whereby the conduct has a detrimental effect on the victim's physical or mental health, interferes with their productivity, or their ability to participate in employer opportunities. The Effingham County Ordinance (2-425.20.1) requires the victim to prove unreasonable actions by the abuser. According to the Godfrey Ordinance (2-238), the reviewer needs to determine that the conduct reflects what a reasonable person would find to be hostile, offensive, or unrelated to the legitimate business interests of the employer.

Intentionality Element

The frame of mind of the perpetrator is interpreted differently by the various jurisdictions. According to the Utah Statute (67-26-102), the victim of abusive conduct is required to show that the perpetrator intentionally acted and exploited a known physical or psychological disability of the victim. The California Statute (12950.1) indicates that degree of malice is a requisite for a claim of abusive conduct. The Carlyle City Ordinance (22-10-2) considers whether bullying reflects intentional or unintentional acts. According to the Winnebago County Ordinance (62-25) and the Godfrey Ordinance (2-238), the behavior of the bully must be malicious. According to the Westmont Village Ordinance (62-82), the bullying may be intentional or unintentional acts. However, the ordinance clarifies that the intention of the alleged bully is irrelevant. The statement implies that the determination is viewed from the effect of the behavior upon the victim that is more important. The Eagle Pass Ordinance (2-31) addresses unreasonable behavior as a form of bullying regardless of intent. Acts of violence or threats are considered serious. The intent of the abuser is irrelevant even if the comment was made in a joking or harmless manner or while angry.

Repetitive Behavior Element

The number of required bullying encounters varies among the laws. The Utah Statute (67-26-102) requires the victim to demonstrate multiple episodes of abusive conduct, meaning more than a single act. However, if abusive conduct is especially severe and egregious, then the repetitive behavior activity is not necessary. In the Tennessee Statute (50-1-502) and California Statute (12950.1), the victim needs to show repeated acts of abusive conduct. According to the Warner Robins Ordinance (2-7), the Godfrey Ordinance (2-238), and the Winnebago County Ordinance (62-25), the bullying behavior must be persistent. The Effingham County Ordinance (2-425.20.1) and the Westmont Village Ordinance (62-82) require the victim to disclose repeated actions of bullying. Although the Eagle Pass Ordinance (2-31) addresses bullying behavior that is persistent and part of a pattern, the law also considers a single incident as a form of bullying.

Competent Evidence Threshold

The evidentiary standard of proof is limited and is referenced in two of the laws. In order to establish physical or psychological harm, the Utah Statute (67-26-102) requires the victim of abusive conduct to offer competent evidence. According to the Eagle Pass Ordinance (2-31), the context of the alleged incident is important in understanding bullying, particularly any verbal communication.

Consequences of Bullying

The laws provide examples of the detrimental effect of bad behavior in the workplace. According to the Tennessee Statute (50-1-502), the abusive conduct may be emotionally distressing or could interfere with the performance of the employee's duties.

As stated in the Carlyle City Ordinance (22-10-1), workplace bullying is linked to absenteeism, drug and alcohol use and sexual violence. According to the Effingham County Ordinance (2-425.20.1), workplace bullying contributes to the loss of talented employees, reduced productivity, impacts morale and creates legal risks.

Application of Policy

The range of impacted stakeholders varies among the statutes. According to the Carlyle City Ordinance (22-10-1) and the Winnebago County Ordinance (62-25), the policy applies to employees, contractors, and volunteers. The Godfrey Ordinance (2-238) indicates that independent contractors run the risk of contract cancellation for noncompliance with the law. In the Tennessee Statute (50-1-502), the law applies to private employers and the state or local governmental entities.

Zero Tolerance

The local laws prescribe that employers maintain a zero-tolerance policy against bullying. The Winnebago County Ordinance (62-25), the Warner Robins Ordinance (2-7), the Westmont Village Ordinance (62-82), the Eagle Pass Ordinance (2-31), the Godfrey Ordinance (2-238), and the Effingham County Ordinance (2-425.20.1) consider workplace bullying to be unacceptable and have established a zero-tolerance policy against bullying under any circumstances.

Discriminatory Acts

Bullying concerns may be linked with discriminatory acts toward others. The Carlyle City Ordinance (22-10-3) prohibits bullying based on actual discrimination characteristics of the victim in all places of employment.

Circumstances of Prohibited Acts

The laws address the context in which abusive conduct occurs. According to the Tennessee Statute (50-1-502) and California Statute (12950.1), abusive conduct must occur in the workplace setting. The Carlyle City Ordinance (22-10-3) forbids bullying during any employment activity on the employer's property, at an employer-sponsored or employer-sanctioned activity. In addition, bullying protection extends to the transmission of information by electronic

means. According to the Westmont Village Ordinance (62-82), the Godfrey Ordinance (2-238), and the Winnebago County Ordinance (62-25), the incidents can occur at the place of work or in the course of employment. Furthermore, the Winnebago policy extends to any work-related setting outside the workplace, including a business trip, professional conferences, business meetings and business-related social events. The scope of the Eagle Pass Ordinance (2-31) encompasses normal working hours, work-related or sponsored functions, and while traveling on work-related business.

Non-Consensual Recipient

The laws consider the actions of the respective parties. According to the Warner Robins Ordinance (2-7) and the Winnebago County Ordinance (62-25), the behavior reflects an unwelcome mistreatment of the victim. The Eagle Pass Ordinance (2-31) and the Godfrey Ordinance (2-238) expect the behavior to be unwelcome by the victim.

Prevention Standard

Employers are expressly required to institute measures to prevent workplace misconduct. The Carlyle City Ordinance (22-10-3) mandates that the employer prevents bullying in the workplace. According to the Winnebago County Ordinance (62-25), employees are expected to refrain from encouraging bullying, report bullying acts to a supervisor, and encourage victims to report acts to a supervisor. The Utah Statute (67-26-301) requires the Division of Human Resource Management to provide biennial abusive conduct training. The purpose of the program is to educate state employees and supervisors of the manner to prevent abusive workplace conduct. The Tennessee Statute (50-1-503) appoints an advisory commission with the responsibility to create a model policy to address abusive conduct in the workplace.

Abusive Conduct Training

The statutes tend to place emphasis on abusive conduct training. The Utah Statute (67-26-301) requires the Division of Human Resource Management to develop and implement a training module. The law intends to provide employees with information on various topics including trust building, motivation, communication, conflict resolution, accountability, coaching, leadership, and ethics. The educational content needs to inform employees of the types of behavior that constitute abusive conduct, the ramifications of abusive conduct, and the actual abusive conduct complaint process. Employers are also expected to provide information on the resources available to employees experiencing abusive conduct. According to the California Statute (12950.1), employers are expected to include information on the prevention of abusive conduct in the mandatory training and education program. The Illinois Human Rights Act (Ill. Comp. Stat. 101-0221) requires an employer to provide sexual harassment prevention training to employees on an annual basis.

Employee Responsibilities

A minority of the laws prescribe responsibilities for employees. According to the Winnebago County Ordinance (62-25), an employee that witnesses bullying is expected to act directly and firmly with the offending person and their supervisor. The Eagle Pass Ordinance (2-31) establishes a general duty and responsibility for all employees to promptly report an incident of bullying.

Supervisory Role

The responsibilities of the employer are prescribed in the laws. The Winnebago County Ordinance (62-25) outlines specific responsibilities for supervisors. These duties include monitoring the work environment, stopping observed acts of bullying, and assisting victims of bullying incidents. A supervisor is expected to advise their department head, human resources department or the attorney's office of possible bullying. According to the Eagle Pass Ordinance (2-31), department heads and supervisors are directed to provide leadership and role modeling in appropriate professional behavior. Management is expected to make employees aware of the anti-bullying policy, respond to all situations of alleged bullying and deal with bullying incidents.

Reporting Initiative

A minority of the laws set forth reporting procedures. The Carlyle City Ordinance (22-10-5) encourages employees to report any instance of bullying behavior so that steps may be taken to intervene and resolve actual or perceived incidents of bullying. The Warner Robins Ordinance (2-7) directs an employee to report bullying incidents to the human resources office. Similarly, the Winnebago County Ordinance (62-25) urges employees to report incidents of bullying to protect the employee from further bullying, to allow rapid action, and to initiate investigatory measures.

Reporting Time Frame

The laws lack clear guidance regarding the time frame for reporting an incident. The Winnebago County Ordinance (62-25) does not prescribe a fixed reporting period. The other laws omit specific reporting time limitations. The Godfrey Ordinance (2-238) specifically indicates that no fixed reporting period has been established.

Complaint Procedure and Documentation

The laws address the need for proper documentation of an incident. Under the provisions of Utah Statute (67-26-102), the employee is permitted to file a written complaint of abusive conduct with the human resources department. The Carlyle City Ordinance (22-10-5) outlines the steps for victims to report their complaints or concerns. The notice may be made verbally or in writing to their supervisor or the City Attorney. According to the Effingham County Ordinance (2-425.20.1) and the Eagle Pass Ordinance (2-31) victims are encouraged to promptly report offending behavior to their supervisor or department head. The employee has the option to file a formal or informal complaint alleging bullying as well as the filing of a grievance. The Winnebago County Ordinance (62-25) expects the employee to document the facts surrounding each incident together with any notes, emails, telephone messages or memos.

Assertive Option

Laws acknowledge the opportunity for assertive victims to express their objections to misconduct. Under the Carlyle City Ordinance (22-10-5), the Godfrey Ordinance (2-238), and the Winnebago County Ordinance (62-25), the victim is not precluded from advising the offender directly and firmly of the unwelcome behavior and requesting that the behavior be discontinued. The Eagle Pass Ordinance (2-31) permits employees to speak directly to the alleged bully and object to their behavior. However, the ordinance cautions that the victim should not respond in kind to a threat or hostile treatment except to legitimately defend oneself.

Alternative Notice Provision

Victims can bypass the traditional chain of command for reporting incidents in some jurisdictions. Under impractical circumstances, the Winnebago County Ordinance (62-25) affords the employee the opportunity to bypass their immediate supervisor and report the behavior directly to the human resources department or the legal department. Similarly, the Carlyle City Ordinance (22-10-5) permits the individual to bring the matter to the attention of other designated city representatives.

Witness Reporting Responsibilities

Witnesses are encouraged to report incidents. When the bullying is not directed at a witness, the Winnebago County Ordinance (62-25) encourages the witness to use the reporting procedure. However, the witness is not required to directly confront the bullying. In addition, the failure of a witness to report known bullying may result in discipline or termination. According to the Effingham County Ordinance (2-425.20.1), the witness is expected to report the bullying incident to their immediate supervisor.

Complaint Investigations

Several laws provide guidance for investigating bullying complaints. Under the Winnebago County Ordinance (62-25), the supervisor is expected to investigate the employee complaint and document the details and nature of the incident. The inquiry is expected to be conducted in a responsible and confidential manner. Employees are expected to cooperate and provide truthful information during the investigation. Following the investigation, the supervisor

completes a report with a conclusion and any remedial recommendations, including training, counseling, and/or disciplinary action. In the event an employee files a written complaint, the Utah Statute (67-26-202) requires the human resources department to conduct an abusive conduct investigation.

According to the Effingham County Ordinance (2-425.20.1), the department head is required to report the complaint to the administrator in order to conduct a thorough investigation. The Eagle Pass Ordinance (2-31) directs the human resources department to undertake an investigation of the allegations. The Warner Robins Ordinance (2-7) provides comprehensive guidelines for the disposition of reports of bullying. The human resources office is required to convene a three-member panel to hear the evidence of bullying and make a recommendation. The guidelines afford the complainant and the accused and other witnesses to appear before the panel. Then, the panel determines the validity of the complaint. If the complaint is affirmed, the employee's supervisor is notified to take appropriate disciplinary action. The Godfrey Ordinance (2-238) encourages employees to formally report instances of bullying behavior. However, the law is nonspecific on the manner for investigating an incident.

Violation Sanctions

Many of the laws contain provisions to discipline perpetrators for bullying infringements. The Winnebago County Ordinance (62-25), the Eagle Pass Ordinance (2-31), the Godfrey Ordinance (2-238), and the Carlyle City Ordinance (22-10-4) address sanctions for workplace bullying including disciplinary action up to and including immediate discharge. In addition, a violation of the law by a contractor may subject the contractor to the cancellation of a contract with the agency. According to the Effingham County Ordinance (2-425.20.1), a violation of the law subjects the employee to corrective action including termination.

False Accusations

The laws in two of the jurisdictions address episodes involving fabricated bullying claims. The Carlyle City Ordinance (22-10-4) provides consequences for any person knowingly making a false accusation of bullying up to and including immediate discharge. According to the Winnebago County Ordinance (62-25), a person making a complaint in bad faith or filing false or frivolous charges is subject to severe gross misconduct and disciplinary action. Although the Eagle Pass Ordinance (2-31) advises that care should be exercised, the policy considers that the reporting of possible bullying behavior is better than letting actual bullying go unreported.

Retaliation Safeguards

A majority of the laws consider psychological safeguard provisions and subject violators to retaliation sanctions. The Tennessee Statute (50-1-503) directs an advisory commission to draft a model policy for employers that contains a provision to prevent retaliation against any employee reporting abusive conduct in the workplace. The Carlyle City Ordinance (22-10-4) prohibits retaliation against any person who reports alleged bullying. Retaliation encompasses any form of intimidation, reprisal, or harassment. The Winnebago County Ordinance (62-25), the Godfrey Ordinance (2-238), and the Warner Robins Ordinance (2-7) prohibit retaliation against an individual participating in a claim of bullying, reporting bullying, or for filing a charge of bullying. According to the Effingham County Ordinance (2-425.20.1), the supervisor, department head or administrator are required to ensure that a person reporting a complaint is not victimized. The Eagle Pass Ordinance (2-31) prohibits retaliation against an individual making a good faith report of bullying.

In addition, the Carlyle City Ordinance (22-10-4) addresses instances where an employee retaliates against someone for reporting alleged bullying by subjecting them to disciplinary action. The Winnebago County Ordinance (62-25) subjects the individual initiating a retaliation to disciplinary action up to and including termination.

Criminal Sanctions

In two jurisdictions, the laws prescribe criminal sanctions for workplace bullying occurrences. According to the Winnebago County Ordinance (62-25), any employee that violates the workplace bullying policy may also be subject to civil and criminal penalties, fines, and other sanctions. The Godfrey Ordinance (2-238) encourages employees to formally report instances of assault, battery, or other bullying behavior of a criminal nature directly to the sheriff's department.

Administrative Oversight

Governmental oversight of workplace bullying is mentioned in three of the statutes. According to the Utah Statute (67-26-301), the Division of Human Resource Management is required to file an annual report with the Economic Development and Workforce Services Interim Committee. The report needs to provide recommendations to reduce workplace abusive conduct, the number and outcomes of abusive conduct complaints, and training activities. The Tennessee Statute (50-1-503) authorizes the appointment of an advisory commission to develop a model policy to assist employers in recognizing and responding to abusive conduct in the workplace. The Oregon Statute (165.1) directs the Bureau of Labor and Industries to prepare a model policy for employers to adopt. The policy is expected to take into consideration any existing respectful workplace policies. In addition, the bureau will create and make available informational materials that identify potential harm to employees and employers created by workplace bullying.

Employer Immunity

One statute grants immunity from civil litigation to diligent employers. The Tennessee Statute (50-1-504) encourages employers to adopt a model policy created by a state advisory commission. By adopting the model policy, the employer obtains immunity from any future litigation for abusive conduct by its employee that results in negligent or intentional infliction of mental anguish.

DISCUSSION

Federal laws or regulations do not specifically prohibit workplace bullying. Instead, some states, counties and municipalities have addressed the broader responsibility of employers to maintain the health and safety of their employees in the workplace. The protection of employees in the workplace against bullying varies among different jurisdictions. The existing statutory and regulatory framework for the antibullying process creates a dilemma for the administrative agency, the employer, and the employee. Anti-bullying legislation needs to encompass a balanced approach which takes into consideration the various perspectives of the interested parties. The statutes and codes may also incorporate a broader range of perspectives to reconcile these competing interests. A broad range of consulting services from other disciplines such as psychologists, leadership development programs, and conflict resolution advisors may intervene to address unresolved differences without the need to escalate the disputes to the courts.

Most jurisdictions in the United States focus on bullying events between two parties. However, the Eagle Pass Ordinance (2-31) considers the concept of “mobbing” that is similar in nature to the laws of the European Union countries. This broader approach addresses incidents involving the collective behavior of multiple parties to a bullying situation. According to the literature, workplace bullying seems to continue in organizations when leadership and management do not address the problem (Needham, 2003). Several of the ordinances address the need for departmental level and supervisory staff to provide leadership and role modeling behavior to discourage workplace bullying.

In the organizational context, the perpetrator may be motivated by envy and jealousy with regard to interpersonal relationships (Needham, 2003). The ordinances also address the state of mind of the perpetrator distinguishing intentional and unintentional acts. According to Needham (2003), the consequences of workplace bullying can affect the self-esteem of a person. The ordinances similarly address the detrimental effects of bad behavior on others in the workplace environment. Conversely, if an employer ignores abusive conduct, the company may be subject to accusations of favoritism and cronyism (Needham, 2003).

The concept of the employer and employee relationship is fundamental to a productive workplace environment. In the past, courts have recognized the rights of employees to be protected from unsafe working conditions. Courts have also recognized the right of employers to establish the policies and procedures for the organization. Ultimately, an employee has the option to leave an employer. Needham (2003) suggests that persons are entitled to prescribed rights. Among them are the right to be treated as an adult, to express one’s feelings and to refuse a request without feeling guilty.

The statutes and ordinances address a broad range of concerns. The Winnebago County Ordinance (62-25) is most comprehensive in scope. The Carlyle City Ordinance (22-10-3) is very extensive in prohibiting bullying on the

premises of the employer or electronically transmitted communication. The reporting of bullying incidents is encouraged in the laws, but disclosure is not mandatory. The laws vary vastly in the suggested reporting approach. The differences entail reporting to the human resources department, immediate supervisor, governmental attorney, designated representative, or non-designated recipient. The laws may provide more uniformity in the recommended reporting process.

Courts do recognize that workplace bullying occurs and has no place in the employment setting. However, courts are less likely to rule on workplace bullying behavior without a statutory basis. The pleadings for workplace bullying are usually insufficient unless a jurisdiction has put forth a specific statute to address abusive conduct. One approach for a victim to pursue is an allegation of workplace bullying that demonstrates workplace harassment in the context of a discrimination action. Again, the victim would be required to meet the applicable statutory discrimination standards. The City of Warner Robins ordinance is distinctive by addressing bullying as well as harassment behavior.

Employees have narrow protection from abusive conduct under existing legislation. Alternatively, abusive conduct may be challenged in the courts under theories of tortious interference with a contract and business relationship between the employer and the employee. An employee may raise a common law action, but the claim is required to follow recognized standards of proof. Abusive conduct is problematic and further controls are needed to address shortcomings. One of the criteria that requires more specificity is the threshold of competent evidence. If bullying occurs in a group or public forum the likelihood of witnesses raises the probability of collaborating evidence. However, in nonpublic situations, the victim is most likely at a disadvantage in establishing workplace bullying. The local ordinances in this study were unanimous in implementing a zero-tolerance approach toward workplace bullying. Although the local laws consider a zero-tolerance approach to bullying, the state statutes omit similar references.

The laws lack guidance on the procedures for documentation and content of incidents that are necessary in order to preserve an accurate written record. The prompt and safe reporting of an incident is important to establish a pattern over time. The laws encourage the reporting of incidents, but the provisions are not mandatory. Legislation may enhance reporting by enacting mandatory requirements. The laws may be expanded to cover the procedures for the proper documentation of workplace bullying to preserve a written record of the encounters.

Prevention is a critical deterrent to workplace bullying. The state statutes place an emphasis on the need for employee training as a preventive measure. Local jurisdictions may consider provisions for employee training. The employer is expected to prevent bullying in the workplace and to provide abusive conduct training to employees. Furthermore, the employer is expected to monitor the workplace setting and provide leadership and role modeling. Legislative bodies may consider incentives to encourage employers to monitor workplace behavior. The jurisdictions may propose the use of formal rewards programs to encourage a higher level of monitoring and surveillance of workplace behavior.

The laws address the responsibilities of each of the parties. Provisions require the behavior of the victim to be non-consensual. The employee is expected to act firmly, express their objections to misconduct, and promptly report incidents. Only one law contains a provision to afford the employer immunity from civil liability. The immunity does not extend to the perpetrator of the abusive conduct. Other jurisdictions may consider these protections.

IMPLICATIONS

As discussed in this paper, some jurisdictions have set forth the duties and responsibilities of employers for the review of workplace behavior. Opponents to the regulation of workplace bullying may examine the process for creating anti-bullying policies. The lack of safety and wellbeing could expose employers to potentially harmful outcomes by ignoring workplace bullying.

Another controversy questions the fairness of workplace antibullying laws. Opponents may maintain that antibullying policies may compromise fairness in the supervision and control of employee performance. Employees with lower performance evaluations may falsely claim workplace bullying as a shield. Other employees who may have received disciplinary action for unsatisfactory performance may take advantage of the antibullying provisions.

LIMITATIONS

The scope of research in this paper is limited to an analysis of state and county legislation and municipal codes concerning the regulation of workplace abusive conduct. The analysis does not address federal mandates. The research does not analyze the related state regulation of firearms or guns in workplace policies. For purposes of this research, the details of the state regulation of employee benefits, earned paid sick and safe leave time are omitted. The paper does not address other related employment relationship topics. Although matters concerning drug and alcohol testing policies come under the regulation of states, for purposes of this research these policies are not addressed. The topic of workplace violence is omitted from the discussion of workplace bullying as well as other behavior of a criminal nature.

The depth of research is further limited because of the ongoing legislative and executive activity associated with the topic of workplace bullying. The research studied a sample of state, county and municipal laws during a limited time frame ending on June 30, 2023.

FUTURE CONSIDERATIONS AND CONCLUSION

The current industry framework for defining the legal requirements of a safe workplace environment appears to be narrow and outdated. Recently, state governments have taken measures to clarify and streamline the regulatory process to secure safer working conditions. Courts will need to determine whether employers have a legal duty to monitor and curtail workplace bullying. Subject to exceptions, an employer can discipline an employee for misconduct. In most jurisdictions, the employer is permitted to terminate an employee for any reason without cause. Future research may identify the frequency of discipline for incidents of workplace bullying.

Future research may examine the merits of state antibullying laws to assure safe working conditions for employees. The justifications for state antibullying legislation should be considered. In addition, other aspects of the antibullying laws may be studied including the frequency of reported incidents, preventive measures, and corrective sanctions. The impact that antibullying laws have on the performance of employees should be considered in future research. Measures of performance require intense analysis, which is especially challenging in the private sector. Future research may examine the frequency of misconduct and statutory compliance among the various jurisdictions. The opposition position toward this proposed legislation expresses the view that antibullying statutes are unnecessary. Antibullying regulations may increase costs and create additional administrative burdens on the employer.

The minority of the laws suggest that the victim needs to speak up to the bully. This assertive situation raises the issue of the best approach for encountering the perpetrator, especially if no witnesses are present. In a public forum, the choices are more available to the victim. Conflict resolution may require a neutral third-party arbitrator.

Paramount in the decision-making process is the need to develop regulatory policies that uphold the best interests of the employer and the employee. To protect the employee, the statutes should require monitoring to avert relaxation of the antibullying doctrine. Another safeguard for inclusion in the legislation is a requirement for a second independent evaluation by an impartial tribunal if the safety of the employee is in doubt.

A major distinction exists regarding the interpretation of harm. Some jurisdictions apply the reasonable person standard to the situation. Other laws measure the extent of harm by the actual perception of the victim. The differences illustrate the weight of harm from the viewpoint of the community rather than the state of mind of the victim. Another dichotomy is the degree of injury. Some jurisdictions apply the reasonable person standard. Other jurisdictions rely on the interpretation of the victim.

The responsibility of employers for the formulation of antibullying policies should uphold the right of employees to be protected from mistreatment in the course of their employment. The employee should not have to consider another employment alternative because of an existing abusive culture. The public and private sector need to recognize the fundamental right of an employee to a healthy and safe workplace free of unjustifiable bullying. The development of antibullying laws is progressing at a slow pace with great variation in the approaches. More consistency among the legislative bodies would standardize the expectations and improve compliance for employers. Companies operating in multiple jurisdictions would be able to create more uniform policies and practices.

A more consistent approach is preferable. The state statutes describe the unwelcome encounter as abusive conduct rather than workplace bullying. On the other hand, the county and municipal jurisdictions characterize the behavior as workplace bullying. Courts have long recognized the special relationship between the employer and the employee. Statutory frameworks need to uphold the preservation of the employer-employee relationship. The abused employee should be afforded the right to make a claim for bullying in collaboration with the employer. A statute should clearly state that a state agency or regulatory board cannot usurp the authority of the employer to establish its own workplace policies and procedures.

The laws can bring to light the need for attention to abusive conduct in the workplace setting by awareness training, prevention guidelines, oversight, and intervention. Our society has championed the principles of the employer-employee relationship and the right of private enterprise. Clearly, our society should be entitled to augment these social policies with a corresponding right to maintain safe working conditions in the best interests of employees that affords them a right to a healthy workplace.

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THE TECHNOLOGICAL IMPACT OF PATENT CLASSES AND THE INNOVATION TRAJECTORIES OF FIRMS AND LOCATIONS

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ABSTRACT

The technological impact of innovations is commonly measured using forward citations linked back to individual patents, or forward citations linked to portfolios of patents at the firm level. Taking a different approach, this study calculates impact at the patent classification level, revealing the changing importance of each underlying technology category over a 40-year period. Applying the calculated class- and subclass-level impact values from each year to firm and location patent histories, the evolving impact trajectories of firms and locations can be observed and quantified to provide new insights into historical patterns of innovation.

INTRODUCTION

Understanding the nature and scope of inventive, innovative, and imitative activity within business units, firms, and geographic regions, and how these characteristics differ and change over time, is of central importance to innovation and strategic entrepreneurship research. It is generally accepted that organizations that consistently exhibit more – and more impactful – entrepreneurial behaviors should outperform their less-entrepreneurial counterparts (Ireland et al., 2003). Recent efforts to clarify these phenomena include investigations into the quality, economic value, and spillover effects of university patents (Kolympiris & Klein, 2017), the patterns and implications of the decline in upstream scientific exploration within firms and corporate labs (Arora et al., 2018), and the effects that imitative efforts by new entrants have on incumbent firm performance (Wang et al., 2019). The potential and realized economic value of these and other exploration efforts is an important factor in decision making by entrepreneurs, managers, investors, and policy makers (Arora et al., 2018).

A critical component of research in this area is the extensive set of tools and measures used to determine the level and impact of exploration, innovation, and entrepreneurship activity in individuals, firms, locations, and other focal units of analysis. Over the past several decades, numerous measures, scales, and indices have been developed from a broad range of perspectives, including simple patent counts and weighted patent counts (Griliches, 1990; Trajtenberg, 1990), patent scope (Lerner, 1994), patent impact (Rosenkopf & Nerkar, 2001), entrepreneurial orientation (Covin & Slevin, 1989; Lumpkin & Dess, 1996; Miller, 1983), and strategic entrepreneurship behaviors (Anderson et al., 2019).

While the effectiveness and limitations of using patent data have been the subject of debate for many years (Acs & Audretsch, 1989; Alcácer & Gittelman, 2006; Criscuolo et al., 2019; Gittelman, 2008; Roach & Cohen, 2012), patent and citation analysis is still widely used and accepted by scholars in entrepreneurship and innovation studies. Forward citations are a benchmark measure of the technological and commercial importance of patents. A review by Aristodemou and Tietze (2018) identifies nine particularly relevant forward citation-based measures of impact, which they categorize as either patent level or patent portfolio level measures.

This study takes a different approach and calculates a new measure of impact at multiple patent classification levels over a 40-year period, yielding two main benefits. First, by developing an aggregate yearly measure of impact that considers all patents in each particular class and subclass, the historical pattern of importance for each underlying technology can be tracked. Second, by applying the calculated yearly impact values for each class and subclass to the patent histories of firms and locations, the yearly impact and historical pattern of impact for each firm and location can be observed and quantified in a new way. New constructs and methods of measuring entrepreneurial activity and its effects are “central to the field, and central to answering the questions we ask as strategic entrepreneurship scholars” (Anderson et al., 2019, p. 200). This study contributes to the literature by developing a new method of measuring entrepreneurial activity and applying it to provide new insights into the innovation activities of locations and firms.

DATA SOURCES

Patent data for this study were obtained primarily from the United States Patent and Trademark Office PatentsView website (<https://www.uspto.gov/ip-policy/economic-research/patentsview>). Additional supporting data were obtained from the NBER Patent Data Project (Hall et al., 2001), the NBER U.S. Patent Citations Data File, Compustat, EDGAR, and individual firm websites.

Patent classes used in this study are based on the Cooperative Patent Classification (CPC) system (<https://www.cooperativepatentclassification.org>), a joint endeavor between the European Patent Office (EPO) and the USPTO. The CPC defines patent classifications at multiple levels of granularity, as articulated in the USPTO PatentsView bulk downloads data dictionary for the “*cpc_current*” table. Table 1 illustrates these distinct levels of patent classification. The full Cooperative Patent Classification code set and details are available at <https://www.uspto.gov/web/patents/classification/cpc/html/cpc.html>.

Table 1: Example of the multi-level patent classification coding in the CPC system		
<i>A patent that is assigned a full CPC classification code of “A61B 3/00” comprises the following four levels of specificity:</i>		
Class Code	Data Element Name	Class Description
A	<i>section_id</i>	Human Necessities
A61	<i>subsection_id; “class”</i>	Medical or Veterinary Science; Hygiene
A61B	<i>group_id; “subclass”</i>	Diagnosis; Surgery; Identification
A61B 3/00	<i>subgroup_id</i>	Apparatus for testing the eyes; instruments for examining the

Within the CPC coding system, many *subgroup_id* classifications have even further subclassifications. For example, within *subgroup_id* “A61B 3/00” there are currently 11 additional subclassifications, including “A61B 3/0008” which indicates “Apparatus for testing the eyes; Instruments for examining the eyes - provided with illuminating means”. Calculating impact at this extreme level of granularity was not pursued in the present study. The top CPC classification level, *section_id*, with only nine distinct classes (e.g. “A – Human Necessities”) was deemed too generalized to provide meaningful insights for this study, and was excluded from further consideration. Similarly, *subgroup_id* was deemed too specific and was also excluded. Covering the years 1975-2014, the final dataset for the class and subclass impact calculations included 125 unique class codes and 4,982 class-year combinations for *subsection_id*, and 653 unique subclass codes and 24,733 subclass-year combinations for *group_id*.

Over 6.8 million issued patents and over 21.6 million citation pairs from 1975 to 2019 were analyzed. Patents and citation pairs from years 2015 to 2019 were included to capture forward citations within five years for the cited patents issued through 2014. Further analysis and processing of the data produced the impact values at two levels of granularity, corresponding to the CPC classifications outlined in Table 1 (*subsection_id* and *group_id*, henceforth referred to as “class” and “subclass”, respectively). For the remainder of this paper, the discussion is focused primarily on the *group_id* or “subclass” level only, but the methodology described can be applied to all classification levels. Unless specified, the term “class” is used to indicate both class and subclass levels.

HOW CLASS AND SUBCLASS IMPACT VALUES ARE CALCULATED

The impact values for each class and subclass were created by combining and cross referencing elements of multiple files from the USPTO PatentsView website, the NBER Patent Data Project (Hall et al., 2001), and the NBER U.S. Patent Citations Data file that separately contain data for each patent including assignee(s), application and grant dates, patent class assignments, and citation pairs. Unless noted, patent application (filing) dates were used in all calculations.

Following prior research, steps were taken to address the inherent “noisiness” and limitations of patent and citation data. For example, because each patent can be assigned multiple CPC classes which would improperly inflate the counts of cited and citing patents in each class, fractional patents were calculated based on the number of classes

assigned to each patent (Rosenkopf & Nerkar, 2001). In addition, time limits on forward citations are commonly used to improve the calculation of impact and avoid truncation bias from citations that continue to be received at a nondeclining rate (Hall et al., 2005). Accordingly, forward citations were limited to those within five years of the cited patent application year. Consistent with prior studies (e.g. Miller et al., 2007; Rosenkopf & Nerkar, 2001), self-citations were also excluded from the impact calculations.

In many prior studies, the technological impact of individual patents has been measured by the number of forward citations a focal patent receives compared to other patents in the same period (Ahuja & Lampert, 2001; Argyres & Silverman, 2004; Kolympiris & Klein, 2017; Onal Vural et al., 2013; Rosenkopf & Nerkar, 2001; Trajtenberg, 1990). To calculate impact at the class level, the single-patent impact logic is extended to identify in each year the total number of patents issued in each class, and the total number of forward citations associated with the patents issued in each class. Following the single-patent approach to measure impact used in prior studies (Ahuja & Lampert, 2001; Rosenkopf & Nerkar, 2001), the ratio of all fractional forward citations to all fractional patents issued in each class was calculated to be the total impact value for each class in each year.

To standardize the calculated impact values which have different ranges each year, all impact values were assigned to one of ten mutually exclusive bins that evenly divide the impact range of each year into equal intervals, or “buckets”. Each patent class then was assigned (based on its impact value) to its corresponding impact bucket in each year over the 1975–2014 period, with the impact bucket “1” containing the most impactful patent classes (with the highest ratios of forward citations to issued patents), and the impact bucket “10” containing the least impactful patent classes (with the lowest ratios of forward citations to issued patents). The aggregation of patent class, year, and impact bucket data for all years and classes provides the full impact summary list, an excerpt of which is shown in Table 2. Figures 1(a) and 1(b) depict a graphical application of this data.

Table 2: Selected impact summary data (1975–2014)
*This summary includes the number of patents issued (full and fractional), 5-year forward citations, calculated impact, and the impact bucket for each CPC patent subclass and year.
The impact buckets range from 1 (“most impact”) to 10 (“least impact”).*

CPC Subclass	Year	Patents Issued (full)	Patents Issued (fractional)	Forward Cites (fractional)	Impact (FC/Patents)	Impact Bucket
A63B	2002	1,627	1,316.58	1,688.80	1.283	7
A63B	2003	1,640	1,338.17	1,695.90	1.267	6
A63B	2004	1,578	1,288.20	1,647.20	1.279	5
A63B	2005	1,450	1,177.65	2,069.87	1.758	3
A63B	2006	1,320	1,066.75	1,774.53	1.663	3
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B41J	2003	2,528	1,988.58	3,267.00	1.643	5
B41J	2004	2,704	2,117.13	3,064.83	1.448	4
B41J	2005	2,700	2,133.33	1,977.48	0.927	6
B41J	2006	2,512	2,041.23	1,663.52	0.815	6
B41J	2007	2,514	2,010.70	1,539.22	0.766	7

APPLICATIONS OF THE CLASS AND SUBCLASS IMPACT VALUES

The comprehensive, standardized listing of yearly impact values and buckets for each patent class from 1975 to 2014 can be combined with other patent details and used to better understand multiple areas of interest to innovation and strategic management scholars. These include the evolving impact of technologies, firms’ exploration strategies and outcomes, and geographic comparisons of innovativeness over time.

The Evolving Impact of Technologies

The impact values can be used to track the emergence of technologies represented by each patent class and their changing impact over time. To illustrate, the increasing and decreasing impact of multiple patent classes are depicted in the figures below.

Since the 1980s, the class of patents representing inventions and innovations in physical training, gymnastics, and related fitness equipment (Class A63B: Figure 1(a)) experienced an upward trend in calculated impact, i.e. the ratio of forward citations to issued patents. Not surprisingly, over the same period the class of patents representing inventions and innovations in typewriters and other less-advanced printing devices (Class B41J: Figure 1(b)) experienced a decline in impact on subsequent innovations, as newer technologies (e.g. personal computers, word processing, and laser printers) emerged and became widely adopted (Danneels, 2011).

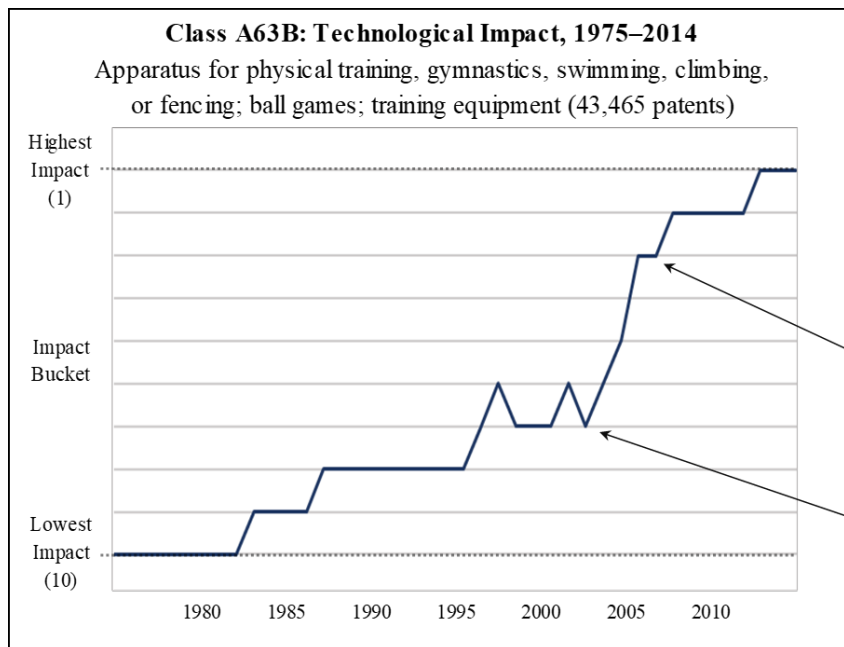


Figure 1(a):

Data points on these graphs correspond to the calculated impact bucket for the class in each year (see [Table 2](#) above).

For example, in 2006 the calculated impact bucket for class A63B is "3", i.e. the "3rd highest impact group" of that year.

In 2002 the calculated impact bucket for class A63B is "7".

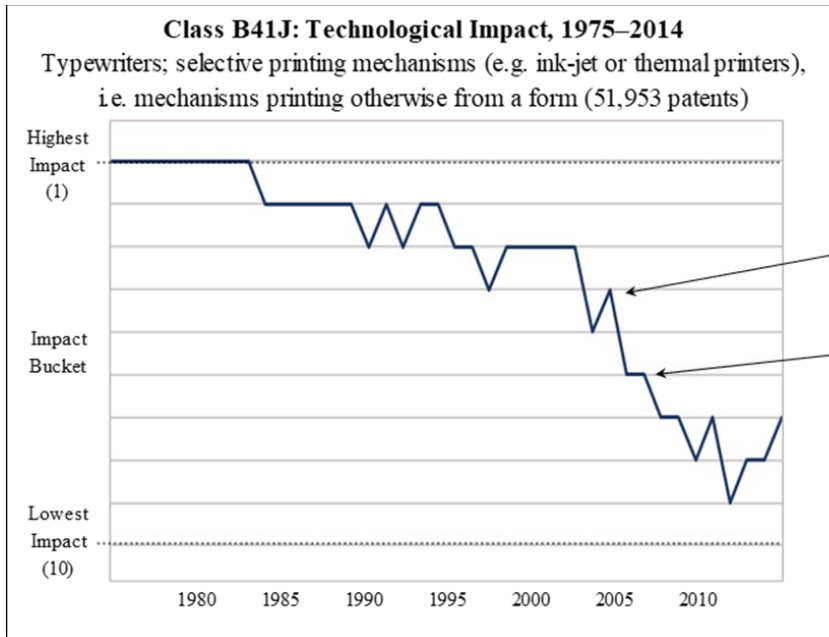
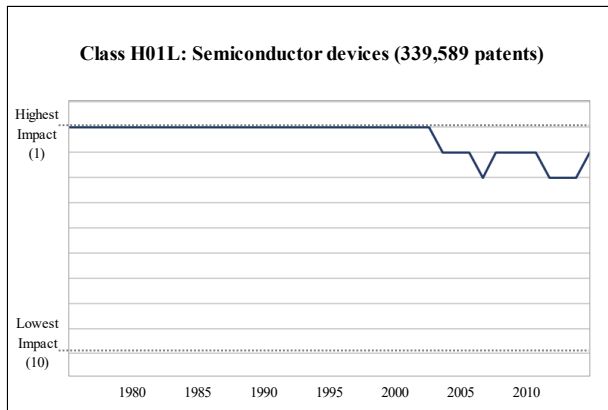


Figure 1(b):
 (from Table 2 above)

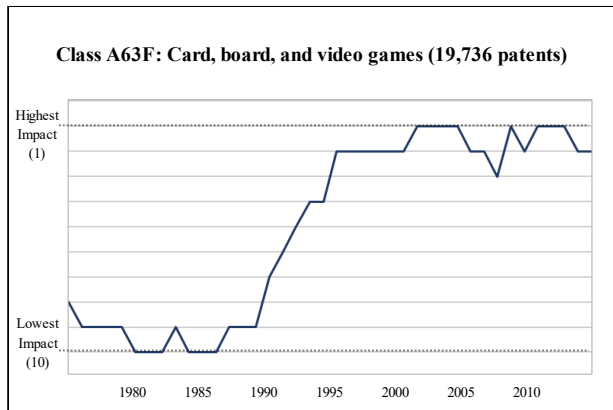
In 2004, the calculated impact bucket for class B41J is "4".

In 2006, the calculated impact bucket for class B41J is "6".

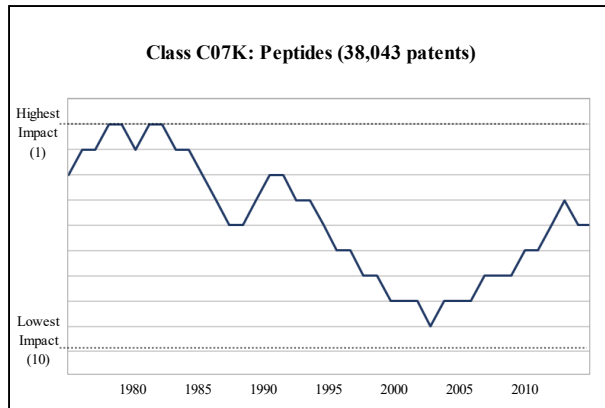
As shown in Figures 2(a) – 2(d), the calculated class impact values reveal the changing and steady states of technological impact related to innovations and industries that are both well-known in the business press and academic literature (e.g. semiconductors and video games), and less well-known (e.g. peptides and grinding machines).



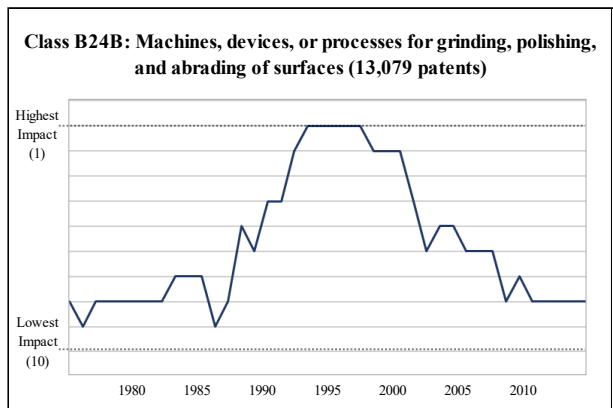
2(a)



2(b)



2(c)



2(d)

Firms' Strategies for Innovation

In addition to tracking the evolving impact of individual technologies, the class impact values can be used to identify and measure differences in exploration strategies and compare the results of R&D investments and innovation outcomes among firms, and within firms over time. To demonstrate this, the calculated impact level or “bucket” of each patent class in each year was assigned to every patent in the PatentsView database. All patents associated with each firm and class were then grouped and summarized, and the proportion of fractional patents in each impact bucket (out of the firm’s total patent count) for each year was calculated and graphed.

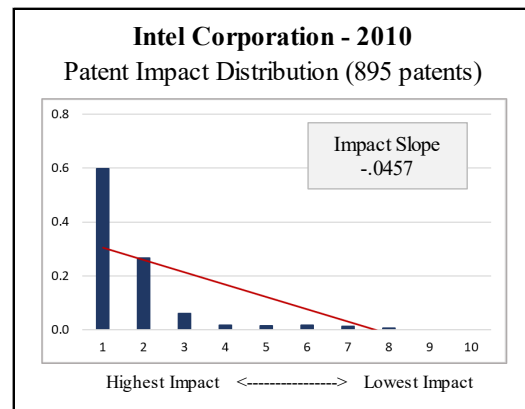
The result of this analysis method provides a visually intuitive bar graph (Figures 3(a) – 3(c)) that shows the proportions of a firm’s total patents across the impact scale in each year, in classes that range from having the most downstream impact (bucket = 1) to the least downstream impact (bucket = 10). Adding a fitted line to the range of values provides a single measure (the impact slope) that captures the unique underlying “shape” and distribution of the firm’s patenting impact for that year. The impact slope value is a standardized firm-year measurement that can be used to describe and compare a firm’s overall innovation activity or outcomes, and can be used as an independent, dependent, or control variable in further analyses.

In Figures 3(a) – 3(c), the aggregate patenting activity of Intel, Boeing, and Xerox in the year 2010 is displayed for comparison. In that year, the majority (nearly 60%) of Intel’s 895 patents were in the highest impact patent classes (bucket 1) of 2010, with most of the remainder in the second and third most impactful classes. The predominance of patents in higher impact classes yields a negative impact slope value (-.0457) for Intel in 2010. Boeing’s 635 patents were more dispersed than Intel’s across the impact spectrum in 2010 (but still in mostly higher impact classes), while Xerox’s 694 patents were spread more evenly across the impact spectrum, yielding a near-zero impact slope value (.0008) for Xerox in 2010. The graphs and impact slope values suggest that, comparatively speaking, despite having fewer patents Boeing generated greater innovation impact than Xerox in 2010, but proportionally less impact than Intel in that particular year.

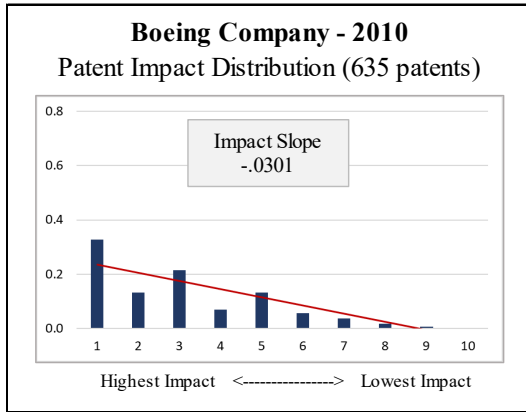
In 2010, the Intel Corporation had a total of 895 fractional patents in all patent classes.

Of these, 59.9% were in the highest impact classes for that year (bucket = 1), 26.7% were in the 2nd highest impact classes (bucket = 2), and 6.1% were in the 3rd highest impact classes (bucket = 3).

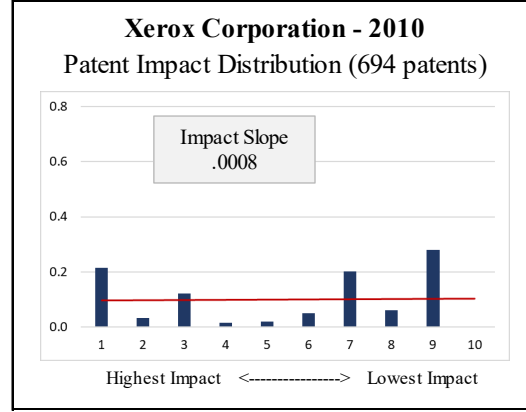
The impact slope value provides a unique, standardized firm-year measure of the distribution of a firm's patenting activity and impact in each year.



3(a)

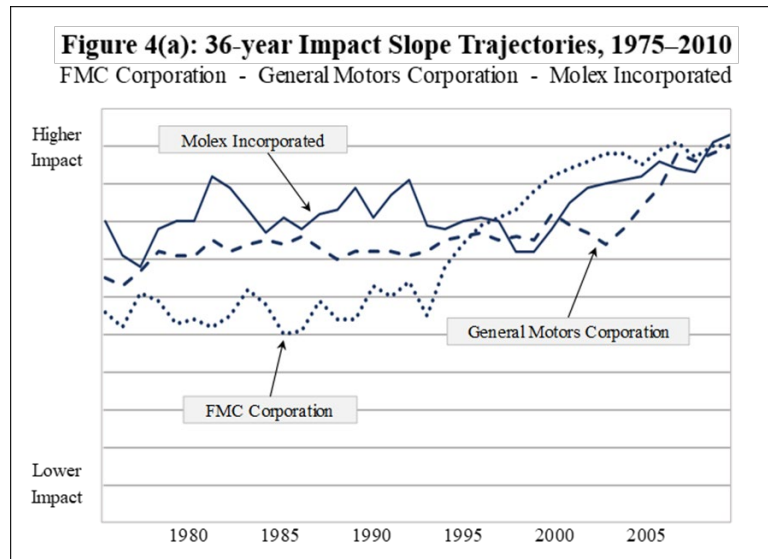


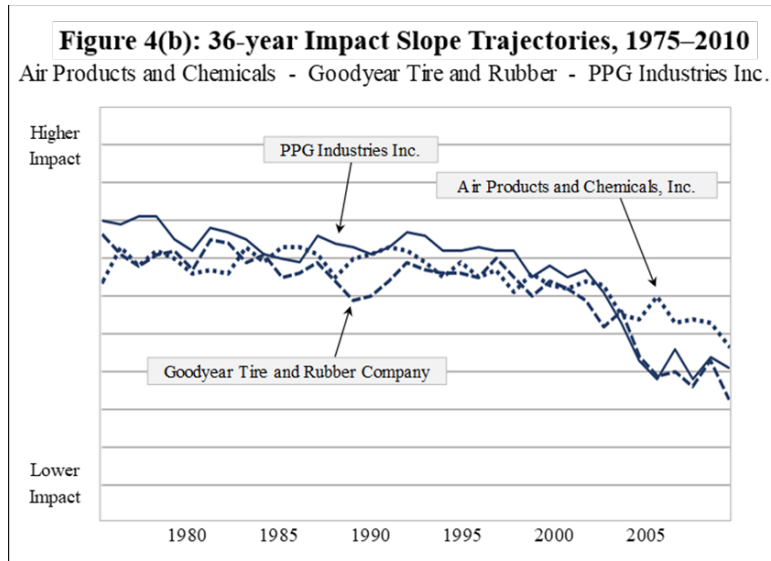
3(b)



3(c)

In addition to providing a standardized measure of the single-year impact generated by firms as described above, the impact slope values for each firm over time can be plotted to reveal longitudinal patterns of increasing, decreasing, or stable impact. For example, in Figure 4(a) the rising impact slope trajectories of FMC, General Motors, and Molex indicate that these firms were over time generating increasingly greater proportions of patents in higher impact classes. In Figure 4(b), the impact slope trajectories of Air Products, Goodyear, and PPG Industries indicate that these firms were over time increasingly generating greater proportions of patents in lower impact classes. Further research using the impact values and slope calculations can clarify whether these patterns reflect strategic shifts by the firms to exploration in different (higher or lower impact) technologies, shifts in the impact level of technologies already being pursued by the firms, or both.



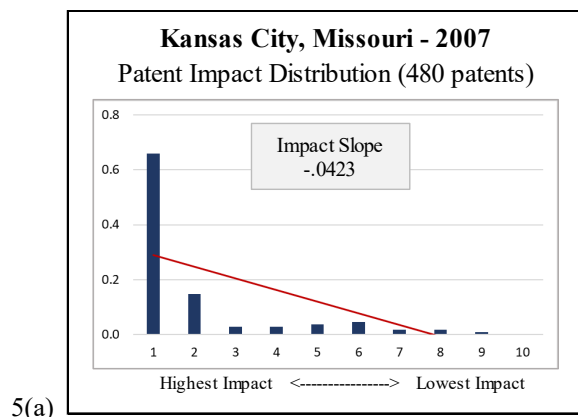


Geographic Differences in Patenting Impact

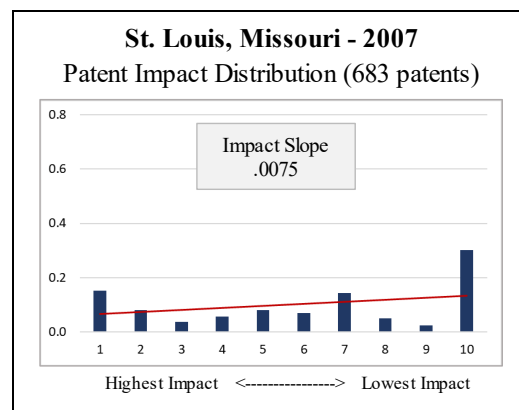
The patent class impact values can also be used to examine the emergence, growth, and decline of innovative importance in geographic regions over time, and to compare impact between regions. Similar to the method for measuring the overall impact of a firm’s patenting activity, all patents in the USPTO PatentsView database are linked with a specific geographic location based on latitude and longitude data from the patent file and corresponding metropolitan area coordinates. These data are grouped and summarized, and the proportion of patents in each impact bucket (out of the geographic location’s total patent count) for each year is calculated.

In the (geo)graphical examples below (Figures 5(a) – 5(d)), the impact distributions of patenting activity in 2007 from several metropolitan areas are displayed for comparison. In that year, patenting activity in Kansas City, Missouri and Iowa City, Iowa was predominantly in higher impact technologies; 65.9% of Kansas City’s 480 patents issued in 2007 were in the highest impact classes of that year.

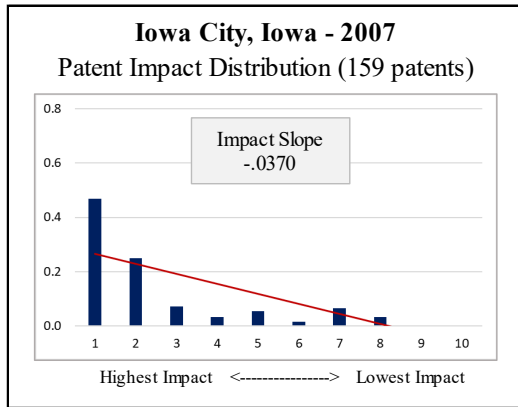
Conversely, most of the patenting activity in St. Louis, Missouri and Des Moines, Iowa was in lower impact technologies; 71.6% of Des Moines’ 186 patents issued in 2007 were in the lowest impact classes of that year.



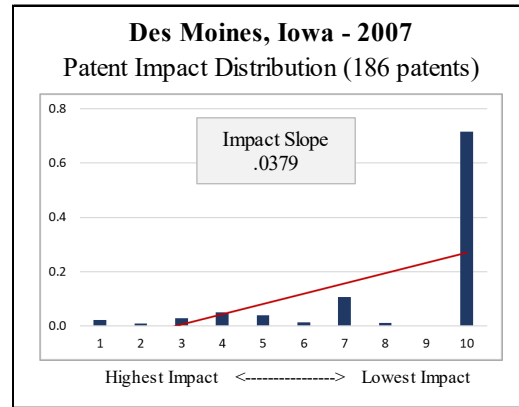
5(a)



5(b)



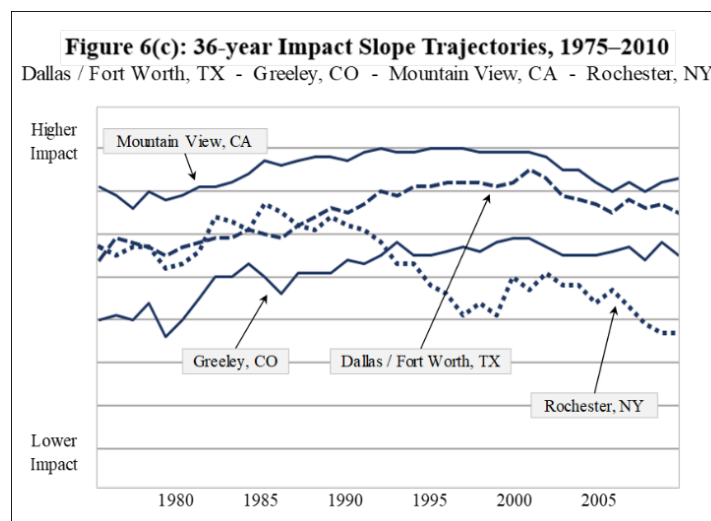
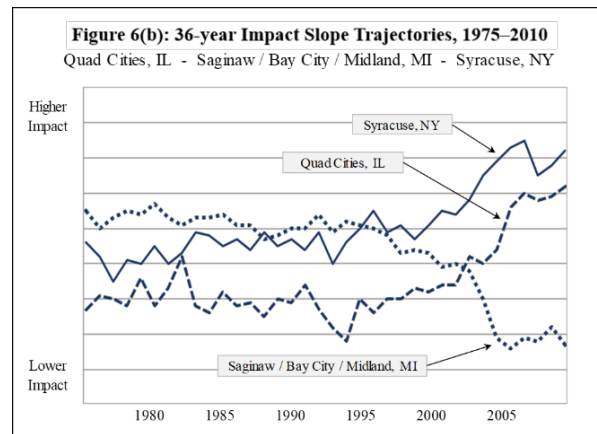
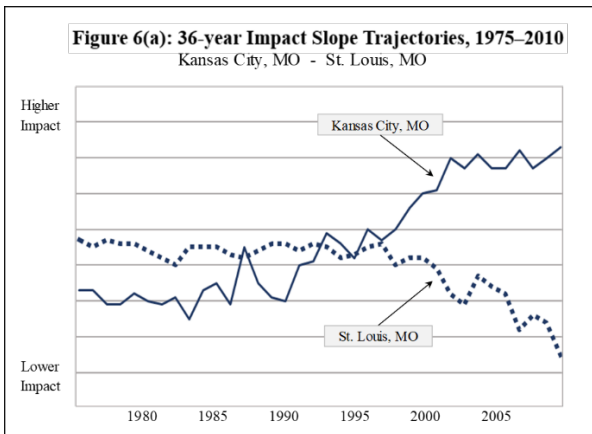
5(c)



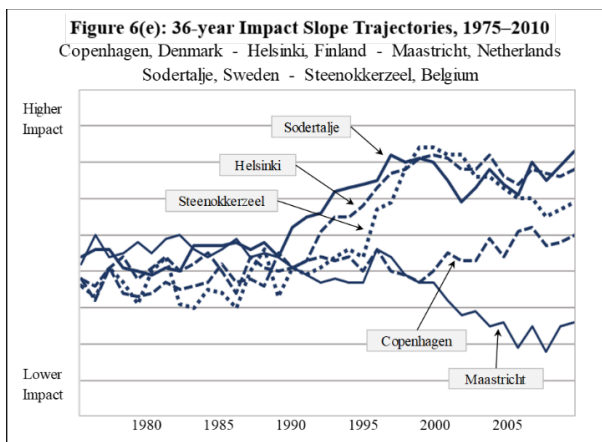
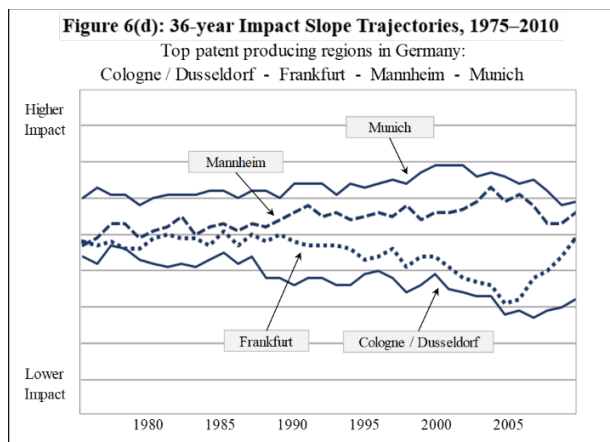
5(d)

As with the firm-level calculations, the impact slope value for each location-year combination is a unique standardized measurement that can be used to describe and compare the overall innovation activities or outcomes for each location, and can be used as an independent, dependent, or control variable in further analyses.

Plotting the impact slope values for each location over time, similar to the process used with firms, reveals longitudinal patterns of increasing, decreasing, or stable impact. Figures 6(a), 6(b), and 6(c) depict the diverging impact trajectories of Kansas City, St. Louis, and other high-volume patenting cities in the United States, indicating periods of both change and relative stability of technological impact in these locations over the last several decades.



In Figure 6(d), the longitudinally plotted impact slope values of the top four patent-producing regions in Germany show these cities maintaining consistently distinct levels of impact from 1975 to 2010, while elsewhere in Europe several cities appear to have caught (or missed) the high-impact 1990s technology wave (Figure 6(e)).



DISCUSSION AND CONCLUSION

Patents and patent citations are among the most widely used and controversial measures in economics, management, public policy, and strategy research. Patent data have played increasingly important roles in empirical research on innovation (Griliches, 1990; Harhoff et al., 1999; Kogan et al., 2017), knowledge flows (Cantwell & Mudambi, 2011; Jaffe et al., 1993), employee mobility (Agarwal et al., 2009), industrial evolution (Stuart & Podolny, 1996), university and public research (Bacchiocchi & Montobbio, 2009; Kolympiris & Klein, 2017), and economic development (Awate et al., 2012). Numerous studies, however, have identified serious limitations in the usefulness and validity of patents and citations as indicators of these phenomena due to noise and bias introduced by measurement error, firm strategy and employee patent policies, patent examiners, the institutional framework of the patent system, and other factors (Alcácer & Gittelman, 2006; Gittelman, 2008; Roach & Cohen, 2012).

As measures of impact based on available patent and citation data, the class- and subclass-level impact values developed in this study are subject to these inherent limitations. Accordingly, these values can and should be used in conjunction with other controls and approaches to address methodological problems and caveats associated with patent data in management research (Gittelman, 2008). Other limitations derive from the methodology used to calculate the impact values. For example, although meticulous processes were designed and followed to properly link individual firms to patents to exclude self-citations from forward citation counts and class impact calculations, assignee names and codes in the patent applications and patent databases vary greatly and change over time. It is likely that some patents for some firms were not correctly captured when calculating the impact values. Additionally, to facilitate the development of this study, patents with multiple assignees were deliberately excluded from the impact calculations. These represented less than 3% of all patents in the USPTO PatentsView data examined. Also, only the first five unique CPC classes sequentially assigned to each patent were retained for analysis; less than 2% of the 6.8 million patents examined had more than five patent classes assigned. More granular studies into specific firms and patent classes using updated patent databases will help to identify weaknesses that can be addressed in this study and its development process.

Despite these limitations, the class-level impact method provides a new approach to patent-based research that can be applied to many areas of interest to innovation and strategic management scholars. In addition to the providing a clearer picture of the evolution of technologies, the methodology used for firm and location comparisons using the class impact values can be applied to examine other units of analysis linked to patents. For example, the levels of innovation quality emerging from university-affiliated incubators (Kolympiris & Klein, 2017) and the efficacy of government grants to regional economic development (Stevenson et al., 2021) can be mapped over time, and the changing impact of individual scientists, engineers, and inventors can be traced as their careers evolve (Ge et al., 2016).

This study was designed to provide a new complementary tool for investigating exploration strategies and outcomes. The calculation of a new measure of impact and the uses of it described here can be universally applied and adjusted to suit the needs of studies that examine patents and patenting activity in a variety of research settings and at multiple levels of analysis.

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HOW CONSUMER VALUE-BELIEF SYSTEM AFFECTS HIS BUDGET SET AND DEMAND CORRESPONDENCE

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ABSTRACT

This paper investigates the budget set and demand correspondence of a consumer when his system of values and beliefs plays a role in his consumption decision making. In particular, when a person's values and beliefs dictate which commodity bundle and how much of the bundle he will consume, one can no longer assume that the consumer orders real numbers the same way as everyone else, although that has been assumed in the prevalent consumer theory. For such more realistic setting than the one conventionally considered, this paper explores the relationship between an individual's consumption preferences and his specific order of real numbers. And, it shows that many well-known properties of budget sets and demand correspondences are not generally true unless his order of real numbers is equal to the conventional order of real numbers and/or his consumption preference relation is complete, reflexive and transitive on his set of all possible consumptions.

INTRODUCTION

Each consumer, be it an individual or a business firm, undergoes lifecycle stages, such as birth, growth, maturation and death. To maintain survival, every individual and business must first satisfy basic physiological or functional business needs before consuming any luxury products, goods, or services. These needs are generally multidimensional in nature. For example, in order to house a physical or virtual existence, a shelter or an office domain is needed first. In order to satisfy physiological needs or to maintain operational demands, various nutritional intakes or business inputs are required. When two consumption choices from different dimensions are presented, the consumer cannot truly tell which alternative is preferred to the other. For example, for an individual person, tickets to different world series games and soft drink choices represent examples of consumption alternatives from two different dimensions; for a business firm, personnel needed for maintaining regular operational routines and talent required for innovative R&D purposes are also examples of consumption choices from different dimensions. In either of these two scenarios, the consumption alternatives cannot be directly compared by using the individual consumer's or the business firm's preferences. Speaking differently, only when two consumption alternatives come from the same dimension, a consumer *might* be able to make a pick based on what he prefers. This recognition of incompleteness is different from that as noticed before from the angle of bounded rationality and consumers' indecisiveness (Aumann, 1962; Bewley, 1986; Mandler, 1999; Ok, 2002).

Because of the existence of such multidimensionality with consumption choices, one can readily see that a consumer's set of all possible consumptions cannot be completely ordered by his/its preferences. Hence, to make the relevant economic theory, such as the consumer theory, practically useful in real life, we cannot continue to assume that consumer preferences can compare any two consumption alternatives, as conventionally done as in widely used textbooks and lecture notes (Levin & Milgrom, 2004; Mas-Colell et al., 1995). The existence and maintenance of this convention, to a large extent, are due to the desire for the community of economists to develop a theory that is mathematically beautiful and satisfactory, for more details about this end, see von Neumann and Morgenstern (1944, p. 29) and Paul Krugman's comment (New York Times, 2009-09-02). Therefore, the following question naturally arises at this junction. Can we reestablish the key conclusions of the prevalent consumer theory regarding a consumer's budget set and demand correspondence without assuming the completeness of consumption preferences?

As expected, this paper demonstrates that when the assumed completeness is replaced by incompleteness, all related conclusions regarding a consumer's budget set and demand correspondence mostly take their correspondingly different forms or only hold true conditionally. And, because the incompleteness assumption is much closer to real life, one can expect the consequent conclusions to be more useful than the conventional ones in terms of their explanation abilities. Compared to what we attempt to do here, there are also parallel efforts in the literature. For example, when it is recognized that preference relations generally only satisfy reflexivity without completeness and transitivity, Ok (2002), Bosi and Herden (2012) and Nishimura and Ok (2016) consider the problem of how to

represent an incomplete preference relation by means of a collection of real-number valued functions. This end is parallel to the classical conclusion that a complete preference relation can be possibly represented by a real-number valued utility function.

The rest of this paper is organized as follows. After outlining the basic model and relevant terminologies needed for the rest of this presentation, the attention is turned to the continuity of a consumer's budget set, the demand correspondence of an individual, and some properties of the total demand correspondence. After establishing the relationship between consumption preferences and the order of real numbers, the paper is concluded with several suggestions for future research topics.

PREPARATION

This section consists of two parts. The first part details the basic setup for the reasoning of the rest of the paper regarding how a consumption is theoretically constructed and points out the differences among three order relations. The second part examines the concept and elementary properties of modular functions needed for us to construct counterexamples.

Possible Consumptions of a Consumer

A consumer can be an individual, a firm or an organization that decides what a package of different commodities to consume now for the current time and the future, as is in the literature (Debreu, 1959; Levin & Milgrom, 2004; Mas-Colell et al., 1995). Such a package is referred to as the consumer's consumption plan (or consumption). The consumer determines how much each of the chosen commodities he will consume and offer within a set of constraints. As examples, the constraints consist of those commodities necessary for survival, those possible within budget, etc.

Consider such a market that contains m consumers, for some $m \in \mathbb{N}$ (= the set of all natural numbers). For consumer i ($= 1, 2, \dots, m$), the amounts of his commodity inputs that are to be consumed are represented as positive numbers; and those of his commodity outputs, offer to the market, are written as negative numbers. Without loss of generality, assume that all commodities, totaling to ℓ different kinds, are ordered by their names as $h = 1, 2, \dots, \ell$. By following this convention (e.g., Panos, 2018), assume that the quantity of each commodity in a consumption plan is a real number.

Without explicitly mentioning, assumed in this model setup include (i) perfect information, (ii) each consumer is a price taker; and (iii) prices are linear without quantity discount. In particular, (i) means that each consumer knows exactly how much each commodity will be consumed.

Let $X_i \subseteq \mathbb{R}^\ell$, where \mathbb{R} is the set of all real numbers (in the rest of this paper, \mathbb{R}_+ stands for the set of all positive real numbers), be the set of all consumptions possible for consumer i . It is referred to as the consumer's consumption set or demand. For each $x_i \in X_i$, the typical inputs consist of dated and location-specific products, goods and services, while the outputs are various kinds of dated and location-specific labors. In other words, products, goods, services, and labors, delivered at different times and/or different locations, are treated as different commodities.

If commodity h is contained in an $x_i \in X_i$ with a positive quantity, then consumer i inputs h so that this quantity must have a lower bound, such as zero. If h is contained in $x_i \in X_i$ with a negative quantity, then h is an output commodity of consumer i so that this quantity must also have a lower bound. It is because the consumer can only produce a limited amount of labor output at any time moment. Based on this analysis, we introduce the following axiom:

Axiom 1 (Lower Boundedness): For each consumer i ($= 1, 2, \dots, m$), his consumption set X_i has a lower bound for the order relation \preceq defined on \mathbb{R}^ℓ , defined as follows: For any $x^1, x^2 \in \mathbb{R}^\ell$,

$$x^1 \preceq x^2 \text{ if and only if } x_h^1 \leq x_h^2, \text{ for } h = 1, 2, \dots, \ell. \quad (1)$$

For two consumptions $x_i^1, x_i^2 \in X_i$, if consumer i prefers x_i^1 at least as much as to x_i^2 , then we write $x_i^1 \succeq_i x_i^2$ or, equivalently, $x_i^2 \preceq_i x_i^1$. That means that there is a preference relation \preceq_i on X_i such that the following axiom holds true.

Axiom 2 (Comparability). If $x_i^1, x_i^2 \in X_i$ are comparable in terms of consumer i 's preference, as determined by his system of values and beliefs, then one and only one of the following alternatives holds true:

- (i) x_i^1 is preferred to x_i^2 , written as $x_i^1 \succsim_i x_i^2$;
- (ii) x_i^1 is indifferent to x_i^2 , written $x_i^1 \sim_i x_i^2$; and
- (iii) x_i^2 is preferred to x_i^1 , written $x_i^1 \precsim_i x_i^2$.

The concept of individuals' systems of values and beliefs are first employed in the study of abstract economic studies by Forrest, Wu et al. (2022). A similar, but different concept, known as tastes (Stigler & Becker, 1977), was used in similar setting. In particular, tastes represent a reason for people to act in different ways. Against the conventional view of tastes, which are seen as inscrutable and often capricious, Stigler and Becker (p. 76) believe that "tastes neither change capriciously nor differ importantly between people." In comparison, an individual's system of values and beliefs also dictate how an individual would act in specific ways, and do not change easily (Lin & Forrest, 2012), similar to Stigler and Becker's interpretation of tastes. But, from one person to another, their underlying systems of values and beliefs can change drastically, leading to, for example, different orderings of real numbers and different priorities of matters. For example, driven by their specific systems of values and beliefs, some people take pleasure in their acts of harming others, while some other people would prefer to treating each other with respect. For the former people, they most likely see \$3 million as a greater amount than \$3 K, while the latter would very possibly see \$3 K as an amount greater than \$3 million if these millions are the outcome of successfully robbing a bank. In other words, differences in systems of values and beliefs are more than differences in relative costs, which are one of the most commonly examined variables by neoclassical economists. Because differences in values and beliefs can easily lead to different orderings of real numbers, comparing costs can be done differently from one individual to another.

Assume that \leq_i (respectively, $<_i, >_i, \geq_i, =_i$) represents consumer i 's order of real numbers. There are then three order relations involved here: (i) \leq (respectively, $<, >, \geq, =$) defined in \mathbb{R}^ℓ , as given in equation (1), (ii) \precsim_i (respectively, $<_i, >_i, \succsim_i, =_i$) defined on X_i , and (iii) \leq_i (defined on \mathbb{R}). One needs to note that different from both \leq and \leq_i , consumer i 's consumption preferences \precsim_i in real life are generally influenceable by peers and frequently altered temporarily by peer pressures, especially for emerging adults (Hu et al., 2021; Li et al., 2023; Mani et al., 2013). Because time does not play a role in this paper, the preference relation \precsim_i becomes fixed and not influenceable by peers.

The binary relation \precsim_i is said to be a preorder, if it satisfies (i) reflexivity: for any $x_i \in X_i, x_i \precsim_i x_i$; and (ii) transitivity: for any $x_i^1, x_i^2, x_i^3 \in X_i, x_i^1 \precsim_i x_i^2$ and $x_i^2 \precsim_i x_i^3$ imply $x_i^1 \precsim_i x_i^3$. It is said to be complete, if each pair $x_i^1, x_i^2 \in X_i$ can be compared by \precsim_i . To make our conclusions closer to real life situations, the preference relation \precsim_i considered in this paper is not generally assumed to be a complete preorder unless it is specifically mentioned so.

Without loss of generality, we assume that \leq_i is reflexive, transitive and antisymmetric (for any $a, b, c \in \mathbb{R}, a \leq_i b$ and $b \leq_i c$ imply $a \leq_i c$). Please note that this assumption does not mean that \precsim_i is rational or that \precsim_i is reflexive, transitive and complete (Mas-Colell et al., 1995).

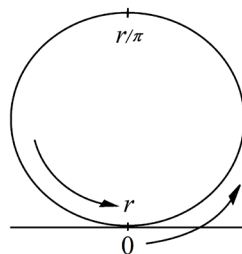


Figure 1. A model of the mod(r) function

The Modular Function

When looking at a real-life economic process, one often sees seasonalities or periodicities. For example, when looking at the time variable underneath an economic process, the economic activities that are carried out in the process are

periodically checked, such as annually or quarterly. If the time length of the basic period is denoted by a positive real number r , then the modular function $\text{mod}(r)$ appears. With this understanding, the time line (or the real number line) becomes a circle of circumference r on which a point travels one loop after another starting at the origin without end in sight, Figure 1.

To make the concept of modular functions in the previous paragraph clearer, one can use the semester system of a school as an example. Assume that the student evaluation of every course contains a question on student learning and the effectiveness of professor's teaching. Due to differences in the value and belief systems of individual professors, each professor generally employs his unique approach to maximize students' learning. To this end, it has been well known in real life that the outcomes of individual professors' maximum students' learning are most likely inconsistent with each other. In other words, although each chosen optimum approach comes out of the same objective function, professors with different systems of values and beliefs generally produce different optimal outcomes. In this case, the length of one school semester is the modular r value, over which professors seek for their individually unique ways to deliver their effective teaching so that students' learning can be maximized.

Conventionally, the $\text{mod}(r)$ function is defined for natural number $r > 1$ (Burton, 2012). For a different purpose, Forrest, Hafezalkotob et al. (2021) generalized it to the case of any positive real number r . Specifically, for a chosen positive number $r \in \mathbb{R}$, a linear order relation $\leq_{\text{mod}(r)}$ on \mathbb{R} can be defined as follows: For real numbers x and $y \in \mathbb{R}$,

$$x <_{\text{mod}(r)} y \text{ if and only if } x \text{ mod}(r) < y \text{ mod}(r),$$

where the ordering $<$ is the conventional one defined on \mathbb{R} , $x \text{ mod}(r)$ is the remainder of $x \div r$ and $y \text{ mod}(r)$ the remainder of $y \div r$, such that $0 \leq x \text{ mod}(r) < r$ and $0 \leq y \text{ mod}(r) < r$. Intuitively speaking, the application of the modular operation makes real numbers wrap around a circle of circumference r (Figure 1), known as modulus. When $b = x \text{ mod}(r) > 0$, b stands for the point on the circle that is of an arc distance b in the counterclockwise direction from point 0; and when $b = x \text{ mod}(r) < 0$, b stands for the point on the circle that is of an arc distance b in the clockwise direction from point 0. When r , x , and y consider here are limited to the set $\mathbb{Z} = \{\dots, -3, -2, -1, 0, +1, +2, +3, \dots\}$ of integers, the afore-defined order relation $\leq_{\text{mod}(r)}$ degenerates into the one widely studied in number theory (Burton, 2012).

MAIN CONCLUSIONS

This section is made up of four relatively independent subsections. In particular, the first subsection examines the continuity of a consumer's budget set, while a counterexample is constructed to show that without assuming consumer-specific order of real numbers is the same as the conventional one, a consumer's budget set cannot be shown to be continuous with the argument given here. The second subsection establishes four propositions regarding a consumer's demand correspondence. Expanding the scope of attention, the third subsection studies the total demand correspondence of all consumers. And the fourth subsection scrutinizes the relationship between preferences and orders of real numbers, while two counterexamples are constructed to demonstrate the necessity for the preference relation to satisfy the conditions of additive conservation and positive multiplicativity.

The Continuity of a Consumer's Budget Function

For consumer i , assume that he has accumulated a certain amount of wealth, denoted as a real number w_i . So, he chooses his consumption $x_i \in X_i$ subject to the constraint $p \cdot x_i \leq_i w_i$, for any given price system $p \in \mathbb{R}_+^\ell$ of commodities, where $p = (p_1, p_2, \dots, p_\ell)$ stands for the price vector of the commodities $h = 1, 2, \dots, \ell$. As noted above, consumer i 's order \leq_i of real numbers is defined specifically by consumer i 's system of values and beliefs. In terms of the literature, the consumer-specific order \leq_i of real numbers has been assumed to be the same as the conventional one \leq (Levin & Milgrom, 2004; Mas-Colell et al., 1995). Evidently, this commonly adopted order \leq of real numbers reflects a certain category of systems of values and beliefs. However, there are such value-belief systems that dictate the ordering of real numbers differently. For example, corresponding to the concept of corporate social responsibilities (Liu et al., 2018; Poist, 1989), consumer i pledges to give back to the society by donating a portion of his wealth to his favorite charity organizations by employing the following scheme: as soon as the accumulation of his wealth reaches the level of, say, 30 units, he will donate away that entire 30 units of wealth. In other words, consumer i 's consumption $x_i \in X_i$ is subject to the constraint $p \cdot x_i \leq w_i \text{ mod}(30)$.

Because there are m consumers, the wealth vector $w = (w_1, w_2, \dots, w_m) \in \mathbb{R}^\ell$ expresses the wealth distribution of the population of concern. The vector $(p, w) \in \mathbb{R}^{\ell+m}$ is referred to as the price-wealth pair (Debreu, 1959) of the population. Define the set of feasible price-wealth pairs of consumer i , for each $i = 1, 2, \dots, m$,

$$S_i = \{(p, w) \in \mathbb{R}^{\ell+m}: \exists x_i \in X_i \text{ such that } p \cdot x_i \leq w_i\},$$

and a set-valued budget function $\gamma_i: S_i \rightarrow X_i$: for any $(p, w) \in S_i$,

$$\gamma_i(p, w) = \{x_i \in X_i: p \cdot x_i \leq w_i\}, \quad (2)$$

where $\gamma_i(p, w)$ is referred to as the budget set of consumer i (Levin & Milgrom, 2004), when the price system is p and the wealth level is w .

A set-valued function $f: A \rightarrow B$, for A and $B \subseteq \mathbb{R}^\ell$, is said to be continuous at a point $a^0 \in A$ (Kuratowski & Mostowski, 1976), if f satisfies both

- (Upper semicontinuity at a^0) For any $\{a^q\}_{q=1}^\infty \subseteq A$ such that $a^q \rightarrow a^0 \in A$, if $b^q \rightarrow b^0 \in B$, for any $\{b^q\}_{q=1}^\infty \subseteq B$ with $b^q \in f(a^q)$, then $b^0 \in f(a^0)$; and
- (Lower semicontinuity at a^0) If $a^q \rightarrow a^0$ and $b^0 \in f(a^0)$, then there is $\{b^q\}_{q=1}^\infty \subseteq B$ with $b^q \in f(a^q)$ such that $b^q \rightarrow b^0$.

Proposition 1. Assume that each infinity can be actually (not potentially) achieved and that \leq_i is the same as \leq . If a price-wealth pair $(p^0, w^0) \in S_i$ satisfies $w_i^0 \neq \min_{x_i \in X_i} p^0 \cdot x_i$, then γ_i is continuous at (p^0, w^0) .

Proof. First, we show the upper semicontinuity. Assume that $\{(p^q, w^q)\}_{q=1}^\infty \subseteq S_i$ is a convergent sequence of price-wealth pairs such that $(p^q, w^q) \rightarrow (p^0, w^0) \in S_i$. Then,

$$\gamma_i(p^q, w^q) = \{x_i \in X_i: p^q \cdot x_i \leq w_i^q\}, q = 0, 1, 2, \dots$$

For any convergent sequence $\{x_i^q\}_{q=1}^\infty$, $x_i^q \in \gamma_i(p^q, w^q)$, $q = 1, 2, \dots$, if $x_i^q \rightarrow x_i^0 \in X_i$, as $q \rightarrow \infty$, we need to show $x_i^0 \in \gamma_i(p^0, w^0)$. This end follows from the facts that $x_i^q \in X_i$ satisfies

$$p^q \cdot x_i^q \leq w_i^q \quad (3)$$

and that in Euclidean space $\mathbb{R}^{\ell+m}$, $(p^q, w^q) \rightarrow (p^0, w^0)$ is equivalent to $p^q \rightarrow p^0$ and $w^q \rightarrow w^0$. Hence, equation (3) implies that as $q \rightarrow \infty$, we have $p^0 \cdot x_i^0 \leq w_i^0$. That is, $x_i^0 \in \gamma_i(p^0, w^0)$.

Second, we show the lower semicontinuity. Assume that $\{(p^q, w^q)\}_{q=1}^\infty \subseteq S_i$ is a convergent sequence of price-wealth pairs such that $(p^q, w^q) \rightarrow (p^0, w^0) \in S_i$, and that $x_i^0 \in \gamma_i(p^0, w^0)$ so that $p^0 \cdot x_i^0 \leq w_i^0$. To conclude the rest of the argument, it needs to show the existence of an infinite sequence $\{x_i^q\}_{q=1}^\infty \subseteq X_i$ such that $p^q \cdot x_i^q \leq w_i^q$, for $q = 1, 2, \dots$, and $x_i^q \rightarrow x_i^0$, as $q \rightarrow \infty$. This is where the assumption that each infinity can be actually (not potentially) achieved comes into play. In particular, Lin (2008) documents that potential infinities and actual infinities are fundamentally different concepts; and they can lead to and have indeed led to completely inconsistent outcomes (Forrest, 2013), while the existence of the desired sequence $\{x_i^q\}_{q=1}^\infty \subseteq X_i$ mistakenly treated potential infinities as actual ones.

To understand the previous paragraph, let us briefly examine the concept of infinities. It involves two different types of infinities with one known as actual infinities and the other potential infinities (Lin, 2008). Specifically, a potential infinity represents a forever ongoing and never-ending process or procedure; and every actual infinity characterizes a process that actually ends or had ended. To see how this concept of infinities applied to our current situation, let us construct the desired sequence in two different cases: (i) $p^0 \cdot x_i^0 < w_i^0$; and (ii) $p^0 \cdot x_i^0 = w_i^0$.

For case (i), because $(p^q, w^q) \rightarrow (p^0, w^0)$, there is a subsequence $\{(p^q, w^q)\}_{q=q^*}^\infty$, for some large integer q^* , such that $p^q \cdot x_i^0 < w_i^q$, for $q = q^*, q^* + 1, q^* + 2, \dots$. Now, each term x_i^q of the desired sequence $\{x_i^q\}_{q=1}^\infty \subseteq X_i$ can be constructed as follows:

$$x_i^q = \begin{cases} \text{an element in } \gamma_i(p^q, w^q), & \text{if } q \leq q^* \\ x_i^0, & \text{if } q > q^* \end{cases}$$

That is, for each chosen q , the term x_i^q is defined, representing a potential process, while the existence of the entire sequence $\{x_i^q\}_{q=1}^\infty$ stands for an actual infinity, where a forever ongoing process is assumed to be finished. That is, potential and actual infinities are seen as the same.

For case (ii). where $p^0 \cdot x_i^0 = w_i^0$, the assumption $w_i^0 \neq \min_{x_i \in X_i} p^0 \cdot x_i$ implies that there is $z_i \in X_i$ such that $p^0 \cdot z_i < w_i^0$. So, the assumed limit $(p^q, w^q) \rightarrow (p^0, w^0)$ implies that there is an integer q^* , such that for $q = q^*, q^* + 1, q^* + 2, \dots$,

$$p^q \cdot z_i < w_i^q \text{ and } p^q \cdot z_i < p^q \cdot x_i^0. \quad (4)$$

For each $q (= 1, 2, \dots)$, let us respectively consider the following hyperplane determined by (p^q, w^q) and the line that passes through z_i and x_i^0 :

$$p^q \cdot x_i = w_i^q \text{ and } x_i = x_i^0 + t(z_i - x_i^0),$$

for $x_i \in \mathbb{R}^\ell$ and $t \in \mathbb{R}$. It can be seen that the intersection a_i^q of this hyperplane and the line is determined by $a_i^q = x_i^0 + t^*(z_i - x_i^0)$, where

$$t^* = \frac{w_i^q - p^q \cdot x_i^0}{p^q \cdot (z_i - x_i^0)}.$$

So, the second inequality in equation (4) implies $p^q \cdot (z_i - x_i^0) \neq 0$, for $q \geq q^*$. That means that for large $q (\geq q^*)$, a_i^q is well defined uniquely and satisfies $\lim_{q \rightarrow \infty} a_i^q = x_i^0$. So, the q th term of the imagined sequence $\{x_i^q\}_{q=1}^\infty$ can be defined as follows:

$$x_i^q = \begin{cases} \text{an element in } \gamma_i(p^q, w^q), & \text{if } q \leq q^* \\ a_i^q, & \text{if } q > q^* \end{cases}$$

where $a_i^q \in \gamma_i(p^q, w^q)$. Once again, the existence of the sequence $\{x_i^q\}_{q=1}^\infty$ is only possible under the assumption that potential and actual infinities are the same. QED

In terms of the literature, Proposition 1 generalizes relevant results (e.g., Debreu, 1959, p. 63) by removing unnecessary conditions imposed on the range of the set-valued function γ_i , such as the assumptions of compactness and convexity of X_i .

There are two assumptions in Proposition 1. The reason why the first one on infinities is needed is explained within the proof; and, without it, the conclusion cannot be established, because potential and actual infinities are generally different (Forrest, 2013). As for the second assumption $\leq_i = \leq$, the following Example 1 shows that in general, the conclusion in Proposition 1 does not follow without this assumption.

Example 1. Assume that an economy has only one consumer, such as the economic situation of an individual consumer that he does not have any financial responsibilities for anybody except himself. Assume that his system of values and beliefs demands him to order real numbers by using modular r function, for $r \in \mathbb{R}_+$. That is, this consumer orders real numbers by using $\leq_{mod(r)}$ so that for any $a, b \in \mathbb{R}$, $a \leq_{mod(r)} b$ if and only if the positive remainder of

$a \div r \leq$ that of $b \div r$. For example, $4.1 \leq_{\text{mod}(4)} 1.2$, because $4.1 \div 4 = 0.1$, while $0.1 \leq 1.2$; and $-1.2 \leq_{\text{mod}(4)} -4.1$, because $2.8 \leq 3.9$, where $-1.2 \div 4 = (-4 + 2.8) \div 4 = -1 + 2.8 \div 4$ and $-4.1 \div 4 = (-8 + 3.9) \div 4 = -2 + 3.9 \div 4$.

Consider the following sequence $\{(p^q, w^q)\}_{q=1}^{\infty} \subseteq \mathbb{R}_+^{\ell+1}$ of price-wealth pairs defined by $p^q = p^0$, for a fixed price system $p^0 = (1, 1, \dots, 1) \in \mathbb{R}_+^{\ell}$, and $w^q = r - 1/q$, for a fixed price system $p^0 \in \mathbb{R}^{\ell}$, and $q = 1, 2, \dots$. It is ready to see that $(p^q, w^q) \rightarrow (p^0, r)$, when $q \rightarrow \infty$.

Next, let us construct a sequence $\{x^q\}_{q=1}^{\infty}$ of possible consumptions from the consumer's set X as follows: for any $q \in \mathbb{N}$,

$$x^q = (x_1^q, x_2^q, \dots, x_{\ell}^q) \in \gamma(p^q, w^q) = \{x \in X: p^q \cdot x \leq_{\text{mod}(r)} w^q\}$$

such that $x_i^q = (r - 1/q)/\ell$, for $i = 1, 2, \dots, \ell$. Then it can be readily seen that $x^q \rightarrow x^0 = (x_1^0, x_2^0, \dots, x_{\ell}^0)$ so that $x_i^0 = r/\ell$, for $i = 1, 2, \dots, \ell$. However, we have

$$(x_1^0, x_2^0, \dots, x_{\ell}^0) = \left(\frac{r}{\ell}, \frac{r}{\ell}, \dots, \frac{r}{\ell}\right) \notin \gamma(p^0, w^0)$$

because $\gamma(p^0, w^0) = \{x \in X: p^0 \cdot x \leq_{\text{mod}(r)} w^0\} = \{x \in X: (1, 1, \dots, 1) \cdot x = 0\} = \{(0, 0, \dots, 0)\}$.

That is, what is shown is that for this particular single consumer economy, when the consumer orders real numbers based on his system of values and beliefs by using $\leq_{\text{mod}(r)}$, for any $r \in \mathbb{R}_+$, the set-valued function $\gamma(p, w)$ is not upper semicontinuous from the feasible price-wealth set into the budget set. QED

Consumer's Demand Correspondence

For any given price-wealth pair $(p, w) \in S_i$, consumer i chooses such a consumption $x'_i \in \gamma_i(p, w)$ that $x'_i \succeq_i z_i$, for any \preceq_i -comparable $z_i \in \gamma_i(p, w)$. If such consumption x'_i exists, it is known as an i 's equilibrium consumption relative to (p, w) , denoted by $x_i^{\text{max}}(p, w)$. For consumer i to select $x_i^{\text{max}} \in \gamma_i(p, w)$, it means that

- He selects the quantities of the commodities he will consume;
- He decides on the quantities of the kinds of labor he will provide to the market; and
- The chosen quantities of commodities and labor jointly form an optimal consumption within his limited wealth.

Because consumptions in X_i are generally not completely comparable by the preference relation \preceq_i , if there is such an equilibrium consumption x_i^{max} , its existence is not generally unique. Hence, for $(p, w) \in S_i$, there are three possibilities: no equilibrium consumption $x_i^{\text{max}}(p, w) \in \gamma_i(p, w)$ exists, a unique $x_i^{\text{max}}(p, w) \in \gamma_i(p, w)$ exists, and multiple $x_i^{\text{max}}(p, w) \in \gamma_i(p, w)$ exist. Define the following subset of S_i

$$S_i^{\text{max}} = \{(p, w) \in S_i: \exists x_i^{\text{max}}(p, w) \in \gamma_i(p, w) \text{ w. r. t. } \preceq_i\}, \quad (5)$$

and a set-valued function $\xi_i: S_i^{\text{max}} \rightarrow X_i$, known as consumer i 's demand correspondence (Debreu, 1959), such that for any $(p, w) \in S_i^{\text{max}}$,

$$\xi_i(p, w) = \{x_i \in X_i: x_i \in \max_{\preceq_i} \{z_i \in X_i: p \cdot z_i \leq_i w_i\}\}, \quad (6)$$

where \max_{\preceq_i} stands for the maximal or maximum operation with respect to the preference relation \preceq_i . Hence, the conclusion below comes naturally from these definitions above:

Proposition 2. For any consumptions $x_i^1, x_i^2 \in \xi_i(p, w)$, one of the following holds true:

- $x_i^1 \sim_i x_i^2$;

(ii) x_i^1 and x_i^2 are not comparable with respect to the preference relation \lesssim_i . QED

As for the case when the preference relation \lesssim_i is complete, such as the case that \lesssim_i becomes complete on a subset A of X_i , although the originally \lesssim_i is incomplete, the following holds true.

Proposition 3. If the preference relation \lesssim_i is a complete preorder and for $(p^1, w^1), (p^2, w^2) \in S_i^{max}$, there are $x_i^{10} \in \xi_i(p^1, w^1)$ and $x_i^{20} \in \xi_i(p^2, w^2)$ such that $x_i^{20} <_i x_i^{10}$, then for any $x_i^1 \in \xi_i(p^1, w^1)$ and $x_i^2 \in \xi_i(p^2, w^2)$, neither $x_i^1 <_i x_i^2$ nor $x_i^1 \sim_i x_i^2$ holds true.

Proof. By contradiction, assume that there are certain $x_i^k \in \xi_i(p^k, w^k)$, for $k = 1, 2$, such that either (i) $x_i^1 <_i x_i^2$ or (ii) $x_i^1 \sim_i x_i^2$. From $x_i^{k0}, x_i^k \in \xi_i(p^k, w^k)$, for $k = 1, 2$, it follows that $x_i^{10} \sim_i x_i^1$ and $x_i^{20} \sim_i x_i^2$, because \lesssim_i is complete.

If case (i) is true, then we have

$$x_i^{10} \sim_i x_i^1 <_i x_i^2 \sim_i x_i^{20},$$

which contradicts to the assumption of $x_i^{20} <_i x_i^{10}$. So, case (i) cannot be true.

If case (ii) holds true, then we have

$$x_i^{20} <_i x_i^{10} \sim_i x_i^1 \sim_i x_i^2 \sim_i x_i^{20},$$

which means $x_i^{20} <_i x_i^{20}$ because of the transitivity of \lesssim_i , an impossible scenario for complete preorder \lesssim_i . Hence, case (ii) is an incorrect assumption.

Combining what are argued above, we conclude that neither (i) nor (ii) can be true. QED

Similar to Proposition 3, the following result can be shown:

Proposition 4. If the preference relation \lesssim_i is a complete preorder and for $(p^1, w^1), (p^2, w^2) \in S_i^{max}$, there are $x_i^{10} \in \xi_i(p^1, w^1)$ and $x_i^{20} \in \xi_i(p^2, w^2)$ such that $x_i^{20} \sim_i x_i^{10}$, then for any $x_i^1 \in \xi_i(p^1, w^1)$ and $x_i^2 \in \xi_i(p^2, w^2)$, the indifference relation $x_i^2 \sim_i x_i^1$ holds true.

Proof. By contradiction. Assume that there are $x_i^1 \in \xi_i(p^1, w^1)$ and $x_i^2 \in \xi_i(p^2, w^2)$ such that $x_i^1 \not\sim_i x_i^2$. Then there are two possibilities: (i) $x_i^1 >_i x_i^2$; or (ii) $x_i^1 <_i x_i^2$. However, according to Proposition 3, if either (i) or (ii) holds true, then $x_i^{20} \sim_i x_i^{10}$ cannot hold true. This end contradicts the given conditions. Hence, the assumption that $x_i^1 \not\sim_i x_i^2$, for some $x_i^k \in \xi_i(p^k, w^k)$, for $k = 1, 2$, cannot hold true. QED

For $(p^1, w^1), (p^2, w^2) \in S_i^{max}$, consumer i prefers the price-wealth pair (p^1, w^1) to the pair (p^2, w^2) , if there are $x_i^1 \in \xi_i(p^1, w^1)$ and $x_i^2 \in \xi_i(p^2, w^2)$ such that $x_i^2 <_i x_i^1$. If, instead, there are such consumptions $x_i^k \in \xi_i(p^k, w^k)$, $k = 1, 2$, that $x_i^1 \sim_i x_i^2$, then the price-wealth pairs (p^1, w^1) and (p^2, w^2) are said to be indifferent.

Proposition 5. If the preference relation \lesssim_i is a complete preorder, then the preference relation, as just defined above on S_i^{max} , is also a complete preorder.

This conclusion follows directly from Propositions 3 and 4. And without causing confusion, in this case, the preference relation defined on S_i^{max} will also be written as \lesssim_i .

The following reasoning illustrates that when the preference relation \lesssim_i is not a complete preorder, then the preference relation defined above on S_i^{max} might not be well defined. Specifically, there might be price-wealth pairs (p^1, w^1) and $(p^2, w^2) \in S_i^{max}$ such that there are $x_i^1, x_i^{10} \in \xi_i(p^1, w^1)$ and $x_i^2, x_i^{20} \in \xi_i(p^2, w^2)$ such that

$$x_i^1 <_i x_i^2 \text{ and } x_i^{20} <_i x_i^{10}.$$

For this end to hold, we only need to make sure to select $x_i^1, x_i^{10} \in \xi_i(p^1, w^1)$ and $x_i^2, x_i^{20} \in \xi_i(p^2, w^2)$ so that x_i^1 and x_i^{10} are \preceq_i -incomparable, and so are x_i^2 and x_i^{20} .

The Total Demand Correspondence

If for the preference relation \preceq_i there is such a subset $X_i^* \subseteq X_i$ that for any x_i^1 and $x_i^2 \in X_i^*$, $x_i^1 \neq x_i^2$ implies that $[x_i^1] \neq [x_i^2]$ and $X_i = \cup_{x_i \in X_i^*} [x_i]$, then this subset X_i^* is referred to as a set of (consumer i 's) preference representations. The idea behind such a set X_i^* is that when the preference relation \preceq_i is only reflexive without being complete and transitive, it cannot generally be utility representable. For the incompleteness of some \preceq_i , see, for example, Bosi and Herden (2012), Nishimura and Ok (2016), for the nontransitivity of certain \preceq_i , see, for example, Birnbaum and Gutierrez (2007), Forrest, Darvishi et al., (to appear), Tversky (1969). Therefore, in real-life applications of relevant economic theories, an appropriate X_i^* can be chosen to play the role as that a real-number valued utility function has conventionally played (Mas-Collel et al., 1995).

For a chosen set $X_i^* \subseteq X_i$ of consumer i 's preference representations, let $u_i: X_i \rightarrow X_i^*$ be the canonical utility function of consumer i such that for any consumption $x_i \in X_i$, $u_i(x_i) = x_i^* \in X_i^*$, if $x_i \in [x_i^*]$. It is shown (Forrest, Darvishi et al., to appear) that if \preceq_i is a complete preorder on X_i , the aforementioned subset $X_i^* \subseteq X_i$ exists.

For each maximal chain X_i^{max} in X_i^* , the u_i -preimage of the chain X_i^{max} is equal to

$$u_i^{-1}(X_i^{max}) = \cup \{[x_i^*]: x_i^* \in X_i^{max}\}.$$

In the rest of this paper, assume that a set X_i^* of (consumer i 's) preference representations exists and is chosen, and for any maximal chain X_i^{max} in X_i^* a utility function $u_i^{max}: u_i^{-1}(X_i^{max}) \rightarrow \mathbb{R}$ also exists and is fixed.

Proposition 6. If consumer i 's ordering \leq_i of real numbers satisfies the condition of positive multiplicativity, that is, for any scalar $\alpha > 0$ and $a, b \in \mathbb{R}$, $a \leq_i b \rightarrow \alpha a \leq_i \alpha b$, then for any $t \in \mathbb{R}_+$, $\xi_i(tp, tw) = \xi_i(p, w)$.

Proof. From equation (6), it follows that

$$\xi_i(tp, tw) = \{x_i \in X_i: x_i \in \max_{\preceq_i} \{z_i \in X_i: tp \cdot z_i \leq_i tw_i\}\}.$$

Because the ordering \leq_i satisfies the condition of positive multiplicativity, $tp \cdot z_i \leq_i tw_i$ is equivalent to $p \cdot z_i \leq_i w_i$. Hence, the previous expression is equal to

$$\{x_i \in X_i: x_i \in \max_{\preceq_i} \{z_i \in X_i: p \cdot z_i \leq_i w_i\}\} = \xi_i(p, w).$$

That is, we have shown $\xi_i(tp, tw) = \xi_i(p, w)$, for any $t \in \mathbb{R}_+$. QED

The condition of positive multiplicity evidently holds true for the conventional ordering of real numbers. However, the following example shows that it does not hold true generally for a randomly chosen ordering of real numbers.

Example 2. Here a situation is constructed to show that positive multiplicativity is not generally satisfied by any ordering of real numbers. In particular, the condition of positive multiplicativity is not satisfied by the order relation $\leq_{mod(4)}$ does not satisfy the. In fact, we have

$$1 \leq_{mod(4)} 2 \not\rightarrow 2 \cdot 1 \leq_{mod(4)} 2 \cdot 2$$

where the left-hand side is actually $2 \cdot 1 = 2 \geq_{mod(4)} 2 \cdot 2 = 0 =$ the right-hand side. QED

For a price-wealth pair $(p, w) \in \mathbb{R}^{\ell+m}$, if $(p, w) \in \cap_{i=1}^m S_i^{max}$, meaning that for each $i = 1, 2, \dots, m$, there is at least one maximal consumption $x_i^{max} \in \gamma_i(p, w)$, define the following set-valued, partial function $\xi: \mathbb{R}^{\ell+m} \rightarrow \sum_{i=1}^m X_i = \{x = x_1 + x_2 + \dots + x_m: x_i \in X_i, i = 1, 2, \dots, m\}$:

$$\xi(p, w) = \sum_{i=1}^m \xi_i(p, w), \quad (7)$$

such that the domain of ξ is $\cap_{i=1}^m S_i^{max}$ and that for each $x = x_1 + x_2 + \dots + x_m \in \xi(p, w)$, $x_i = x_i^{max} \in \xi_i(p, w)$ is a maximal consumption of consumer i . This function ξ is referred to as the total demand correspondence (Debreu, 1959). Both Proposition 6 and equation (7) jointly imply that

Proposition 7. For any $(p, w) \in \cap_{i=1}^m S_i^{max}$ and any scalar $t \in (0, +\infty)$, $\xi(tp, tw) = \xi(p, w)$. QED

Proposition 8. For a given price-wealth pair $(p, w) \in S_i$, x_i^* is a maximal element in $\gamma_i(p, w)$ with respect to the preference relation \preceq_i , if and only if x_i^* minimizes the expenditure $p \cdot x_i$ on the set $\{x_i \in X_i: x_i \succeq_i x_i^*\}$.

Proof. (\Rightarrow) Assume that $x_i^* \in \max_{\preceq_i} \gamma_i(p, w)$. From equation (2), it follows that

$$\begin{aligned} x_i^* &\in \max_{\preceq_i} \{x_i \in X_i: p \cdot x_i \leq w_i\} \\ &= \min_{\preceq_i} \{x_i \in X_i: p \cdot x_i \geq w_i\} \\ &= \min_{x_i \in X_i, p \cdot x_i \geq w_i} \{x_i \in X_i: x_i \succeq_i x_i^*\}. \end{aligned}$$

That is, x_i^* minimizes the expenditure $p \cdot x_i$ on the set $\{x_i \in X_i: x_i \succeq_i x_i^*\}$.

(\Leftarrow) The argument for this part is similar to the reasoning above except that we move forward in the opposite direction. QED

Relationship between Preferences and Order of Real Numbers

One can readily see that both \preceq_i and \leq_i are defined on consumer i 's system of values and beliefs, although the preference relation \preceq_i can be temporarily influenced by peers and altered slightly by peer pressures (Hu et al., 2021; Li, et al., 2023; Mani et al., 2013). In other words, because of their common roots, in some measure \preceq_i and \leq_i cannot be inconsistent with each other. One way to describe such consistency between these orders, let us adopt the following Axioms from Debreu (1959).

Axiom 3. For any price-wealth pair $(p, w) \in S_i$, any consumption $x_i \in X_i$, and a chosen $x_i^* \in X_i$, $p \cdot x_i \leq w_i$ implies $x_i \preceq_i x_i^*$.

Axiom 4. For any price-wealth pair $(p, w) \in S_i$, any consumption $x_i \in X_i$, and a chosen $x_i^* \in X_i$, $x_i \succeq_i x_i^*$ implies $p \cdot x_i \geq w_i$.

Preference relation \preceq_i is said to be continuous (Forrest, Darvishi et al., to appear), if for any maximal chain X_i^{max} in X_i^* , and for each $x_i' \in u_i^{-1}(X_i^{max})$, the following sets are closed in $u_i^{-1}(X_i^{max})$:

$$\{x_i \in u_i^{-1}(X_i^{max}): x_i \preceq_i x_i'\} \text{ and } \{x_i \in u_i^{-1}(X_i^{max}): x_i \succeq_i x_i'\}. \quad (8)$$

The relation \preceq_i is said to be additively conserved, if for any consumptions $a_i^j, b_i^j \in X_i, j = 1, 2$,

$$a_i^1 \preceq_i b_i^1 \text{ and } a_i^2 \preceq_i b_i^2 \rightarrow a_i^1 + a_i^2 \preceq_i b_i^1 + b_i^2, \quad (9)$$

where the sign \preceq_i becomes $<_i$ in the consequence, if $<_i$ appears in at least one of the two antecedents. Accordingly, the relation \preceq_i is said to be positively multiplicative, if for any consumptions $x_i^1, x_i^2 \in X_i$ and any scalar $\alpha > 0$,

$$x_i^1 \preceq_i x_i^2 \rightarrow \alpha x_i^1 \preceq_i \alpha x_i^2,$$

where the sign \preceq_i will become $<_i$ in the consequence, if $<_i$ appears in the antecedent. And, \preceq_i is said to be asymptotically preserves preference preordering, if for each sequence $\{x_i^q\}_{q=1}^\infty \subseteq X_i$, satisfying $x_i^q \succeq_i x_i^0$

(respectively, $x_i^q \lesssim_i x_i^0$), for each $q \in \mathbb{N}$ and some $x_i^0 \in X_i$, $\lim_{q \rightarrow \infty} x_i^q \gtrsim_i x_i^0$ (respectively, $\lim_{q \rightarrow \infty} x_i^q \lesssim_i x_i^0$), whenever the limit exists.

Proposition 9. If the following conditions hold true, then Axiom 4 implies Axiom 3.

- (i) $w_i \neq_i \min_{z_i \in X_i} p \cdot z_i$,
- (ii) preference relation \lesssim_i satisfies the conditions of additive conservation and positive multiplicativity, and
- (iii) consumer i 's consumptions asymptotically preserve preference relation \lesssim_i .

Proof. For any price-wealth pair $(p, w) \in S_i$, any consumption $x_i \in X_i$, and a fixed $x_i^* \in X_i$, assume that $x_i \gtrsim_i x_i^*$ implies $p \cdot x_i \geq_i w_i$. Equivalently, $p \cdot x_i <_i w_i$ implies $x_i^* \succ_i x_i$. We need to show that for any consumption $x_i \in X_i$, if $p \cdot x_i \leq_i w_i$, then $x_i \lesssim_i x_i^*$.

Axiom 4 implies that for any consumption $x_i \in X_i$, $p \cdot x_i <_i w_i$ implies $x_i <_i x_i^*$. For the rest of this proof, we focus on showing that for any consumption $x_i \in X_i$, $p \cdot x_i =_i w_i$ implies $x_i \lesssim_i x_i^*$. To this end, because $w_i \neq_i \min_{z_i \in X_i} p \cdot z_i$, there is a consumption $x_i^1 \in X_i$ such that $x_i^1 \neq x_i$, and $p \cdot x_i^1 <_i w_i$.

For any scalar $\alpha \in (0, 1)$, define $z_i(\alpha) = \alpha x_i^1 + (1 - \alpha)x_i$. From $p \cdot x_i^1 <_i w_i$ and $p \cdot x_i =_i w_i$, the condition of positive multiplicativity guarantees that $p \cdot (\alpha x_i^1) <_i \alpha w_i$ and $p \cdot (1 - \alpha)x_i =_i (1 - \alpha)w_i$. So, the condition of additive conservation implies

$$p \cdot z_i(\alpha) = p \cdot \alpha x_i^1 + p \cdot (1 - \alpha)x_i <_i \alpha w_i + (1 - \alpha)w_i = w_i.$$

So, Axiom 4 implies that $z_i(\alpha) <_i x_i^*$ and that for any natural number q , $z_i(q^{-1}) = q^{-1}x_i^1 + (1 - q^{-1})x_i \rightarrow x_i$. So, the asymptotical preservation of consumer i 's preference implies that $x_i = \lim_{q \rightarrow \infty} z_i(q^{-1}) \lesssim_i x_i^*$. QED

In terms of the literature, the conclusion that Axiom 4 implies Axiom 3 was established under a different set of conditions. In particular, instead of conditions (ii) and (iii) in Proposition 9, Debreu (1959) requires that X_i is convex, and \lesssim_i is a continuous and complete preorder. Therefore, a generalization of Debreu's work is established here, because in this paper the preference \lesssim_i is not generally assumed to be a complete preorder. As for the conditions listed in (ii) and (iii) in Proposition 9, Examples 3 and 4 below demonstrate that (a) in general, the preference relation \lesssim_i does not necessarily satisfy the condition of additive conservation, and (b) not every preference relation \lesssim_i is asymptotically preserving. And similar to Example 2, one can readily see that not all preorders satisfy the condition of positive multiplicativity.

Example 3. Assume that consumer i 's system of values and beliefs preorders the quantities of a particular commodity h by referring to the mod4 function so that for any two real numbers x and y , $x <_i y$ if and only if $x(\text{mod}4) < y(\text{mod}4)$. Let $x_i^1, x_i^2, x_i^3 \in X_i$ be three consumptions such that

$$x_{ik}^1 = x_{ik}^2 = x_{ik}^3, k = 1, 2, \dots, \ell, k \neq h,$$

and

$$x_{ih}^1 = 2, x_{ih}^2 = 3 \text{ and } x_{ih}^3 = 1.$$

Then, we have $x_i^1 \lesssim_i x_i^2$ and $x_i^3 \lesssim_i x_i^1$. However, instead of $x_i^1 + x_i^3 \lesssim_i x_i^2 + x_i^3$, we have

$$x_i^1 + x_i^3 \gtrsim_i x_i^2 + x_i^3,$$

because

$$x_{ik}^1 + x_{ik}^3 = x_{ik}^2 + x_{ik}^3, k = 1, 2, \dots, \ell, k \neq h,$$

and

$$x_{ih}^1 + x_{ih}^3 = 3 \succsim_i x_{ih}^2 + x_{ih}^3 = 3 + 1 =_{\text{mod}4} 0.$$

That is, the specifically defined \succsim_i is not additively conserved. QED

Example 4. Let us continue to employ the preference relation \succsim_i , defined in the previous example. And, define a sequence $x_i^1, x_i^2, \dots, x_i^q, \dots \in X_i$ of possible consumptions for consumer i such that

$$x_{ik}^q = x_{ik}^1, k = 1, 2, \dots, \ell, k \neq h, q = 1, 2, \dots \quad (10)$$

and

$$x_{ih}^q = 3 + \frac{q}{q+1}, q = 1, 2, \dots \quad (11)$$

Then, it is ready to see that $x_i^q \rightarrow x_i^0$, as $q \rightarrow \infty$, where $x_{ik}^0 = x_{ik}^1, k = 1, 2, \dots, \ell, k \neq h$, and $x_{ih}^0 = 0$, which is equal to 4 (mod4).

Define x_i^{low} as follows: $x_{ik}^{\text{low}} = x_{ik}^1, k = 1, 2, \dots, \ell, k \neq h$, and $x_{ih}^{\text{low}} = 3$. Then, equations (10) and (11) imply that

$$x_i^q \succsim_i x_i^{\text{low}} \text{ and } \lim_{q \rightarrow \infty} x_i^q = x_i^0 \prec_i x_i^{\text{low}}.$$

That is, the specifically defined preference relation \succsim_i is not asymptotically conserved. QED

The set X_i of consumer i 's possible consumptions is said to be convex with respect to \succsim_i (Debreu, 1959, p. 60; Forrest, [Tiglioglu et al., 2022](#)) or \succsim_i is said to be convex, if X_i is convex, as a subset of \mathbb{R}^ℓ , and for any distinct consumptions $x_i^1, x_i^2 \in X_i$ and arbitrary scalar $\alpha \in (0,1)$,

$$x_i^1 \prec_i x_i^2 \rightarrow x_i^1 \prec_i \alpha x_i^2 + (1 - \alpha)x_i^1. \quad (12)$$

One consumption $x_i \in X_i$ is said to be satiation for consumer i (Mas-Collel et al., 1995), if for any $y_i \in X_i, y_i \precsim_i x_i$. It is ready to see that if consumer i has incomparable consumptions, then there might be several incomparable satiation consumptions in X_i simultaneously.

Proposition 10. If both X_i and \succsim_i are convex, $x_i^* \in X_i$ is not a satiation consumption, and consumer i 's consumptions asymptotically preserve preference relation \succsim_i , then Axiom 3 implies Axiom 4.

Proof. For any price-wealth pair $(p, w) \in S_i$, any consumption $x_i \in X_i$, and a chosen $x_i^* \in X_i$, Axiom 3 is equivalent to $x_i \succ_i x_i^* \rightarrow p \cdot x_i \succ_i w_i$. Let $x_i \in X_i$ satisfy $x_i \succsim_i x_i^*$, which can be split into two cases: $x_i \succ_i x_i^*$ and $x_i \sim_i x_i^*$. Axiom 3 guarantees that the former case leads to the desired conclusion $p \cdot x_i \succ_i w_i$ or $p \cdot x_i \geq_i w_i$.

For the second case $x_i \sim_i x_i^*$, because $x_i^* \in X_i$ is not a satiation consumption, there is a consumption $x_i^1 \in X_i$ such that $x_i^1 \succ_i x_i^*$. So, for any scalar $\alpha \in (0,1)$, the convexity of X_i implies that $\alpha x_i^1 + (1 - \alpha)x_i \in X_i$; and the convexity of \succsim_i guarantees that $\alpha x_i^1 + (1 - \alpha)x_i$ and x_i are comparable in terms of \succsim_i such that $x_i^* \sim_i x_i \prec_i z_i(\alpha) = \alpha x_i^1 + (1 - \alpha)x_i$. So, Axiom 3 implies that

$$p \cdot z_i\left(\frac{1}{n}\right) \succ_i w_i, \text{ for } n = 2, 3, 4, \dots \quad (13)$$

From $z_i\left(\frac{1}{n}\right) \rightarrow x_i$, the asymptotic preservation of the preference relation \succsim_i and equation (13) guarantee that $p \cdot x_i \geq_i w_i$. QED

Comparing to what has been established in the literature (e.g., Levin & Milgrom, 2004; Mas-Collel et al., 1995), when the preference relation \succsim_i is no longer assumed to be a complete preorder, the convenient fact that $p \cdot x_i$ is a continuous

function in x_i cannot be readily employed (e.g., Dubra & Ok, 2002; Ok, 2002; Nishimura & Ok, 2016; Bosi & Herden, 2012) in the proof of Proposition 10, as Example 4 demonstrates.

Proposition 11. For given $(p, w) \in S_i^{max}$ and $x_i^* \in \xi_i(p, w)$, if the following hold true, then $p \cdot x_i^* = w_i$.

- X_i is convex, as a subset of \mathbb{R}^ℓ , and is convex with respect to \preceq_i ,
- x_i^* is not a satiation consumption,
- consumer i 's consumptions asymptotically preserve preference relation \preceq_i ,

Proof. From $x_i^* \in \xi_i(p, w)$, it follows that $p \cdot x_i^* \leq_i w_i$. To establish the desired equality, it suffices to show that $p \cdot x_i^* \geq_i w_i$. To this end, let $X_i^* \subseteq X_i$ be a chosen subset of consumer i 's preference representations, $u_i: X_i \rightarrow \mathbb{R}$ the canonical utility function, and X_i^{max} a maximal chain in X_i^* such that $x_i^* \in u_i^{-1}(X_i^{max})$.

Hence, for any $x_i \in u_i^{-1}(X_i^{max})$, if $p \cdot x_i \leq_i w_i$, then $x_i \in \gamma_i(p, w)$ and therefore $x_i \preceq_i x_i^*$. That is, Axiom 3 holds true on $u_i^{-1}(X_i^{max})$, which, from Proposition 10, implies that Axiom 4 holds true. That is, $p \cdot x_i^* \geq_i w_i$. QED

Proposition 12. Assume that each infinity can be actually (not potentially) achieved. If $u_i^{-1}(X_i^{max})$ is a connected subset of \mathbb{R}^ℓ , for each maximal antichain $X_i^{max} \subseteq X_i^*$, and the preference relation \preceq_i is continuous on X_i , then $S_i^{max} = S_i$.

Proof. For each maximal antichain $X_i^{max} \subseteq X_i^*$, let us choose a continuous utility function $u_i^{max}: u_i^{-1}(X_i^{max}) \rightarrow \mathbb{R}$. The existence of u_i^{max} is confirmed by the famous Debreu (1959), where the original proof is valid only with the assumption that each infinity can be actually (not potentially) achieved (for details, see the proof of Proposition 9).

For each price-wealth pair $(p, w) \in S_i$, consumer i chooses a maximum in $u_i^{-1}(X_i^{max}) \cap \gamma_i(p, w)$ in terms of \preceq_i , which reflects the principles held in his system of values and beliefs. That is, he maximizes u_i^{max} on $u_i^{-1}(X_i^{max}) \cap \gamma_i(p, w)$, which is non-empty and compact, because of the Lower Boundedness Axiom (Axiom 1) and the definition of γ_i . Therefore, the real-number valued utility function u_i^{max} actually reaches its maximum on $u_i^{-1}(X_i^{max}) \cap \gamma_i(p, w)$. In other words, there is a non-empty subset of maximal consumptions in $\gamma_i(p, w)$. That is, $(p, w) \in S_i^{max}$. Hence, the equality $S_i^{max} = S_i$ has been shown. QED

Comparing to the literature, this result generalizes the corresponding result (Debreu, 1959, p. 72) by removing the one imposed condition: the set X_i of consumption is a compact subset in \mathbb{R}^ℓ .

A FEW FINAL WORDS

This paper embeds a consumer's set X_i of all possible consumptions in a Euclidean space \mathbb{R}^ℓ , while removing the unrealistic assumption that a consumer's consumption preferences are complete (e.g., Hervés-Beloso & Cruces, 2019; Levin & Milgrom, 2004; Mas-Collel et al., 1995). On such bases, this research revisits part of the prevalent consumer theory regarding a consumer's budget set and demand correspondence and shows, among other conclusions, that

- Only when a consumer's order of real numbers is the same as the conventional one, the budget set function γ_i is continuous at the price-wealth pair $(p^0, w^0) \in S_i$ satisfying $w_i^0 \neq \min_{x_i \in X_i} p^0 \cdot x_i$ (Proposition 1 and Example 1).
- If consumer i 's ordering \leq_i of real numbers satisfies the condition of positive multiplicativity, then this consumer i 's demand correspondence is homogenous of degree zero in price and in wealth. That is, for any $t \in \mathbb{R}_+$, $\xi_i(tp, tw) = \xi_i(p, w)$ (Proposition 6).
- The conditions of additive conservation and asymptotic preservation are not generally satisfied by preference relations (Examples 3 and 4).
- If each maximal chain $U \subseteq X_i$ is connected in \mathbb{R}^ℓ and preference relation \preceq_i is continuous on X_i , then for each feasible price-wealth pair (p, w) there is at least one equilibrium consumption $x_i^{max}(p, w)$ (Proposition 12).

Highlighted by these results, this paper necessarily introduces several unconventional concepts, such as consumer-specific order of real numbers, positive multiplicativity, additive conservation, and asymptotic preservation. It then confirms under what conditions some of the previously known properties continue to hold true. At the same time, this paper investigates issues never before faced so that brand new conclusions are established.

Other than its theoretical contribution, as outlined above, this paper can also be seen as a small part of a much larger effort of developing a new consumer theory for the purpose of producing more tangible economic values than possible by the current, prevalent theory. Such need has been loudly called for by Paul Krugman (*New York Times*, 2009-09-02), Paul De Grauwe (*Financial Times*, 2009-07-21), and others.

For future research, there are evidently many important questions still left open. For example, if a preference relation \preceq_i is not a complete preorder, under what conditions will the relation \approx_i on S_i^{max} , as given in Section 3.2, be well defined? What will be the form of Proposition 1 if \leq_i is not the same as \leq ? Under what conditions does the preference relation \preceq_i have a set X_i^* ($\subseteq X_i$) of preference representations, when \preceq_i is not a complete preorder, as mentioned at the start of Section 3.3? In some measure the binary relations \approx_i and \leq_i cannot be inconsistent with each other, as stated in Section 3.4. Can such an unspecified measure be identified for each given system of values and beliefs?

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THE PERVASIVE NATURE OF FRAUD: A STUDY OF ORGANIZATIONS FROM PRE to POST PANDEMIC

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ABSTRACT

There are a number of reasons fraud proliferates during recessions and times of economic instability. A large factor is the increased pressure companies, and their employees feel as they struggle to meet the challenges of an economic deceleration. For example, struggling companies can face pressure to falsify their financials in order to meet earnings targets or secure financing. The resultant financial statement fraud is also the most expensive type of fraud. There is an immense negative impact from fraud incidents on institutional stability and ultimately repercussions on the economy in general. This paper analyzes ways that the pandemic affected the risk of fraud for firms and auditors, comparing the 2018 and 2022 ACFE (The Association of Certified Fraud Examiners) reports. For example, according to data from the 2019 Global Fraud Survey, financial statement fraud costs an average of \$8.7 million. This research further discusses the signs of fraud post- COVID, focusing on occupational fraud. Trends on the risks of fraud are identified and analyzed during this period. Finally, we discuss recommendations in preparing for a post-pandemic fraud landscape.

INTRODUCTION

The COVID-19 pandemic affected many different aspects of American lives, including conceptions about where work is performed. According to the Census Bureau Report (April, 2023), the number of people who worked from home in the U.S. tripled between 2019 and 2021. The amount of people in the workforce increased from 5.7% of the workforce in 2019 to 17.9% in 2021. While this increase in the incidence of working from home is evident across all income groups, it is more prominent amongst the highest-earning group. This group reported the biggest increase in the number of workers working from home jumping from 11% in 2019 to 38% in 2021. Among the industries which evidenced the biggest increases in work from home (WFH) was finance, insurance and real estate, in which 38% of people worked from home compared to only 8% of people in the arts, entertainment, recreation, accommodation and food services industry in 2021. This normalization of the work from home culture has grown ever since, with service professionals seeking a better work-life balance, reducing commute time and improving efficiency and worker productivity.

While employees appreciate the flexibility of work from home arrangements and they were able to reassess their work-life priorities, such changes have an impact on organizations' risks. Whenever organizations plan a major shift in operations, it has to be followed by a proper change in management protocols. With the sudden shift to remote work at the onset of the pandemic, such management planning was harder to implement. As a result, the shift in the work environment has led to higher risk. Although the risks might differ in magnitude by sector and organization, the general threats include data theft, cybercrime and occupational fraud, according to the Association of Certified Fraud Examiners (ACFE), 2023. While data theft and cyber crimes are examples of external attacks, one of the biggest threats organizations face is from unsupervised employees. The ACFE Report to the Nations provides insights into the factors and toll of occupational fraud. The 2022 ACFE, the largest global study on occupational fraud from 133 countries, reports a median loss of \$117,000 in revenue for an average organization due to fraud that equates to a 5% loss, per year.

Given the extent of losses associated with occupational fraud, this research will further analyze the pandemic's effects on the risk of fraud for firms and auditors, comparing the 2018 and 2022 ACFE reports, discuss the signs of fraud post- COVID, and suggest recommendations in preparation for a post-pandemic fraud landscape.

PREVIOUS LITERATURE

With the onset of the pandemic, and the commensurate changes in the workplace, many employees appreciated the flexibility of working from home without having to commute to the office. A study by Barrero, Bloom and Davis (2021) found that a post-pandemic shift to work from home had significant benefits for workers, primarily due to reduced drive times. This flexible work environment also improved worker productivity. In a natural experiment with call center workers at large US firms, Emanuel and Harrington (2021) found that remote work led to an 8% increase in productivity of workers. Another study which conducted a natural experiment involving the U.S. Patent Office workers discovered that a work-from-anywhere approach led to a 4% increase in productivity, Choudhury, Foroughi, and Larson, (2021). Similarly, Angelici and Profeta (2020) report that granting employees some flexibility over when and where to work led to an increase in productivity in a field experiment at a large Italian firm. Work from home has been shown to improve work-life balance for many employees. A study by Tilo (2021) found that employees who work from home are four times more likely to report having an improved work-life balance since the start of the COVID-19 pandemic.

Additionally, Aksoy, Barrero, Bloom, Davis, Dolls, and Zárate, (2022) states “employers plan an average of 0.7 WFH days per week after the pandemic, but workers want 1.7 days.” These results are based on the Global Survey of Working Arrangements (G-SWA) which covers full-time workers, aged 20-59, who finished primary school across 27 countries. This research drew on a near-universe of online job vacancy postings in the United States and four other English-speaking countries, Hansen, Lambert, Bloom, Davis,, Sadun, and Taska, (2022) find the number of job postings that offer remote work for one or more days per week, has been increased significantly since mid-2020 through mid-2022. Adrian et al. (2021) found that the share of vacancy positions that offer remote work in 20 OECD countries also increased significantly through September 2021. The growing trend of employers offering remote work options to their employees indicates that this is a practice that was likely here to stay, although recent organizational announcements may indicate a reversal.

While many employees have found that working from home can improve their work-life balance and productivity, some executives are more wary about workers’ productivity at home, and fear that their company culture will take a hit if teams do not work together face-to-face. Barrero, Bloom and Davis (2021) note that “business leaders often mention concerns around workplace culture, motivation, and innovation as important reasons to bring workers back onsite three or more days per week”.

The desire to work remotely has increased tremendously across America. According to Barrero, Bloom and Davis (2021), four in ten Americans who currently work from home at least one day a week would be willing to leave their job if their employer required them to return to the business premises. Workers have become more comfortable with the flexibility and freedom of the hybrid and remote office environments since the pandemic began (Robinson,2022).

Despite the growing popularity of remote work, many large companies including Google, Tesla, Amazon etc., are requiring their employees to come back to their respective office either full-time or part-time. This is a significant trend reversal, as many companies had previously embraced remote work during the COVID -19 pandemic and even touted work from anywhere policies. Remote work is becoming a contentious issue, with both employers and employees taking strong stances on the issue. For example, Tesla CEO Elon Musk has called working from home “morally wrong” and has given his executive staff a choice of either returning to the office or quitting. On the other hand, Amazon workers recently staged a walkout to protest the company’s office policies, which include tracking employees’ in-office attendance and penalizing them for not spending enough time in the office.

However, there are negative impacts of such work from home policies on occupational fraud incidences. The 2021 ACFE survey notes that 51% of organizations have reported more fraud since the onset of the pandemic. A majority (71%) of survey respondents expect the level of fraud impacting their organizations to increase over the next year (Kreston Global, 2021).

OCCUPATIONAL FRAUD

Occupational fraud is usually defined in 3 categories:

- Asset misappropriation – stealing or misuse of company assets – most common, but least costly.
- Corruption – the use of power for personal gain including bribery, extortion or conflicts of interest.
- Financial Statement fraud - intentional misstatement in financial documents – least common, but most costly.

Occupational fraud averages 12 – 18 months before detection. Fraud can be perpetrated by executives at any level, but 3 factors, entitled the fraud triangle are most prevalent: Perceived opportunity – due to a failure in controls or distribution of duties; pressure – often originates from financial challenges; and rationalization – an individual’s justification for the fraudulent act. More than 50% of all fraudulent activity occurs in 4 areas; 15% in Operations; 12% in Accounting; 11% in Executive / Upper Management; and 11% in Sales.

Red flags in consumer scams may include unusual urgency, the name of the company is similar to other names, the name cannot be found on the internet, cannot take a phone call, an offer to pay in gift cards, a request to send your banking details, etc. (Grimes, 2019). Individual behavioral flags for potential fraud include living beyond one’s means, financial difficulties/ history of debts, gambling, unusual close association with a vendor or customer, excessive control issues / unwillingness to share duties, recent divorce or family problems and a general ‘wheeler – dealer’ attitude toward unscrupulous behavior (Moody, 2018). Internal signs of fraud may manifest in inventory shrinkage, missing documents, an increase in the volume of invoices, multiple payments, excessive entry adjustments, etc. (CFI, 2022).

The number of fraud cases during the period of the COVID – 19 pandemic exploded. According to Ayres and Wilder (2021), the proliferation scanned a myriad of industries from fraudulent exploitation of government stimulus plans to consumer fraud spanning fake cures to counterfeit personal protective equipment (PPEs). Predatory losses from COVID-19, according to Gorman (2020) from Reuters have been reported as \$97.5 million by the Federal Trade Commission and include online fraud and unscrupulous callers attempting to defraud fellow Americans.

One of the worst global scandals involved the German financial technology company Wirecard founded in 1999, which processes payments and sells data analytics services. Wirecard, was lauded to be one of Europe’s leading fintech firms. Amidst a series of fraud investigations into the firm’s accounting practices, by EY, a shortfall of \$2 billion was reported missing, resulting in a meteoric decline in its overall worth from \$26.9 billion plummeting to \$3.6 billion by the end of June 2020 (Riley & McSweeney (2020).

Fraud magazine in 2020 quotes from the Second ACFE COVID-19 report, of the anti-fraud professionals surveyed for the ACFE Fraud in the Wake of COVID-19 Benchmarking Report, September 2020 Edition, listed that 77% have seen an increase in the overall level of fraud as of August, compared to 68% who’d observed an increase when the ACFE published the first COVID-19 report in May. In the ACFE report, The Next Normal: Preparing for a Post Pandemic Fraud Landscape, (2021), 51% of organizations reported that they have uncovered more fraud since the onset of the pandemic.

Ninety-two percent of the survey participants expect the overall level of fraud to continue increasing over the next 12 months. Forty-eight percent expect this increase to be significant. Participants said the top fraud risks, based on current observations and expected increases, are: (1) Cyberfraud (2) Social engineering (3) Identity fraud (4) Unemployment fraud (5) Payment fraud (6) and Fraud by vendors and sellers. Cyberfraud includes business email compromise, ransom and malware, and hacking; and social engineering – phishing and baiting; are the top categories for forecasted growth. Comparing 2019 – 2020, New Yorkers were scammed from a variety of sources from the lottery, sweepstakes, or inheritance scams along with phishing scams, out 50% more money in 2020, for a total of \$415,812,917. The FBI listed the state as second in the country for the most money lost, due to fraud, compared to 2019 with \$198,765,769 in reported losses (Darmanjian, 2021). This data from the New York State Comptroller’s Office, the FTC and the FBI Cyber Crime Unit, New York alone recorded \$1.7 million in healthcare-related fraud, an increase of a staggering 782.62%.

For 2022, 43% expected an increase in their overall anti-fraud budgets and technology over the next year, while 48% expected a similar overall anti-fraud budget. Here are notable changes to specific budget areas:

- 29% expect an increase in budget for travel for anti-fraud staff; while 13% expect a decrease.
- 30% expect an increase in budget for training/professional development for anti-fraud staff. However, 13% expect a decrease in this budget item.
- 54% expect their level of anti-fraud staffing to remain about the same; 29% expect an increase and 11% expect staffing reductions.

A majority - 68% to 76% - say that preventing, detecting and investigating fraud are more difficult now than before COVID-19. This research cites changing consumer behaviors (on-line and virtual retail transactions), and business operations (remote work and work from home) are two of the highest risk elements and primary challenges to anti-fraud programs. These programs are at risk due to changes in investigative processes and in the control / operating environment. Changes in controls and processes due to the migration to remote work, staffing changes and reductions, all add to the obstacles to mitigate fraud. According to more than 60% of the respondents, fraud awareness has increased too due to media coverage of various schemes, heightened efforts by fraud professionals and more internal communication within organizations (ACFE- 2021). In a 2022 Anti-Fraud Technology report through the collaboration of SAS and ACFE, at least 97% of fraud examiners believe that analytics are an essential tool to mitigate fraud through an improvement in timeliness, efficiency and accuracy of the fraud detection programs.

An inability to travel is still the number one challenge in combating fraud. But more people are citing conducting remote interviews as a current top challenge for them, moving this up to the number 2 spot. Examining the trends in financial fraud, Karpoff (2021) in contrast, speculated that the future of financial fraud may have some mixed results. He posits that new and innovative fraudsters along with anonymity may increase the possibility of fraud in the industry. Technological and wealth changes, a decrease in information, search, and transaction expense, may, however, precipitate a decrease in incidents as third-party enforcement and ethical deterrents to fraud increase.

Another area of concern is cryptocurrency, defined by the Federal Trade Commission as "a type of digital currency that generally only exists electronically." It is decentralized digital money designed to be used over the internet and can be invested as tokens or coins. Transactions occur through peer-to-peer networks, while a blockchain maintains the records in a decentralized digital database or ledger. Chaum, (1983) published a paper on eCash, an early version of cryptocurrency, that was developed in the 1990's through the firm, DigiCash, that declared bankruptcy in 1998. Bitcoin is considered one of the first forms of cryptocurrency and is now the most popularly traded. First introduced by a programmer under the pseudonym Satoshi Nakamoto, in January 2009, a 2008 whitepaper described the blockchain system as the foundation of the cryptocurrency market. Nakamoto (2008), stated that the peer-to-peer networks use timestamped transactions to create a chain of proof-of-work, thereby forming a blockchain or public record of the transactions. Reviews by investors range from a Ponzi scheme, to a trap for unsuspecting investors, to a viable investment vehicle to a speculative craze (Kerr, Loveland, Smith, and Murphy - Smith, 2023 and Nakamoto, 2008). A 2023 study in Risks, (by Kerr, et al) identified a number of high-profile fraud cases involving cryptocurrency. With the potential upside of outperforming the traditional stock market, comes the risk of much higher volatility and the proliferation of fraud cases.

A few of the top fraud cases involving cryptocurrency are (O'Driscoll, 2023):

- 2022 – Ronin network breach - \$620 million
- Mt. Gox exchange - \$470 million lost, over time but uncovered in 2014
- FTX – Crypto Exchange – November, 2022, hack of about \$500 million

Another growing area has been labeled, Cryptojacking, that uses either malware or a browser-based approach to mine cryptocurrency with the computers or devices of others (Lake, 2020). According to the SonicWall Cyber Threat Report (2022) global crypto jacking has risen to an alarming rate with 12 million attacks and 97 million attempts as of March 2021.

In February, 2023, Bitcoin alone was up 40% year to date, but the industry as a whole is reeling from some of the aforementioned collapses like FTX. The market cap is \$1 trillion, so it remains a huge market to be reckoned with, according to market experts like Marion Laboure from Deutsche Research. Still other critics believe that it is simply the next Dutch Tulip Bubble (a boom-and-bust craze), whereby investors will be left with nothing as the asset bubble crashes when the asset price is not reflected in the value.

In 2022, the FBI in its Internet Crime Report estimated that on-line fraud including tech support, extortion, non-payment / non-delivery, personal data breach and phishing totaled \$10billion. The chart below depicts the proliferation of worldwide internet scams.

Cryptocurrency can generally be used for e-commerce, often using digital wallets. Merchants may choose to accept cryptocurrency either directly or indirectly through a service provider. Companies such as Microsoft, PayPal, Starbucks, Overstock and AT&T have adopted cryptocurrency as a payment option.

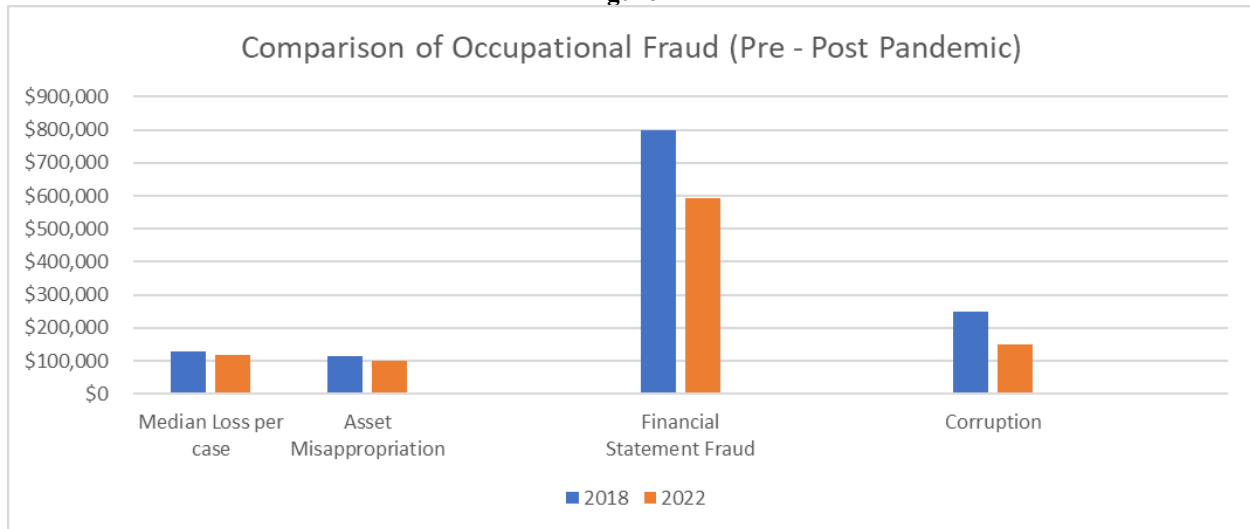
COMPARISON OF PRE AND POST PANDEMIC FRAUD

The rapid shift to digital operations during the pandemic made many organizations susceptible to fraud. However, the comparison of 2018 and 2022 ACFE Report to Nations shows a downturn in fraud as reported in Table 1 below.

Table 1
Comparison of 2022 and 2018 ACFE Report Findings

	2022	2018
Number of Cases	2110 cases	2690 cases
Total Losses of more than	\$3.6 billion	\$7 billion
Median Loss per case	\$117,000	\$130,000
Asset Misappropriation (Median Loss)	\$100,000	\$114,000
Financial Statement Fraud (Median Loss)	\$593,000	\$800,000
Corruption (Median Loss)	\$150,000	\$250,000
Median Duration of Fraud	12 months	16 months

Figure 1



The Figure 1 above indicate a decline in overall fraud cases as well as in the losses reported from occupational fraud between 2018 and 2022. However, it should be noted that while the changing business landscape during the pandemic increased the fraud risk for organizations, detecting and investigating fraud have become increasingly more difficult. Instances such as someone living beyond their means, which are common red flags of fraud are harder to detect during remote work on a video call. During the pandemic, many organizations reported receiving fewer tips from employees since remote work made it harder for employees to spot red flags and report them. Hence significant levels of occupational fraud were undetected or unreported during this time (ACFE 2021).

FRAUD SIGNS AND TRENDS POST PANDEMIC

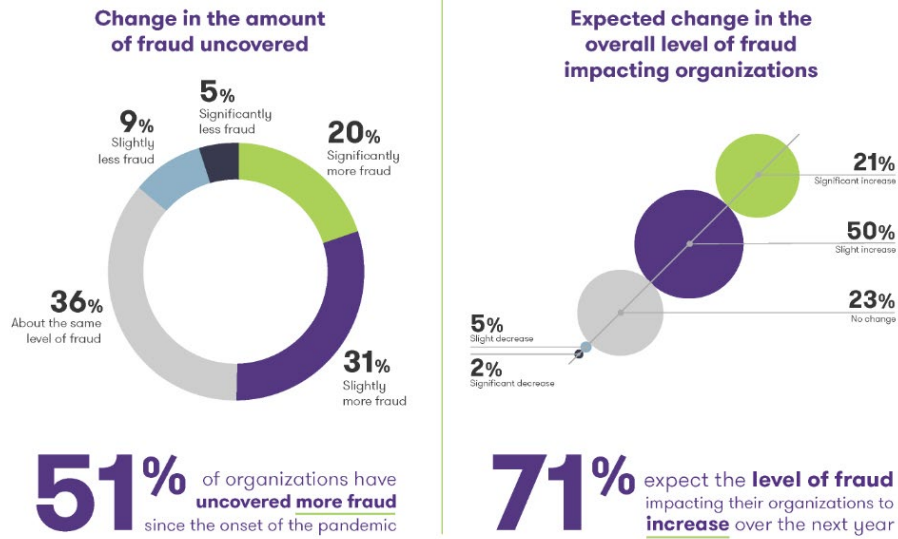
In order to acknowledge the effects of the pandemic, many organizations had to alter their work environments, which included allocation of resources, staffing and operations. Combined together, these changes prompted incentives for employees to commit fraud.

The Figure 2 below summarizes the ACFE (2021) findings regarding the percentage of organizations which uncovered additional fraud since the onset of the pandemic. A vast majority of survey respondents fear that the level of fraud in their organization will increase over the following year.

The ACFE survey identified certain roadblocks in the prevention and detection of fraud during the pandemic. These included issues such as changes to investigative processes and operating environments, as well as uncertainty about how the pandemic has changed the risk of fraud.

We can examine the increased risk of fraud due to change in work environment through the lens of the Fraud Triangle, which states that “individuals are motivated to commit fraud when three elements come together: 1) some kind of perceived pressure 2) some perceived opportunity 3) some way to rationalize the fraud as not being inconsistent with one’s values.”

Figure 2



Source: The ACFE and Grant Thornton's Report, *The Next Normal: Preparing for a Post-Pandemic Fraud Landscape*

RECOMMENDATIONS FOR POST PANDEMIC FRAUD LANDSCAPE

A significant shift in business operations and changes in consumer behavior during the COVID-19 pandemic had a profound impact on fraud risk. With the ACFE report (2021) findings indicating over 71% of organizations expecting fraud incidences to increase, business leaders need to address this issue and incorporate measures into their risk assessments and anti-fraud plans. Organizations need to strengthen their anti-fraud resources in response to the likely increase in fraud.

Measures to detect and prevent fraud incidents include:

- **Budget:** budgetary and staffing support available to anti-fraud programs can have a significant impact on the effectiveness of detection and prevention of fraud. ACFE (2021) report notes that 38% of organizations surveyed increased their budgets for anti-fraud technology, and have confirmed a commitment of continued investment in such anti-fraud programs.
- **Adjustments to existing anti-fraud programs:** a vast majority of organizations have implemented changes to their anti-fraud programs in response to the risks and circumstances of the pandemic. In particular, conducting internal fraud awareness training and updating a fraud risk assessment are the most common initiatives undertaken by the organizations. Other actions include making operational changes to the risk management program, creating a fraud risk map and conducting external fraud awareness training.
- **Invest in Anti-Fraud Programs:** investing in anti-fraud activities such as establishing a Code of Conduct for your organization to reduce losses and limit the duration of fraud, obtaining fraud insurance, and implementing an internal audit function in the organization. If smaller organizations find this cost-prohibitive, it could be considered as an outsourced activity to better fit the needs of organizations of varying sizes.
- **Fraudulent Emails and Texts:** using the phone to ensure whether a correspondence is legitimate instead of responding via email, as there are higher chances of email being hacked. Being aware of unsolicited communications, especially from governmental agencies such as the IRS or SBA. These organizations do not contact businesses unsolicited via phone or email.
- **Empower employees:** many fraudulent disbursements occur because employees do not want to bother their manager for fear of appearing incompetent. It is important to make employees a part of the team to help fight fraud in the organization. Encouraging employee participation in fraud prevention with praise and reward will set a tone of proactive transparency (Campbell. 2022)

CONCLUSION

The COVID-19 pandemic brought about significant changes in the workplace, with a rapid shift to remote work and digital operations. While many employees enjoyed the flexibility of working from home, this transition also introduced new challenges and risks for organizations, particularly in terms of fraud. This paper analyzed the impact of the pandemic on fraud risk for firms and auditors, comparing data from the 2018 and 2022 reports by the Association of Certified Fraud Examiners (ACFE).

The ACFE reports revealed a decline in both the number of fraud cases and the total losses reported between 2018 and 2022. However, this reduction in reported fraud cases should not be misconstrued as a decrease in fraud risk. Detecting and investigating fraud became more challenging during the pandemic due to remote work, which made it harder for employees to spot red flags and report incidents. Many instances of occupational fraud likely went undetected or unreported during this time.

Occupational fraud can manifest in various forms, including asset misappropriation, corruption, and financial statement fraud. It typically takes 12 to 18 months before detection, and it often involves individuals who see an opportunity, feel financial pressure, and can rationalize their actions. Red flags for potential fraud include living beyond one's means, financial difficulties, close associations with vendors, and more.

The paper has also highlighted the increasing risk associated with cryptocurrency, as its usage and investment have grown significantly. The crypto market has seen both tremendous growth and a surge in fraudulent activities, including high-profile cases of breaches and scams.

In response to the evolving fraud landscape, organizations need to take proactive steps to mitigate fraud risk, which are discussed in the paper. As organizations continue to adapt to the post-pandemic work environment, addressing fraud risk is essential for maintaining stability and financial security. While the numbers of reported fraud cases may have decreased, the changing landscape of remote work and evolving tactics by fraudsters require continued vigilance and proactive measures to protect against occupational fraud and related risks.

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DIRECT AND INDIRECT EFFECTS OF FEAR AND RESPONSE COST ON CARD PAYMENT PROTECTION MOTIVATION

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ABSTRACT

This study employs Protection Motivation Theory (PMT) to examine the influence of fear and response costs on card payment protection motivation based on the Latin America context. We conducted a quantitative study using non-probability convenience sampling and gathered data from 210 university students in Puebla, Mexico. Our findings shed light on both the direct and indirect effects of fear and response costs on the protection motivation of card payment service users revealing that while perceived fear associated with card payment usage triggers protection motivation among users, the perceived response cost linked to card payment usage does not have the same effect. These results underscore the necessity of promoting consumer awareness as to the advantages of employing anti-theft tracking software and other protective measures. Importantly, our research advances the fields of card payment and PMT by delivering significant contributions in theory, empirical insights, managerial implications, and policy considerations.

INTRODUCTION

The convenience associated with using card payments has fundamentally transformed how society handles financial transactions in today's increasingly digital and interconnected world. Whether swiping a credit card, making contactless payments with a mobile phone, or purchasing retail gift cards, the simplicity of these transactions has undeniably streamlined our lives. However, this convenience comes at a price — a host of security concerns that threaten consumers' financial well-being and the stability of the payment card industry itself.

While the global transition from cash to electronic payments offers substantial prospects (Olaleye, Nuhu & Galindo, 2022), Mexico has yet to achieve a completely cashless economy. Like many developing nations, the country is just catching up with the cashless economy (Olaleye, Sanusi & Oyelere, 2023). Statistics show that despite extensive government initiatives promoting electronic payment methods, increased consumer awareness, and the growing global acceptance of card payments, Mexicans lean heavily toward cash transactions rather than electronic alternatives. Across Latin America, the story is similar. Credit cards account for 39% of e-commerce payments in Latin America, while debit cards make up 18% in the region (WorldPay, 2022). In stark contrast, only 14% of Latin Americans aged 15 or older possess credit cards, significantly lower than the 51% in developed economies (The World Bank, 2021). UNCTAD studies emphasize that building a secure and trustworthy environment is crucial for fostering e-commerce as growing concerns about online fraud and data security breaches continue to weigh heavily on consumers' and businesses' minds.

The ubiquity of card payments has attracted legitimate users and, at the same time, nefarious individuals seeking to exploit the inherent vulnerabilities within these systems. One particularly favored avenue for exploitation is the realm of retail gift cards. These seemingly innocuous tokens of monetary value have become the weapon of choice for fraudsters orchestrating various mass marketing scams. Their appeal to criminals lies in their accessibility to consumers and the ability to redeem card values remotely and anonymously. Consequently, we witness a disconcerting trend where unsuspecting individuals fall prey to gift card payment scams, enduring financial losses, severe emotional distress, and trauma in the process (DeLiema, Volker & Worley, 2023).

Moreover, the rapid transition to card payments has exposed a series of vulnerabilities inherent in the payment approval system. Large-scale data breaches, often orchestrated by cybercriminals, loom as a significant threat. These criminals target banks and nonbank payment processors, retailers, and government entities, compromising sensitive information that can be exploited for payment fraud. While traditional forms of payment fraud remain a concern, a complex chain linking data breaches to payment fraud is evolving. Initial estimates suggest that the United States may be experiencing a higher fraud loss rate than other nations (Sullivan, 2010).

Technological advancements have ushered in innovative ways to conduct transactions in response to the shifting landscape of payment security. Mobile phones, equipped with enhanced computational capabilities and support for near-field communication (NFC), now enable users to emulate credit cards or use quick payment response codes.

However, these innovations are not without their security concerns. Attackers can exploit contactless transactions through relay attacks, posing risks to consumers' financial well-being. Novel transaction protocols compatible with existing EMV protocols have been proposed, ensuring the legitimacy of transactions and safeguarding against security issues such as man-in-the-middle attacks and credit card cloning to combat this problem (Yang, Luo, Vijayalakshmi & Shalinie, 2022).

Amid these challenges, the payment card industry has developed a private ordering regime to define security practices and monitor compliance among network participants. While this regime has played a significant role in establishing payment cards as a trusted method, data security breaches persist, sparking discussions about the need for additional government regulation to protect consumers. Questions arise concerning the effectiveness of legal intervention within this private ordering system, including disclosure laws, and whether such measures genuinely enhance consumer welfare. Striking a balance between consumer protection and the economic realities merchants, banks, and payment card companies face remains an ongoing challenge (Morse & Raval, 2011).

In this ever-evolving landscape of card payment security and fraud prevention, it becomes evident that a multifaceted approach is necessary. Understanding the motivations and vulnerabilities of both consumers and criminals is essential. Furthermore, technological innovation must be complemented by robust security measures, and the delicate equilibrium between private industry regulation and government intervention must be carefully maintained. This study delves deeper into these critical issues, exploring the complex web of motivations, vulnerabilities, and countermeasures in card payment protection.

Given the context above, this study sets out to better understand the direct and indirect effects of fear and response cost on card payment protection motivation. This study intends to answer two fundamental questions: How does the fear of card payment insecurity motivate the response cost among its users? Two, what is the relationship between the fear of card payment and protection motivation? Leveraging the Protection Motivation Theory (PMT), widely used to explain why individuals engage in hazardous activities (Milne et al., 2002), our study comprehensively reviews the literature, outlines our methodology, presents results, and discussions, and concludes with theoretical and managerial implications, limitations, and directions for future research.

THEORETICAL FRAMEWORK

Protection Motivation Theory (PMT) provides a comprehensive framework for understanding and predicting protective behaviors across a wide range of contexts, from online safety to climate change mitigation. Its adaptability and continued relevance in diverse contexts make it a valuable tool for researchers seeking to unravel the complexities of human decision-making in the face of potential threats.

PMT initially emerged as a specialized branch of expectancy-value theories, primarily aimed at shedding light on the interplay between fear appeals and attitude change (Rogers, 1975). The theory is prominent in behavioral information systems (IS) security research, making it one of the most extensively utilized theories in this field (Haag et al., 2021). Notably, PMT has found application in predicting the behaviors and intentions of IS users across diverse contexts, including health (Alsaad, & Al-Okaily, 2022; Foth et al., 2012), cyber-citizenship (Anderson & Agarwal, 2010; Chen et al., 2017; Tsai et al., 2016), employees (Anwar, et al., 2017; Burns et al., 2017; Lee, 2011; Posey et al., 2015; Siponen et al., 2010; Yoon, & Kim, 2013), students (Boss et al, 2015; Chen, and Zahedi, 2016; Chenoweth et al., 2009; Crossler & Belanger, 2014; Gurung et al., 2009; Johnston & Warkentin, 2010; Yoon et al., 2012), among others.

The foundational model of PMT comprises two key cognitive processes: threat appraisal and coping appraisal. Threat appraisal revolves around individuals' assessments of their susceptibility to a given threat and their perception of the severity associated with that threat. This dimension includes perceived severity and perceived vulnerability. Perceived severity refers to the belief that the threat will have significant negative consequences while perceived vulnerability relates to the belief that one is personally at risk of experiencing the threat (Miller & Goldberg, 1990). On the other hand, coping appraisal pertains to the anticipated effectiveness of counteracting a threatening event. Specifically, it examines whether the perceived efficacy of a protective behavior outweighs the costs associated with that behavior (Rogers, 1975).

Coping appraisal further breaks down into three dimensions: response efficacy, self-efficacy, and response cost (Boss et al., 2015). Response efficacy refers to the belief that the protective behavior will actually reduce the risk of harm.

Self-efficacy refers to the belief that one is capable of performing the protective behavior while Response cost is the perceived negative consequences of performing the protective behavior itself.

Fear occupies a central role within the framework of threat appraisal. It is a natural emotional and motivational state that serves as a defense mechanism against danger, prompting individuals to distance themselves from risky situations and motivating protective action (Alsaad et al., 2022). Protection motivation emerges as a critical intermediate variable connecting perceptions of risk and fear with behavioral intentions (Rogers, 1975).

FEAR

Fear, a fundamental human emotion, stands as a central component within PMT, serving as a potent motivator for protective action. As earlier discussed, PMT posits that fear arises from two key appraisals: threat appraisal and coping appraisal. Threat appraisal assesses the perceived severity and likelihood of a negative outcome, while coping appraisal evaluates the perceived effectiveness of available protective measures. When both threat appraisal and coping appraisal are high, individuals experience fear, prompting them to consider and adopt protective behaviors to mitigate the perceived risk (Rogers, 1975; Maddux & Rogers, 1983).

Within the PMT framework, fear appraisal is heavily influenced by the perception of risk, encompassing factors such as the severity of the threat, vulnerability to the threat, and the probability of threat occurrence (Floyd et al., 2000; Maddux & Rogers, 1983). Thus, fear can be defined as a relational construct triggered in response to situations perceived as risky, prompting individuals to make protective decisions (Boss et al., 2015; Rogers, 1975; Alsaad et al., 2022). Fear catalyzes individuals to take protective responses more seriously, highlighting the potential risks and threats that could otherwise be ignored (Alsaad et al., 2022).

PMT posits that fear arises from two key appraisals: threat appraisal and coping appraisal. Firstly, fear acts as a signal, alerting individuals to the presence of a threat and prompting them to seek ways to reduce the potential harm. This fear-driven alertness enhances the likelihood of individuals engaging in protective behaviors. Secondly, fear can intensify the motivation to act by amplifying the perceived negative consequences of inaction. The prospect of experiencing the feared outcome, magnified by fear, can serve as a powerful motivator, driving individuals to take action to protect themselves (Miller & Goldberg, 1990).

Numerous studies have provided empirical support for the role of fear in PMT. For instance, Witte (1992) found that fear appeals, which induce fear by highlighting the severity and likelihood of a threat, can be effective in promoting protective behaviors. Similarly, Miller and Goldberg (1990) examined the role of fear in sun protection behaviors among college students. Their findings showed that fear of skin cancer, particularly among those with a higher perceived susceptibility, significantly predicted the use of sunscreens.

Despite existing studies, however, it is important to emphasize that PMT implicitly assumes the role of fear, a construct that few works have made a concerted effort to formally measure (Boss et al., 2015; Johnston et al., 2015). In this research, we recognize the critical role of fear and the response cost incurred by card payment users as direct and indirect predictors of protection motivation. Therefore, given the critical role of fear in motivating protective behavior, we propose the following hypotheses:

- H1: Perceived fear associated with card payment will influence the response cost incurred by card payment users.
- H2: Perceived fear related to card payment will stimulate protective action by card payment users.

RESPONSE COST

There exists an abundance of literature on coping appraisal; a construct related to how individuals cope with perceived threats (Tsai et al., 2016). Coping self-efficacy refers to an individual's belief in their ability to successfully carry out protective behaviors, while response efficacy represents their belief in the effectiveness of these protective measures (Tsai et al., 2026). Response costs, a key component of the coping appraisal, encompass the perceived personal costs associated with taking protective actions (Posey et al., 2015; Yoon et al., 2012). These perceived costs stem from a cognitive cost-benefit analysis individuals conduct (Posey, 2015).

Within the Protection Motivation Theory (PMT) literature, constructs like response costs and response efficacy have occasionally been overlooked, with researchers providing limited justification for their omission. Additionally, these constructs have been inconsistently defined and measured in non-standardized ways, often lacking sufficient validation (Boss et al., 2015). Some researchers choose to include response costs only when they involve physical or monetary expenses. For instance, Alsaad et al. (2022) argued against including response cost as a dimension in research, citing examples where protective apps are free or the cost of using specific payment methods is minimal. However, others define response costs more broadly to include any perceived personal costs, such as effort, time, money, or inconvenience incurred by individuals when taking protective actions (Floyd et al., 2000; Boss et al., 2015).

Response cost is said to be directly associated with the time and effort required to engage with protective measures. If individuals perceive these costs as excessive, they are less likely to adopt protective behaviors (Posey et al., 2015). The perception of excessive costs negatively impacts attitudes toward protection motivation (Posey et al., 2015). Interestingly, users consider response cost, self-efficacy, and crisis experiences as relevant factors for adopting protective behaviors, while non-users often do not (Fischer-Preßler et al., 2022).

The literature presents a nuanced debate regarding the significance of the response cost construct. Some researchers contend that response cost is a vital predictor of protective intentions (Chenoweth et al., 2009; Yoon, 2012; Posey, 2015; Tsai et al., 2016), while others find that, in specific contexts, fear assumes greater importance as the primary predictor (Boss et al., 2015; Alsaad & Al-Okaily, 2022; Kim et al., 2022). Otherwise, when response costs significantly conflict with individual or organizational security goals, insiders must understand the compelling reasons for performing an action, despite any personal costs associated with it (Posey, 2015).

For example, a recent study on COVID-19 found that response cost had no significant positive or negative influence on emotions. This suggests that the perceived costs associated with recommended behaviors may not have been a significant indicator of hope and fear in this particular situation, as the health threat of COVID-19 poses a serious risk to human life (Kim et al., 2021). These results indicate that costs may not be a strong determinant of actions when the consequence could be a matter of life and death (Kim et al., 2021). Furthermore, Fischer-Preßler (2021) found how users, compared to non-users, were indifferent to the perceived costs and risks of using a system. This shows that perceived vulnerability influenced only intention to use, whereas response cost and self-efficacy affected continued use intention. An explanation for this difference is that users, once they adopt a system, are willing to incur costs.

Moreover, Posey et al. (2015) found that increased response costs related to protection-motivated behaviors decreased protection motivation among insiders. Tsai et al. (2016) concluded that response costs significantly predicted security intentions, with an increase in response costs leading to decreased motivation to practice security measures (Boss, 2015; Tsai et al., 2016; Yoon, 2012). Empirical results regarding response cost find it to serve as a negative predictor of behavioral intention across a variety of situations (Shore et al., 2022). Burns et al. (2017) indicate that it is necessary for companies to enhance security response efficacy and reduce perceptions of security response costs. PMT literature predicts that response cost will positively impact maladaptive coping and negatively impact behavioral intention; research results indicate that response cost has a highly significant effect on behavioral intention (Chenoweth et al., 2009). Therefore, we make the following hypothesis:

H3: Perceived response cost of card payment usage will motivate the adoption of card payment protection measures.

METHODOLOGY

This study employed a quantitative approach, utilizing non-probability convenience sampling to examine university students in Mexico. Convenience sampling was chosen due to its practicality in reaching respondents during the disruptive era of COVID-19. Initially, a pilot study was conducted to identify and rectify potential questionnaire issues. Subsequently, a 5-point Likert rating scale was administered through Qualtrics, a widely used Experience Management Software (EMS). The response scale for the study ranged from "strongly disagree" (1) to "strongly agree" (5). A total of 210 responses were collected, constituting a moderate response rate. After the data cleaning process, analysis was carried out using SmartPLS software version 3.3.5, encompassing descriptive and structural analysis to assess the validity of the measurement model the specified structural model, and to test the hypotheses. This rigorous analysis ensured that the measurement items and structural relationships met the criteria for quality.

The constructs, fear, reaction cost, protective motivation intentions, and their respective items were adopted from Milne et al.'s (2002) study. Further details are available in Table 1. Fear and reaction cost are independent variables, while protection motivation is the dependent variable. Figure 1 illustrates the proposed model and hypotheses encompass the fundamental PMT constructs: cost, fear, and protection motivation. The assessment of the measurement model's reliability and validity (outer model) revealed that all composite reliability items met or exceeded the standard of 0.7 across all categories.

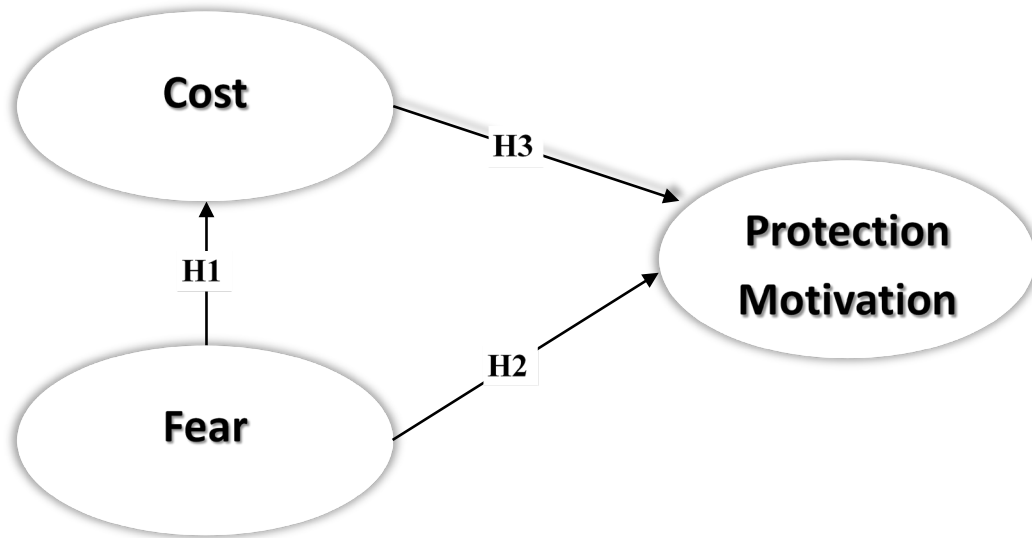


Figure 1: Proposed hypotheses for the protection motivation study

Table 1: Adapted measurement from the existing literature

Fear (Milne et al. 2002)	Response cost (Milne et al. 2002)
I am worried about the prospect of losing money from my C-Payment (FEAR01)	The benefits of updating my anti-theft tracking software regularly outweigh the costs (RC01)
I am frightened about the prospect of losing money from my C-Payment (FEAR02).	I would be discouraged from updating my anti-theft tracking software during the next week because it would take too much time (RC02).
I am anxious about the prospect of losing money from my C-Payment (FEAR03).	Taking the time to update my anti-theft tracking software during the next week would cause me too many problems (RC03)
I am scared about the prospect of losing money from my C-Payment (FEAR04)	I would be discouraged from updating my anti-theft tracking software regularly because I would feel silly doing so (RC04).
Protection Motivation Intentions (Milne et al. 2002)	
I intend to update my anti-theft tracking software during the next week (INT01).	
I do not wish to update anti-theft tracking software during the next week (INT02).	

**All items were measured using 5-point Likert-type scales from 1 = strongly disagree to 5 = strongly agree*

A total of 210 participants initially completed the survey, but after a rigorous review process, 161 usable questionnaires were obtained. The COVID-19 pandemic impacted the response rate. The data were meticulously analyzed using SmartPLS software version 3.3.5, employing descriptive and structural analysis techniques. The assessment results of the measurement model's reliability and validity (Outer Model) reveal that all composite reliability items meet or exceed the standard of 0.7 across all categories. Specifically, the values ranged from 0.866 to 0.923.

Additionally, each construct successfully incorporated all its items, and any items falling short of the 0.5 threshold were excluded from the data analysis. Notably, the reaction cost loading scored the lowest at 0.808, while the fear loading exhibited the highest significance at 0.939. The average variance met the 0.5 threshold, with values ranging from 0.683 to 0.752. Furthermore, the Variance Inflation Factor (VIF) ranged from 1.284 to 4.194, well within the recommended range. Table 2 presents a detailed breakdown of the quality criteria results.

Convergent and discriminant validity are critical considerations in this analysis. Contrary to common misconceptions, convergent validity affirms relationships between structures that are believed to be related, while discriminant validity validates relationships between unrelated constructs. The composite reliability and average variance extracted from the items exceeded 0.7 and 0.5, respectively, underscoring convergent validity (refer to

Table 2). Discriminant validity is highlighted in the diagonal, represented by the square root of the average variance extracted.

Turning to the structural model (Inner Model) analysis results, three coefficients of determination (R^2) were identified. The lowest R^2 value, at 32.1 per cent, pertained to the cost variable, while the highest R^2 , reaching 62.5 per cent, was observed for protection motivation, as depicted in Figure 2. The effect sizes varied, with the most substantial effect observed for protective motivation (0.967), followed by fear (0.481), and the most miniature effect was attributed to response cost (0.020). The structural model was tested based on three hypotheses, with two (H1 and H2) being accepted and one (H3) rejected. The findings of the investigated hypotheses are detailed in Table 3.

Hypothesis one (H1) examines the relationship between fear and response cost (Fear \rightarrow Response Cost, $\beta = 0.570$, $t = 9.980$, $p = 0.001$). Hypothesis two (H2) explores the link between fear and protection motivation (Fear \rightarrow Protection Motivation, $\beta = 0.729$, $t = 12.401$). However, hypothesis three (Response Cost \rightarrow Protection Motivation, $\beta = 0.106$, $t = 1.386$, $p = 0.166$) did not yield significant results.

Table 2: Quality criterion for protection motivation study

LV and MV	FL1	FL2	FL3	CA	rho A	CR	AVE	VIF	f Square
Fear				0.891	0.916	0.923	0.752		0.481
fear1	0.843							2.550	
fear2	0.818							2.286	
fear3	0.864							2.569	
fear4	0.939							4.194	
Protection Motivation				0.820	0.842	0.890	0.731		0.967
p_motivation2			0.840					1.449	
p_motivation3			0.867					2.664	
p_motivation4			0.857					2.508	
Response Cost				0.783	0.836	0.866	0.683		0.020
r_cost1		0.835						1.284	
r_cost2		0.808						2.458	
r_cost3		0.837						2.604	
LV	Fear	Cost	Pmotivation						
Fear	0.867								
Cost	0.570	0.827							
Pmotivation	0.789	0.521	0.855						

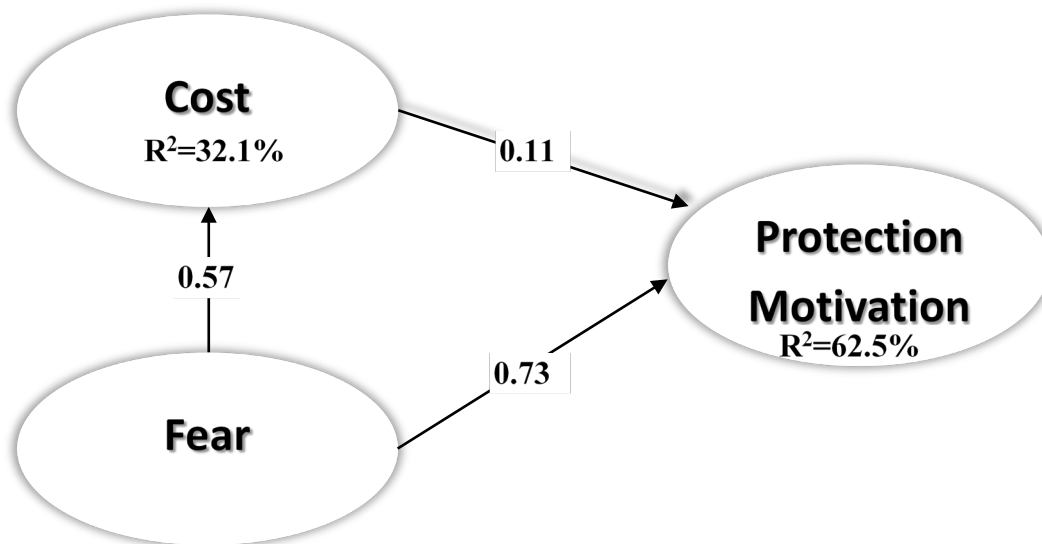
This study meticulously defined the selected constructs, established the measurement model, designed a study on card payment services to yield empirical results, assessed the validity of the measurement model, specified the structural

model, and conducted hypothesis testing using SmartPLS software version 3.3.5. The aim was to ensure that the measurement items and structural relationships met the established quality criteria.

We treated fear and reaction cost as independent variables, while protection motivation was the dependent variable. The reliability and validity assessment results for the measurement model (Outer Model) demonstrated that all composite reliability items not only met but also exceeded the standard of 0.7 across all categories. Specifically, these values ranged from 0.866 to 0.923. Additionally, each construct successfully incorporated all its items, with any items failing to meet the 0.5 criterion excluded from the data analysis. The reaction cost loading displayed the lowest score at 0.808, whereas the fear loading exhibited the most significant score at 0.939. The average variance exceeded the 0.5 threshold, ranging from 0.683 to 0.752. Moreover, the Variance Inflation Factor (VIF) fell within the prescribed range, ranging from 1.284 to 4.194. A detailed breakdown of the quality criteria results is provided in Table 2.

It is crucial to distinguish between convergent and discriminant validity. Contrary to popular belief, convergent validity affirms relationships between structures believed to be related, while discriminant validity validates relationships between unrelated constructs. The composite reliability and average variance extracted from the items consistently exceeded 0.7 and 0.5, respectively, indicating strong convergent validity (refer to Table 2). Discriminant validity, defined as the square root of the extracted average variance, is highlighted along the diagonal.

Figure 2: Tested hypotheses for the protection motivation study



The structural model (Inner Model) analysis results have been thoroughly examined, revealing three coefficients of determination (R^2). Among these, the R^2 value for cost was the lowest, standing at 32.1 per cent. Conversely, the highest R^2 was observed for protection motivation, reaching an impressive 62.5 per cent, as depicted in Figure 2. Regarding effect size, protective motivation displayed the most significant impact at 0.967, followed by fear at 0.481, while response cost exhibited the smallest effect size at 0.020.

This structural model underwent testing based on three hypotheses, with two (H1 and H2) being accepted and one (H3) being rejected. The findings of the investigated hypotheses are presented in Table 3.

Hypothesis one (H1) explored the relationship between fear and response cost (Fear \rightarrow Response Cost, $\beta = 0.570$, $t = 9.980$, $p = 0.001$). Hypothesis two (H2) elucidated the link between fear and protection motivation (Fear \rightarrow Protection

Motivation, $\beta = 0.729$, $t = 12.401$). However, hypothesis three (Response Cost \rightarrow Protection Motivation, $\beta = 0.106$, $t = 1.386$, $p = 0.166$) did not yield statistically significant results.

Table 3: Tested Hypotheses Results

Hypotheses	Variable Relationship	Original Sample	Standard Deviation	T Statistics	P Values	Result
H1	Fear \rightarrow Response Cost	0.570	0.057	9.980	0.001	Accepted
H2	Fear \rightarrow pmotivation	0.729	0.059	12.401	0.001	Accepted
H3	RCost \rightarrow pmotivation	0.106	0.076	1.386	0.166	Rejected

DISCUSSION

Research on Protection Motivation Theory (PMT) has typically taken two forms. First, the PMT has been used to develop and evaluate persuasive communications. Second, PMT has been employed as a social cognition model to predict health behavior. The origins of PMT can be traced back to early work on the persuasive impact of fear appeals, which focused on the conditions under which fear appeals may influence attitudes and behavior (Norman et al., 2015).

This study reveals a noteworthy finding regarding the role of response costs in predicting protection motivation. Interestingly, this finding contradicts the study by Woon et al. (2005), in which the response cost was identified as a significant predictor of recommended behavior related to home wireless network security. Similarly, Chenoweth et al. (2009) found that response costs influenced the use of anti-spyware software as a protective technology.

In the increasingly digital world, where card payments have become the standard, ensuring financial transaction protection is paramount. Understanding the factors that influence individuals' motivation to safeguard their card payment information is vital for financial institutions and consumers. This discussion delves into the direct and indirect effects of fear and response costs on card-payment protection motivation.

Fear, as a potent emotion, can directly impact individuals' motivation to protect their card-payment information. Concerns about identity theft, fraud, or unauthorized access to personal financial data can trigger fear in the context of card payments. When individuals perceive these threats, they are more inclined to take protective measures such as regularly monitoring their card statements, utilizing secure payment methods, and establishing robust authentication.

In contrast, response cost refers to the perceived barriers or costs associated with protective actions. In the context of card payment protection, these response costs may encompass inconveniences, such as setting up complex passwords, the time needed for additional security measures, or the financial expenses associated with purchasing antiviral software. High response costs can discourage individuals from taking protective actions, potentially diminishing their motivation to safeguard card payment information.

In the multifaceted landscape of card payment protection, motivation, fear, and response costs emerge as pivotal factors that directly shape individuals' decisions. Fear can act as a catalyst, prompting individuals to adopt protective measures, whereas response costs can impede their motivation.

To enhance the motivation for card payment protection, financial institutions and policymakers should focus on mitigating response costs through user-friendly security measures, providing comprehensive education and information, and fostering trust. A comprehensive approach that addresses both the direct and indirect effects of fear and response costs is indispensable for ensuring the security of card payments in our progressively digitalized world.

The findings of this study highlight the significance of perceived fear regarding the use of card payments among young people in emerging countries. This fear motivates the response costs incurred by card payment users. Moreover, the perceived fear associated with card payments plays a substantial role in shaping users' protection motivation.

However, the results suggest that the perceived response cost of card payment users did not significantly influence their protection motivation.

Anti-theft tracking software is a specialized category of computer programs and applications designed to assist individuals and organizations in tracking and recovering stolen or lost electronic devices such as smartphones, laptops, tablets, and other valuable gadgets such as banking cards. These results underscore the importance of enhancing consumer perceptions of the benefits of utilizing anti-theft tracking software. Additionally, the time investment required for updating anti-theft software is perceived as burdensome, with users anticipating potential challenges and hesitating to dedicate time to this task. Consequently, user attitudes toward updating anti-theft software tend to be negative as users may view this effort as unnecessary.

The study outcomes emphasize the need to educate users about the advantages of anti-theft software and improve the technology involved, making it more user-friendly and accessible to the population. This step, in turn, will enhance the protection of user transactions and contribute to the growth of e-commerce in Latin American markets.

ORIGINALITY/VALUE

Our study stands out in terms of its originality and the value it brings to several research areas, including card payment, Protection Motivation Theory (PMT), and the role of fear, all within Latin America. Firstly, this study extends the existing PMT theory and contributes significantly to the literature on card payments in the context of emerging economies. While previous studies have explored the impact of various variables, including 'fear,' on card payments, our study is the first to adopt the robust PMT framework. This novel approach adds a fresh layer of credibility to the theory and its application in this domain.

Furthermore, it is worth noting that the existing literature on card payments, fear, and response costs has primarily focused on developed countries. However, our study breaks new ground by providing empirical evidence on the effects of fear and response costs in the context of card payment protection motivation, specifically within an emerging economy like Mexico. This geographical shift in the research setting offers a unique perspective that enriches understanding of these factors' influence on card payment behavior.

THEORETICAL AND MANAGERIAL IMPLICATIONS

This study contributes significantly to the existing body of knowledge on Protection Motivation Theory (PMT) by investigating the variables that encourage or deter fear related to banking card payments. Notably, our research is a pioneering study that directly assessed the influence of fear of banking card payments and response costs on protection motivation.

Furthermore, our study's findings, which reveal a positive correlation between trust and the perceived value of card payments (Goczek & Witkowski, 2016), have substantial implications for existing literature. By addressing this critical knowledge gap, we shed light on the direct and indirect impacts of fear and response costs on card payment protection motivation, particularly in emerging markets. This result enhances the theoretical framework of protection motivation theory and deepens our understanding of how consumers can be incentivized to adopt card payment methods. In turn, these results contribute to the growth and advancement of e-commerce.

It is important to note that cards have emerged as an ideal payment method for repetitive transactions where alternatives would be impractical (Teoh et al., 2013). Consequently, the insights derived from our study hold significant value for service providers and merchants seeking to promote greater card usage over cash (Aboubaker & Mohamed, 2022).

Moreover, our research extends its contributions to managerial and policy domains. Firstly, it equips payment service providers with valuable insights into the direct and indirect influences of fear and response costs on consumers' motivation to safeguard their card payments. This knowledge empowers managers and government authorities to craft effective strategies to address the response costs driven by fear, helping consumers overcome apprehensions and unfavorable cost perceptions. For instance, financial institutions can establish dedicated anti-fraud units to monitor transactions, address consumer concerns, and alleviate fear.

Also, our findings, particularly regarding card payment protection motivation in Mexico, provide insights into the unique dynamics of this country compared to others. Understanding these distinctions can pave the way for a more rapid transition toward a "cashless society," ultimately fostering the growth of e-commerce (Humbani & Wise, 2018).

Lastly, our study enriches the theoretical framework of the PMT and offers practical implications for industry stakeholders and policymakers. By addressing the intricate interplay between fear, response cost, and protection motivation in the context of card payments, we contribute to the broader goal of enhancing security and promoting the adoption of card-based transactions in emerging markets.

RESEARCH LIMITATIONS/FUTURE RESEARCH

This study offers valuable insights into the motivations driving card payment users to protect themselves against insecurity, encompassing the factors of fear and response cost. However, it is important to acknowledge several limitations in this research, which can serve as points of consideration for future studies.

Firstly, this study primarily focused on a sample of students. Future researchers should leverage the findings from this study and expand data collection efforts to encompass a broader spectrum of consumer segments that extensively utilize card payments. Triangulating data from diverse consumer groups can lead to a deeper understanding of card payment phenomena.

Secondly, this study concentrated on a single country, although card payment issues are a global concern. Therefore, it would be highly beneficial to extend the scope of this research to include multiple countries. This cross-cultural approach can provide richer insights into the global landscape of card payment motivations.

Thirdly, collecting information post-pandemic could be a valuable endeavor. This proposed study would help us comprehend any trust and security perceptions shifts, thereby validating the current findings and offering insights into evolving consumer behaviors. Comparing these post-pandemic perceptions with those from other cultures and countries could provide a broader perspective on the subject matter.

Lastly, the relationship between fear, response cost, and card payment protection motivation is nuanced and influenced by various mediating factors, such as perceived efficacy, information and education, trust in financial institutions, and personal experience. Individual perceptions of the effectiveness of protective actions play a crucial role. If they believe their measures will effectively safeguard their card payment information, they are more motivated to protect them, even when facing fear and response costs. Access to information and education on card payment security can mitigate the effects of fear and response costs. Well-informed individuals are more likely to overcome barriers posed by response costs. Trust in financial institutions mediates this relationship. When individuals trust banks or card issuers to protect their card payment information, they may be less fearful and more willing to bear the response costs associated with additional security measures. Personal experience with card payment security breaches or fraud can significantly impact motivation. Those who have experienced such incidents may have higher levels of fear and be more motivated to invest in protection, even if response costs are high. Future researchers should explore these mediating variables to contribute further to the literature on card payments.

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APPENDIX

Table A1: PMT Research Framework

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
Zhu, Liu, Cao & Dong, (2022)	Based on the unified theory of acceptance and use of technology and the protection motivation theory, the authors built an MCDMS adoption model. The authors also verified the differentiating age effect on the service adoption intention from experiential distance perspective of the construal level theory	Individual, cross-sectional questionnaire survey	Perceived vulnerability, Perceived severity,	H1-Perceived vulnerability is positively associated with MCDMS adoption intention- except for elderly users H2: Perceived severity is positively associated with MCDMS adoption intention. For young users and elderly users
Alsaad & Al-Okaily, (2022)	Examines the role of fear in explaining the acceptance of exposure detection apps.	Individual-cross sectional Online survey	Fear and risk, self-efficacy, response efficacy,	H2. An increase in perceived Covid-19 risk increases perceived Covid-19 fear. H3. An increase in perceived Covid-19 fear increases protection motivation. H4. Perceived Covid-19 fear will mediate the association between perceived Covid-19 risk and protection motivation. H5. An increase in self-efficacy increases protection motivation. H6. An increase in response efficacy increases protection motivation. H7. An increase in protection motivation increases the intent to use exposure detection apps.
Fischer-Pfeßler, Bonaretti, & Fischbach, (2022)	Identifying the determinants of use intention and continued use intention.	Individual-cross sectional Digital survey	Threat appraisal: perceived severity, perceived vulnerability, and maladaptive rewards Coping appraisal: response efficacy, self-efficacy, and response cost, information quality trust and social influence	H1: Information quality trust → Protection Motivation H2: Social influence → Protection motivation H6a: Perceived response H6a: Perceived response efficacy → Protection motivation H6b: Perceived response efficacy → Trust
Anderson & Agarwal, (2010)	Studied the phenomenon of conscientious cybercitizens, defined as individuals who are	Study 1: Survey Study2: Experiment	Security, Public Goods Research, Psychological	H1: Concern → Attitude Toward Security-Related Behavior

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
	motivated to take the necessary precautions under their direct control to secure their own computer and the Internet in a home setting		Ownership, goal framing and self-view	H2: Perceived Citizen Effectiveness → Attitude Toward Security-Related Behavior H3: Self Efficacy → Attitude Toward Security-Related Behavior H4a: Attitude → Intentions to Perform Security-Related Behavior (Internet) H4b: Attitude → Intentions to Perform Security-Related Behavior (Computer) H5b: Subjective Norm → Intentions to Perform Security-Related Behavior (Computer) H6a: Descriptive Norm → Intentions to Perform Security-Related Behavior (Internet) H7a: Psychological Ownership (Internet) → Intentions to Perform Security-Related Behavior (Internet) H7b: Psychological Ownership (Computer) → Intentions to Perform Security-Related Behavior (Computer)→
Anwar, He, Ash, Yuan, Li & Xu, (2017).	To investigate into the differences between male and female (gender as a moderating variable) in terms of the above-stated constructs affecting cybersecurity beliefs and behaviors.	Individual, online survey	Security self-efficacy (SSE), perceived severity (PS), perceived vulnerability (PV), perceived benefits (PB), computer skills (CS), Internet skills (IS), prior experience with computer security (PE), perceived barriers (PBR), response efficacy (RE), cues to action (CA), peer behavior (PBEH), and self-reported cybersecurity behavior (SRCB)	Men have slightly higher self-reported cybersecurity behavior than women. The study found insignificant difference in perceived vulnerability (PV) between men and women. Men self-reported better cybersecurity behavior than that of women, however if it is men's overconfidence then women are not more vulnerable to cybersecurity risks. Results show that there are statistically significant gender-wise differences in terms of computer skills, prior experience, cues-to-action, security self-efficacy and self-reported cybersecurity behavior
Boss et al. (2015)	To perform an extensive review of PMT and its conventional practice in ISec research to identify opportunities for potential theoretical and methodological improvements on which to build this literature. Also propose theoretically and empirically addressable research questions and provide results based on	Study1: longitudinal, use main constructs PMT (data backups) Sudy 2: anti-malware software use in a short-term cross-sectional experimental survey	Fear, Perceived threat severity, Perceived threat vulnerability, Response efficacy, Self-efficacy, Response costs, Maladaptive rewards	Recommendation #1: ISec PMT researchers should ideally use and establish the core or full nomology of PMT before adding non-PMT constructs. Recommendation #2: ISec PMT researchers should ideally use fear-appeal manipulations when conducting security-related PMT studies. Recommendation #3: ISec PMT researchers should measure fear when conducting security-related PMT studies.

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
	empirical testing in two different studies			Recommendation #4: ISec PMT researchers should ideally model and measure behaviors, not only intentions.
Burns et al. (2017)	Extending an oft-cited theory in the information security literature protection motivation theory (PMT) to include the relationship of insiders' psychological capital (PsyCap) with the mechanisms of PMT.	Panel online-questionnaire	Threat severity, Maladaptive regards, response cost, security response efficacy, PsyCap: Hope, Optimism, Self-efficacy, Resilience; Fear	Find support for PsyCap's relationship with the mechanisms of PMT and suggest opportunities to develop PsyCap in conjunction with other organizational security efforts
Chen et al. (2017)	Tested seven antecedents of the Internet scam victimization and addressed how victim experiences influence people's privacy concerns and subsequent privacy protection behaviors	Online survey- adults USA	Antecedents: Knowledge about Internet privacy, Willingness to make risky investments, Online information disclosure, Online shopping, downloading files, Online information consumption, Opening email from unknown sources, Being an Internet scam victim, Online privacy concerns, Installing antivirus software, updating antivirus software, password changing frequency	H1b. Knowledge about Internet privacy is inversely associated with the likelihood of being an Internet scam victim. H2. Routine Internet activities (information disclosure, online shopping, downloading files, online information consumption, and opening emails from unknown sources) are positively associated with the likelihood of being an Internet scam victim H3. Being an Internet scam victim is positively associated with online privacy concerns. H4c. Online privacy concerns are positively associated with password-changing frequency. H5a. Being an Internet scam victim mediates the effects of self-control and routine Internet activities on online privacy concerns H5b. Online privacy concerns mediate the effects of being an Internet scam victim on privacy protection behaviors.
Chen & Zahedi (2016)	Motivators and moderators online security behaviors (protection against security attacks) in the united states and china	Survey	Susceptibility, Severity, Perceived Security Response Efficacy, Perceived Security Self-Efficacy, Protective actions, seeking help, avoidance Polycontextual Components:	H2: Severity → Perceived threat (U < C) H3: Perceived threat → Protective actions (U > C) H4: Perceived threat → Seeking help (U < C) H5: Perceived threat → Avoidance (U < C) H6: Response efficacy → Protective action (U < C) H7: Self-efficacy → Protective action (U < C)
Chenoweth et al. 2009	Presents a PMT-based model of users' intentions to adopt anti-spyware software and test the	Survey	Perceived Vulnerability, Perceived Severity, Fear Appraisal, Response Efficacy, Self Efficacy,	H1. Maladaptive coping has a negative effect on behavioral intention to use anti-spyware software. H2b. Perceived vulnerability has a positive effect on behavioral intention to use anti-spyware software.

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
	model on undergraduate student computer users.		Response Cost, Maladaptive Coping, Behavioral Intention	H5b. Response efficacy has a positive effect on behavioral intention to use anti-spyware software. H3b. Perceived severity has a positive effect on behavioral intention to use anti-spyware software. H7a. Response cost has a positive effect on maladaptive coping. H7b. Response cost has a negative effect on behavioral intention to use anti-spyware software.
Crossler & Belanger, (2014)	Empirically tests the effectiveness of PMT to explain a newly developed measure for collectively capturing several individual security practices	Panel of seven experts in information security, provided their opinion on necessary protective security practices -Survey	Severity, Vulnerability, Response efficacy, Self-Efficacy, Response cost, unified security practices,	H1: Perceived severity positively influences volitional Unified Security Practices. H2: Perceived vulnerability positively influences volitional Unified Security Practices. (Results indicate a negatively influencing USP) H3: Response efficacy positively influences volitional Unified Security Practices. H4: Self-efficacy positively influences volitional Unified Security Practices.
Foth et al. (2012)	Analysis of factors of relevance with regard to data protection compliance	Cross-sectional survey	Severity, perceived probability of abuse, data protection level, Perceived usefulness, ease of use, attitude, Subjective norm, data protection compliance,	H1: Low acceptance of technical and organizational measures negatively affects employee compliance with data-protection specifications and regulations H2: The perceived severity of breaches has a positive impact on compliance with data protection H3: The perceived probability of breaches in data protection has a positive impact on compliance with data protection H5: Assessment of effectiveness in their own actions will positively impact employees' conduct toward specifications in data protection H6: Subjective norms (high expectations from others) have a positive effect on compliance with data-protection legislation
Gurung, (2009)	To develop a research framework and empirically analyze the factors that motivate consumers to adopt and use anti-spyware tools when they are faced with security threats	Cross-sectional online survey	Use of anti-spyware tool: adopters, non- adopters; severity, vulnerability, Self-efficacy, Response efficacy, Response cost, Use of anti-spyware	H1. PS will have a positive relationship in determining that anti-spyware tool will be used H3. SE will be significant in determining the use of anti-spyware tool H4. RE will be positively associated with the use of anti-spyware tool

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
Johnston & Warkentin (2010)	Influence of fear appeals on behavioral intentions, specifically the compliance of end users.	Lab experiment	Severity, susceptibility, Self efficacy, Response efficacy, Social influence, Behavioral intent	H1: Response efficacy will have a positive effect on end user intentions to adopt recommended individual computer security actions with respect to spyware. H2: Self-efficacy will have a positive effect on end user intentions to adopt recommended individual computer security actions with respect to spyware. H3: Social influence will have a positive effect on end user intentions to adopt recommended individual computer security actions with respect to spyware. H4a: Perceptions of threat severity will negatively influence perceptions of response efficacy. H4b: Perceptions of threat severity will negatively influence perceptions of self-efficacy.
Lee & Larsen, (2009)	Factors affecting small- and medium-sized business (SMB) executives' decision to adopt anti-malware software for their organizations	Questionnaire-based	Severity, Vulnerability, Response efficacy, self-efficacy, perceived cost, social influence, Situation-Specific Behavioral Control: Vendor Support, IT Budget, Firm Size, Intention to Adopt	H1: Perceived severity→Intention H2: Perceived vulnerability→Intention H3: Response efficacy→Intention H4: Self-efficacy→Intention H5: Response cost→Intention H6: Social influence→Intention H7a: Vendor support→Intention H7b: Vendor support→Adoption H8a: IT budget→Intention H8b: IT Budget→Adoption H10: Intention→Adoption
Posey, Roberts & Lowry, (2015).	The factors of intrinsic and extrinsic maladaptive rewards, response costs, and fear—components central to PMT and their relationships with protection motivation and previously performed protection-motivated behaviors (PMBs) within their organizations. Highlight the importance of SETA initiatives as a major source of security-based information for insiders. Demonstrate how the relationships proposed by PMT are moderated by insiders' organizational commitment levels. Show how the threat and	Survey panel of insiders	Maladaptive regards (intrinsic, extrinsic), Threat vulnerability, Threat severity, Fear, Response efficacy, self-efficacy, Response costs, Protection motivation and past protection motivated behaviours, organizational conditions (Affective organizational Commitment, Job satisfaction, Financial incentives, Managerial support, SETA programs)	H1b: SETA frequency → Extrinsic maladaptive rewards H1d: SETA frequency → Threat severity H2a: SETA frequency → Response efficacy H3a: Intrinsic maladaptive rewards → (-) Protection motivation H3b: Intrinsic maladaptive rewards→ (-) Past PMBs H6b: Threat severity → Past PMBs H8: Threat severity → Fear H10a: Response efficacy → Protection motivation H10b: Response efficacy → Past PMBs H12a: Response costs → (-) Protection motivation

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
	coping appraisal processes are interconnected through insiders' development of response cost perceptions.			
Siponen, Pahnla & Mahmood, (2010).	Understand why employees do not comply with the organization's information security procedures.	Cross-sectional Survey	Normative Beliefs, Threat appraisal, Self-efficacy, Visibility, Deterrences, Rewards, Intention to comply with information security policies and Actual compliance with information security policies	Normative Beliefs → Intention to comply with information security policies Threat appraisal → Intention to comply with information security policies Self-efficacy → Intention to comply with information security policies Visibility → Intention to comply with information security policies Deterrences → Actual compliance with information security policies
Tsai, Jiang, Alhabash, LaRose, J.Rifon & Cotten, (2016).	Understanding online safety behaviors	Cross-sectional survey	Threat Appraisal: Threat Severity, Threat Susceptibility, Prior experience with safety hazards, Subjective norms, Personal responsibility, Coping self-efficacy, response costs, Perceived security, response efficacy, Safety habit strength	Prior experience with safety hazard → Security Intentions Response efficacy → Security Intentions Subjective norms → Security Intentions Response costs → Security Intentions Safety habit strength → Security Intentions Personal responsibility → Security Intentions
Yoon, Hwang & Kim, (2012).	Examine factors that motivate college students' information security behaviors	Cross-sectional survey	Perceived vulnerability, Perceived severity, Response efficacy, Self-efficacy, response costs, Subjective norm, Behavioral intention, security habits, information security behaviors	Perceived severity -> Behavioral intention Response efficacy -> Behavioral intention Self-efficacy -> Behavioral intention Response costs -> Behavioral intention Behavioral intention -> Information security behaviors Security habits -> Information security behaviors
Shore, Prena & Cummings, (2022).	Extends Protection Motivation Theory (PMT) through incorporating the watchful eye effect and the theory of contextual integrity to analyze	Experiment	Environmental factors: Surveillance, Situational severity, PMT variables: perceived severity, self-efficacy, response efficacy, response cost,	H1. Participants in conditions of high situational severity report higher intentions to share with the police than participants in those of low situational severity. H3. Perceived severity is a positive predictor of intention to share data with the police.

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
	predictors of intention to share data with the police		intention to share criminal data with the police	H4. Self-efficacy is a positive predictor of intention to share data with the police. H5. Response-efficacy is a positive predictor of intention to share data with the police. H6. Response cost is a negative predictor of intention to share data with the police.
Pan, Xu, Luo & Law, (2022).	How fear of COVID-19 further affects service experiences and recommendation intentions	Cross-sectional Survey	Fear, perceived risk, participation, service experience, recommendation intention	H1: Fear of COVID-19 affects perceived risk. H2: Perceived risk negatively affects service experience. H3: Perceived risk negatively affects participation. H4: Participation positively influences service experience. H6: Participation positively influences recommendation intention. H7: Service experience positively influences recommendation intention.
Kim, Yang, Min & White, (2022)	The influence of cognitive and affective responses on a customer's behavioral intention amid COVID-19 in the context of restaurants	Cross-sectional Survey	PM: vulnerability, severity, maladaptive reward, Response efficacy, response cost, self-efficacy; Affective response: Hope, Fear; Behavioral intention: Health-focused behavior, support local, conscious consumption	H1a/b: Perceived Threat -> Hope H1c: Maladaptive Reward-> Hope H1d: Response Efficacy -> Hope H1f: Self-efficacy-> Hope H2a/b: Perceived Threat-> Fear H2d: Response Efficacy -> Fear H3b: Fear -> Hygienic Behavior H4a: Hope -> Support Local H4b: Fear -> Support Local H5b: Fear -> Conscious consumption
Nazneen, Xu, Din & Karim, (2021).	Investigates the direct and indirect relationships between perceived COVID-19 impacts and travel avoidance and to test the differences in group-specific parameter estimates using a multi-group analysis	Survey snowball sampling technique	Covid-19 impacts, Travel risk perception, Health & Safety Perception, Travel Avoidance	H1: Perceived COVID-19 impacts → TA H1a: Perceived COVID-19 impacts → TRP H2a: Perceived COVID-19 impacts → HSP H1b: TRP → TA H2b: HSP → TA Different age groups possessed different perceptions
Tsai, Shih, Hsieh, Chen, Lin & Wu, (2022).	ARCS model was adopted in conjunction with the Protection Motivation Theory in this research as a strategy to provide learners with a real-life context, allowing them to participate in learning to achieve effective InfoSec protection motivation and better behavior	Quasi-experimental	ARS model: Attention, relevance, confidence, satisfaction; PMT: Perceived severity, Perceived vulnerability, Perceived response efficacy, Perceived self-efficacy, Perceived response cost, Problematic behavior	

Article	Purpose	Data collection	Components Of PMT	Hypothesis supported
Yoon & Kim, (2013).	To propose and empirically test a comprehensive model of computer security behaviors of individuals in the workplace.	Cross-sectional survey	Perceived Threat Severity, Perceived Threat Vulnerability, Response Efficacy, Self-efficacy, Attitude, Security Policy, Organizational Norms, Moral Obligation, Subjective Norm, Computer Security Behavioral Intentions	H2 Attitude → computer security behavioral intentions H3 Moral obligation → computer security behavioral intentions H4 Subjective norm → moral obligation H5 Perceived threat severity → attitude H7 Response efficacy → attitude H8 Self-efficacy → attitude H9 Security policy → moral obligation H10 Security policy → organizational norms H11 Organizational norms → moral obligation H12 Organizational norms → subjective norm H13 Organizational norms → computer security behavioral intentions

WINNING THE SOCIAL GAME: UTILIZING UNIVERSITY MASCOTS ON TIKTOK

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ABSTRACT

TikTok is rapidly becoming one of the most prolific social media applications utilized around the world. Specifically, high school and college-aged students engage with TikTok regularly for the purpose of entertainment. At the college level, universities have attempted to capitalize on the desire to watch TikToks by making their own accounts for the institution, admissions teams, clubs, sports programs, or other groups at that university. Some schools have embraced the usage of their mascots in university TikTok accounts or have created separate accounts on the application for their mascots individually. We examine the impact that individual university mascot TikTok accounts have on overall fan engagement, and how having individual mascot TikTok accounts may benefit the institution.

INTRODUCTION

Mascots have a large impact on university engagement in multiple capacities. In today's day and age, school mascots can get as much publicity and notoriety as any athlete, student, or employee at that given school. University athletic departments work closely with mascots, especially in what is arguably the most engaging and public part of the college landscape; college football. Mascots hold the capability of engaging fans on a personal level in any environment at the university. The importance of mascots in today's world goes well past their physical presence at athletic contests and community events, but instead now requires a presence on social media to have an even greater impact on fans and their engagement with the university.

Mascots are one of the most effective marketing tools because they help engage consumers and reinforce brand messaging (Peterson, 2014). Using the mascot as this kind of marketing tool on TikTok can be extremely effective being that TikTok has 1.1 billion users worldwide. Sixty percent of TikTok users are between the ages of 16-24 (Walaroomedia, 2023). An expanding youth market has emphasized the role of entertainment in both consumer behavior and branding strategies (Caputo & Resciniti 2003). Consumers also want to play a more active role in the consumption process. They want to build their identities in the here and now, express themselves creatively, socialize with other consumers, and enjoy unique and memorable experiences (Csikszentmihalyi 1997; Fabris 2003; Calder & Malthouse 2005; Aitken et al. 2008).

While it is certain that mascots are engaging and have the ability to forge strong relationships with fans at sporting events, it is also clear they have the ability to forge relationships and generate engagement through social media platforms as well. This study will explore not only how engaging mascots are on TikTok, but what aspects of individual mascot accounts and posts are the most engaging or important in generating engagement through TikTok.

LITERATURE REVIEW

Digital Content Marketing

Social media marketing, particularly video content, has the ability to create a sense of emotional engagement and brand loyalty that traditional marketing strategies do not necessarily possess (Miller & Lammas, 2010). This can be seen through the growth of Instagram, especially among young adults, as a tool for sports marketing (Duggan & Madden, 2015). Current industry research indicates the average person will spend more than five years of their lives on social media (Mediakix, 2016). Social media has transformed the relationship between athletes and fans, reducing perceived barriers and bringing the two closer together (Pegoraro, 2010). This, of course, makes social media a very viable platform for companies and organizations to devote resources to in terms of their marketing efforts.

The effectiveness of video content in fan engagement creates a more personal connection between the brand and the audience (Hilton & Rague, 2015). For this reason, TikTok, a platform that is almost entirely short video-based, has become a must-use resource for companies in their marketing efforts. Social media applications, like TikTok, have

completely transformed the relationship between fans, athletes, and sports organizations, posing both opportunities and challenges for all stakeholders (Sanderson, 2011). Digital content marketing focuses on increasing potential customers' appreciation of the brand or firm by adding value to their lives, celebrating the brand, or providing increased education about the brand. (Hollebeek and Macky, 2019). This conceptualization and definition of digital content marketing applies directly to the kind of marketing mascots provide universities and athletic programs, both on and off of social media.

Tik Tok and Engagement

TikTok is a social media app focusing on short video sharing. Users can take advantage of an assortment of templates, filters, and visual effects, as well as a built-in music library, to create short videos. The TikTok application skyrocketed in growth throughout the COVID-19 pandemic (Su et al., 2020). The app added 12 million domestic users in March 2020 and a total of 52.2 million users globally (Weiss, 2020), making it the most downloaded, non gaming app on the Apple app store in the first quarter of 2020 (Leskin 2020). U.S. visitors spent an average of 8 hours on the app during the month of March 2020, which is 10.8% higher than time spent in January 2020 (Weiss, 2020). Given that roughly 50% of TikTok's audience are under the age of 24, this platform is an ideal way to target the next generation of consumers, workers, and investors (Olympus Mascots, 2023). The TikTok platform leaves the door wide open for well-known personas and celebrities to connect with fans and general consumers alike.

Given TikTok's distinctive audio-visual format and escalating user engagement, this research seeks to bridge substantial gaps in the existing literature which predominantly revolves around platforms like Facebook, Instagram, and Twitter, omitting critical components like sound in content marketing and the contextual uniqueness of TikTok. Posting high-end, accurate, and unique videos helps marketers accomplish this goal. Researchers suggest TikTok has so many more advantages over disadvantages and holds such a huge market of opportunities for companies, schools, and individuals to be unique and show anything that they feel is important (Akbari et al., 2022).

TikTok is the cheapest and most enjoyable tool for creating excellent marketing content for digital marketing purposes. It can promote and show product activities in a broad range of digital marketing efficiently (Yosep et al., 2021). TikTok is also used by influencers or sports practitioners to interact with their fans and promote their products (Akbari et al., 2022). From a branding perspective, TikTok's popularity attests to a shift in consumer culture where authentic brand narratives are valued and self-brand connections are more important than ever (Kunkel et al., 2019).

Mascot Effectiveness

Collegiate symbols and mascots represent a school's public image or identity and the qualities expected of their intercollegiate teams (Almond, 2020; Bronner, 2012; Riess, 2015). Deeply rooted in intercollegiate athletics, mascots impact institutional identity, campus programming, and federal regulations. Mascots or brand characters are powerful ways to personify a brand and strengthen a brand's image. Carol Phillips, president of consulting group Brand Amplitude, said 'Mascots are the gift that keeps on giving...They never get in trouble with the law. They don't up their fees. You can use them for a long, long time' (Schultz, 2012).

The influx of social media into the realm of marketing has provided a significant avenue for mascots to come alive. "Social media has made icons and mascots a much more interactive component of a brand's story" (Shah, 2009). Many characters communicate to consumers through their respective social networking sites. "In many cases, consumers would rather interact online with a cute or cuddly character than with a faceless corporate executive ...It's easier to have a casual conversation" (Shah, 2009). Mascots are an essential part to building a school identity at any level of education. Branding and identity manuals are often used to guide and influence design of both new schools and renovations/modernizations of existing campuses. Branding can also be an effective way for a district to build identities for existing and new school campuses, create opportunities for academic improvement, and create a sense of pride for students, teachers, parents, and their communities (Kruger and Perez 2017).

In reference to the impact mascots can have through social media, Olympus Mascots, a company specializing in marketing plans and mascot usage, notes, "This shift in shorter video content has caused the marketing world to follow suit. It is harder now than ever before to grab someone's attention and hold it. One strategy that has been making waves in the TikTok world is the implementation of mascots" (Olympus Mascots 2023). Mascots grab attention like

no other. They're weird, cool, and not something you see every day. They stick out amongst giant crowds, they not only draw your attention, they command it.

METHODOLOGY

The purpose of this study is to examine the impact individual university mascot TikTok accounts have on overall fan engagement and how individual mascot TikTok accounts may benefit the institution on a number of different levels. In order to evaluate the impact of individual university mascot TikTok accounts, the researchers identified university-affiliated mascot TikTok accounts for all universities in six major Division I athletic conferences. Accounts were identified in the Southeastern Conference (SEC), Big Ten Conference, Atlantic Coast Conference (ACC), Big 12 Conference, Pac-12 Conference, and American Athletic Conference (AAC). Official university accounts for the identified universities were also identified. This study analyzed and collected data on TikTok posts during three time periods in the 2023 calendar year; 2/15 through 3/15, 6/1 through 7/15, and 8/1 through 9/15.

The study cataloged posts and collected information on social media metrics including views, likes, comments and shares. Posts were also categorized by content including type of collaboration, background setting, audio/video details, use of CapCut design software, and trending sounds or themes. Comparison data was also collected from university posts aligning with mascot posts. Descriptive statistical analysis was used to analyze the data collected. Collaboration posts are defined as posts where a mascot engages with any additional individual. Non-collaboration posts are defined as posts where a mascot does not engage with anyone else.

RESULTS

Researchers identified 31 mascot TikTok accounts in their initial analysis, but only 22 accounts remain active (n=22). These accounts span all of the identified athletic conferences, with the Big Ten leading the way with nine mascot accounts. The Big 12 is a close second with seven such accounts. Followership varies greatly for mascot accounts. One account has over 1.4 million followers, while many others have less than one thousand followers. The average number of followers is just under 100,000 followers (m=99,527).

Table 1: Mascot TikTok Accounts Engagements

Engagement Measurement	Average Quantity
Views	42,725.33
Likes	4,841.57
Comments	41.53
Saves	224.14
Shares	198.92

Table 1 illustrates that mascot TikTok accounts gathered nearly 43,000 views per post on average. Mascot posts also more than double the amount of likes and saves that University TikTok accounts gathered on their average posts (see Table 2). Researchers identified and analyzed 163 mascot account posts, compared to the 1,122 posts found on the general university accounts. Engagement through average comments and shares still favored mascot account posts, but the difference was smaller.

Table 2: University Tik Tok Accounts Engagements

Engagement Measurement	Average Quantity
Views	24,115.83

Likes	2,089.02
Comments	28.11
Saves	83.78
Shares	162.96

Researchers then classified active mascot accounts by an activity level of less than or equal to five posts or more than five posts in the analyzed time frame. Fourteen accounts posted 5 times or less and eight accounts posted 6 times or more. On average, Mascot accounts that posted 6 or more times throughout the analyzed date ranges had more than 2,000 likes per post than Mascot accounts that did not post more than 5 times (see Tables 3 and 4). The increased frequency in posts resulted in increases in every metric that was observed on the TikTok application. Overall, the average number of engagements was over 50% higher for accounts with the higher level of activity.

Table 3: Mascot TikTok Accounts With 6 or More Posts in Date Ranges

Engagement Measurement	Average Quantity
Views	45,878.17
Likes	5,401.01
Comments	46.62
Saves	266.70
Shares	208.92
Average Total Engagements	51,801.42

Table 4: Mascot TikTok Accounts With 5 Posts or Less in Date Ranges

Engagement Measurement	Average Quantity
Views	31,269.93
Likes	3,015.50
Comments	27.75
Saves	83.18
Shares	183.82
Average Total Engagements	34,580.18

Tables 5 and 6 suggest that Mascot TikTok accounts need to post in collaboration with other figures like celebrities, athletics teams, academic staff, and administrators. Collaboration posts were classified as any post where a mascot was engaged with anyone on campus in some way shape or form, regardless of the setting or content of the post. Fifty-five, or 33.7 percent of the 163 mascot posts received the collaboration designation. On average, collaboration posts led to higher engagement than when a mascot posts in isolation. Collaboration posts had over 23,000 engagements

more than non-collaboration posts. Fans “liked” collaboration posts at a rate more than double those of non-collaboration posts. Fans “saved” collaboration posts at a rate of more than 5 times in comparison to non-collaboration posts.

Table 5: Mascot TikTok Account Engagement for Collaboration Posts

Engagement Measurement	Average Quantity
Views	54,687.89
Likes	8,150.05
Comments	58.42
Saves	480.75
Shares	248.09
Average Total Engagements	63,625.2

Table 6: Mascot TikTok Account Engagement for Non-Collaboration Posts

Engagement Measurement	Average Quantity
Views	36,518.34
Likes	3,124.91
Comments	32.76
Saves	91.00
Shares	173.41
Average Total Engagements	39,940.42

ANALYSIS

The results suggest that universities generally and athletic departments specifically should consider the creation of mascot specific TikTok accounts to increase fan engagement through TikTok. The descriptive analysis demonstrates the impact a mascot specific TikTok account can have in comparison to general university accounts. The literature and results of the study all support the creation and maintenance of these accounts.

If a mascot account exists, two specific strategies are supported by the results of the study. First, mascot accounts should maintain a more active presence. The results suggest that posting at least twice per period analyzed was more impactful in all of the engagement metrics measured. Followers lose interest if accounts lay dormant.

In addition to being active, mascot-specific accounts should also find ways to collaborate with individuals across the university. The researchers found examples of mascots collaborating with other mascots, student-athletes, coaches, students, cheerleaders, fans, and academic administrators in their data collection. These collaborations were found to drive more engagement activities, especially in the rates of saves and likes.

One area where universities without mascot-specific accounts are missing is the ability for their mascot to go viral, which is the case with Cosmo the Cougar, Brigham Young University’s celebrity mascot. Although Cosmo’s account

metrics were in line with the other accounts during the time frames utilized in the study, Cosmo's virality on TikTok is well known. Cosmo has a TikTok video with over 33 million views and over 20 posts with at least 1 million views. The ability for a university and athletic department to generate this type of engagement is too important to continue to operate without mascot-specific accounts or mascot-driven digital content.

Moving forward, additional analysis should be completed. Comparison analysis of other identified categories like trends, use of music or other sounds, type of graphics, and type of collaboration can be conducted. Additional date ranges or extended ranges may provide a more accurate picture.

CONCLUSION

The data suggests that universities should invest in the creation of a TikTok account for their university mascot for a number of different reasons. Mascot TikTok pages that were active through the selected date ranges had a higher level of engagement than the university affiliated TikTok accounts. Building an account that is active, uses TikTok trends, and focuses on collaboration posts will build fan engagement for the university and athletic department.

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DIGITAL MARKETING'S ROLE IN UNDERSTANDING, ADAPTING & TRANSFORMING THE BUSINESS ECOSYSTEM

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ABSTRACT

Marketing continues to help the world create resilient business ecosystems amid difficult challenges, in many ways, as it has for years. Its role is to help businesses understand how to tackle these issues head-on, but it must also assist in ensuring the sustainable, proactive, and equitable responses of businesses as a whole. In this paper, one will see just how marketing has impacted the resilience of these ecosystems during times of unrest, such as during the Covid-19 pandemic, the ongoing Russian-Ukrainian War, the current volatility of our economy, and the greater supply chain disturbances. A common theme discovered amongst all challenges faced in these recent events is the increase in both digital marketing and social media tactics. These strategies have served as a way of supporting and carrying businesses to not only sustain themselves through the changing environments, but also prosper by achieving greater profits.

A business ecosystem can be defined as “an economic community supported by a foundation of interacting organizations and individuals--the organisms of the business world” (Karhiniemi, 2009). Within this community, customers are provided goods and services that are produced to be of potential value to them (Karhiniemi, 2009). Additional members of the ecosystem can include lead producers, other stakeholders, suppliers and competitors (Karhiniemi, 2009). The leader of these ecosystems, while they may change over time, guides it towards the overall shared vision of finding roles of mutual support and similar investments (Karhiniemi, 2009). Today, it is becoming increasingly difficult to ensure the resilience of these ecosystems due to the impact of external forces such as the current pandemic, certain regional conflicts, growing economic volatility and increased disruptions in the supply chains. Marketing plays a large role in helping to better shape business ecosystems' resilience and increase the overall understanding of these many challenges upon us, while also ensuring that businesses will be able to respond sustainably, proactively and equitably.

To begin, the occurrence of the Covid-19 pandemic, that started in early 2020, led to an exponential growth in digital marketing techniques and strategies in marketing within a time of quarantines and lockdowns (Mohammad, 2021). Due to consumers being unable to leave their homes, marketing evolved rapidly to combat this crisis in a way in which its strategies would then become interactive in a changing environment (Mohammad, 2021). The pandemic, and its corresponding quarantines, also brought about behavioral changes such as increased consumer participation on social media platforms like Facebook, Instagram and Twitter (Mohammad, 2021). This led businesses, and their marketing departments, to create opportunities and elevate communication with their customers more digitally than ever before (Mohammad, 2021). Tactics developed included increased use of “micro-video marketing (MVM), search engine optimization (SEO), search engine business (SEM) and social media (SMM)” which all helped to expand companies digital marketing reach (Mohammad, 2021). In addition to these, in-app point of sale features such as e-commerce, email, digital display ads and social media optimization were largely more relied upon by marketers (Mohammad, 2021). With these tactics came the further development of a different way for companies and their consumers to have two-way communication virtually - artificial intelligence robots (Mohammad, 2021). This would allow companies to better assist their users in specified chat rooms and coincide with increased online consumer activity paired with employees working from their homes (Mohammad, 2021).

In a study of five hundred and thirty-five responses, conducted using primarily millennials and their association with a variety of life insurance products, a diverse array of digital marketing practices were tested to determine the effectiveness of reaching the desired audiences and generating final purchases (Dash and Chakraborty, 2021). Millennials were chosen for this study due to their behavior being notably more practical and overall less emotional than their preceding generations (Dash and Chakraborty, 2021). This study showed that it became imperative to value customer experience as a driving marketing tactic in the changing digital world, so as to better separate one's business from their competition (Dash and Chakraborty, 2021). Further, researchers have continued to evaluate the important relationship between that of marketing and sustainability (Dash and Chakraborty, 2021). Marketing is able to present companies with an improved understanding of their clients' behaviors and should be valued as a tool to assist in changing their attitudes and values (Dash and Chakraborty, 2021). Therefore, marketing is a sustainable practice to support the many facets of business including driving employee satisfaction and loyalty, access to the best investors possible, improved product differentiation and a strong supply chain system (Dash and Chakraborty, 2021). Overall, this study has shown that acquiring a detailed digital marketing strategy can assist in improving, and then maintaining,

a company's customer satisfaction and involvement, while also influencing their customers' intention to purchase rate (Dash and Chakraborty, 2021).

The role of marketing has had a great impact on the world's ongoing regional conflicts, and vice versa. The greatest current example of a regional conflict is the present day Russia-Ukraine War. Due to this event, the marketing industry has had to make a wide variety of changes to their tactics and approaches. On March 10th, Google announced that they would be issuing a pause on all advertisements and commercial activity in Russia (SETUPAD Inc., 2022). This is just one of many companies that decided to reduce their marketing and advertising initiatives within the aggressive country and pause additional business ties for the foreseeable future (SETUPAD Inc., 2022). In this time, a change in marketing tactics was instated as well - efforts to send powerful messages through different approaches that would encourage others to rise up and stand against the enemy in support of Ukraine (Writer, 2022).

This also led to many multinational companies and businesses being increasingly encouraged to pick a stance in the ongoing crisis and cut ties with others still attached to the Russian government (Writer, 2022). Marketing initiatives also have started to take the form of showing the public all a company is doing to support the region's staff and others that had been impacted by the crisis (Writer, 2022). For example, Airbnb had announced that it was going to offer free, temporary housing to almost a hundred-thousand refugees fleeing Ukraine and in need of shelter (Writer, 2022). Not only this, but they have also provided shelter for twenty-one thousand five-hundred hosts that partook in the refugee program over in Europe and here in the United States (Writer, 2022).

Due to the ongoing crisis overseas, the threats of inflation and recession have penetrated the minds of people all over the world, and the squeeze of marketing budgets has begun. Customers of businesses everywhere have had to adjust many of their habits, in terms of shopping, which has led many of them to make the decision to switch brands that they consider to be cheaper (SETUPAD Inc., 2022). Already seventy percent of customers think the world is currently in the midst of a recession, according to a different study (SETUPAD Inc., 2022). Marketing has taken many different approaches to prepare for this shift in customer behavior and to keep their companies afloat in this time of crisis. As previously stated, the idea of where and in what type of context the company's brand is appearing to the public matters (*Marketing and Crisis Communications: Russia-Ukraine War*, n.d.). This has taken the form of many marketing leaders beginning to preplan the many social media and email campaigns that will best fit the stance of their company on the situation and show their customers why they should back their brand during this time (*Marketing and Crisis Communications: Russia-Ukraine War*, n.d.). Thus, delivering these messages not only timely, but also relevantly, has helped to boost the element of a specific brand's safety and protection during volatile times (*Marketing and Crisis Communications: Russia-Ukraine War*, n.d.).

The ever-evolving world of technology is an increasingly significant complexity for the business environment. The field of marketing must keep up with current technologies and adopt them at the same rate as the general population, if not sooner in order to stay relevant. Social media, specifically, has changed the game for marketing opening up a whole new world of opportunities and challenges. The opportunities of social media marketing include the reach of over three billion social media users that brands can actively engage and directly interact with and the potential for immense data collection (Liadeli et al., 2022). However, social media engagement is not directly related to increased sales, and different brands will require different social media strategies (Liadeli et al., 2022). According to a recent study in the *Journal of Marketing*, it was found overall that increasing a brand's owned social media by 1% leads to an increase in social media engagement by 0.137% and 0.353% in sales (Liadeli et al., 2022). Considering the different brand types, this study also found significantly larger social media engagement elasticities for hedonic content than for functional content (Liadeli et al., 2022). The authors differentiate the types of brand-owned social media content with hedonic content, referring to emotional or social orientation, and functional content referring to product-related information such as product/service attributes or deals and other aspects of pricing (Liadeli et al., 2022). It is important to note that not all social media posts generate increases in engagement and sales, and functional content is more closely related to sales generation than hedonic content. Hedonic content is more closely related to engagement, and therefore much thought and research must be behind a brand's social media strategy and individual posts (Liadeli et al., 2022). To further explain how complex social media marketing is, it was found that brands with smaller followings experienced larger elasticities. This is possibly due to a ceiling effect for brands with large followings, in combination with the "fan base versus customer base" effect, in which the number of consumers engaging with a brand may be higher than the number of consumers actually buying the brand (Liadeli et al., 2022). The effectiveness of social media marketing can also be affected by additional variables such as industry, brand characteristics, different platforms, and consumer's home countries.

Furthermore, brand social media accounts provide a platform for complaints to be shared and mistakes to be showcased. Despite the unavoidable nature of shortcomings, many firms still struggle to provide effective responses to customer complaints with a recent study indicating that less than one-third of respondents felt satisfied with the response they received (Herhausen et al., 2022). Unfortunately, the impersonal experience social media users feel being on the other side of a screen amplifies expressions of negativity for which brands must be able to combat to limit recovery dissatisfaction and the spread of detrimental effects on customers (Herhausen et al., 2022). In the current technological environment, just shy of 90% of customers are said to prefer social media communication characterized by text-confined, asynchronous interactions, and public exposure (Herhausen et al., 2022). Unlike the problems themselves, that set the stage for complaints, social media backlash and related escalation is an overarching issue that has been the focus of far less research. Focusing on the best practices for de-escalation, or the efforts to minimize high arousal in a firm's complaint response, active listening and empathy are key techniques for reducing arousal identified by crisis negotiation literature (Herhausen et al., 2022). In an attempt to translate these techniques to the written word, active listening may be conveyed through writing style and empathy would be displayed in the content of a firm's complaint response (Herhausen et al., 2022). In a recent study, positive effects of active listening through the matching of functional words to their linguistic meaning, and even more so of empathy through explicit expressions of validation and affirmation in high arousal circumstances (Herhausen et al., 2022). Interestingly, no significant effect of empathy was observed for complaints characterized by low-arousal (Herhausen et al., 2022). With regret, this study was limited to measuring the probability of inciting gratitude rather than any true decrease in customer arousal before and/or after the firm's response to a complaint, which serves as an additional representation of the complicated environment of social media for marketing (Herhausen et al., 2022).

Social media has also introduced further intricacy to marketing with the prospect of online influencers engaging their mass followings to promote a firm's products. The advantage of utilizing online influencers comes from the opportunity to reach new more potential customers and provide advertising that comes across as more authentic (Leung et al., 2022). The use of social media influencers is essentially the modern form of celebrity endorsements, but less costly with influencers that commonly have no real certifications and a more moderate following than mainstream celebrities. Mainstream celebrity endorsers can be described as well-known individuals striving for media attention and willing to promote products for firms while social media influencers are a new breed of confident endorsers that have influence over their audience through their sharing of experiences and attitudes (Rodulfo, 2018). Marketing through social media influencers is growing in popularity as it becomes known that they invoke greater influence over their audience. On the other hand, celebrities, using their status, have less relatableness which has a negative impact on developing a following on social media (Rodulfo, 2018). In other words, consumers perceive celebrity endorsements on the same level as advertisements from the brand itself, while promotions from social media influencers are viewed with a more accepting attitude. The evidence in this influence lies in the lower expectation that social media influencers are being paid for their product recommendations, which is conversely the main reason why mainstream celebrity influencers are seen as less genuine (Rodulfo, 2018). Unfortunately, even this illusion has come crashing down as social media influencer sponsorships have become overwhelmingly taken advantage of. On the up side, the influence of social media influencers may be able to be strategically increased.

According to a more recent study, the more original the influencer's content is, the more elastic engagement becomes (Leung et al., 2022). In continuation, it was found that with more engagement comes larger followings, and with more prominent brands/sponsors, more awareness will be spread. Thus, the more direct an informational post is, sales will increase as well (Leung et al., 2022). This strategy attempts to completely avoid the negative feelings that come with loyal followers feeling blindsided by secret advertisements, by approaching the sponsorships very openly. However, social media influencer persuasion begins to dwindle again with new product launches, which support less engagement likely due to the lack of trial and experience the influencer is to have with a new product (Leung et al., 2022). In summary, the study suggests that the optimal budget allocation for social media influencer sponsorships should be proportional to the engagement elasticity and base engagement levels of the particular influencer(s), assuming an equal per-engagement profit contribution for all influencers (Leung et al., 2022). Therefore, in theory, marketers may be able to enhance engagement, and possibly sales, by strategically selecting original influencers with a following likely to have characteristics in common with the target demographic for potential customers.

Climate change is a change in the usual weather found in a place. It is also the change in Earth's climate. Even though the Earth's temperature only went up by one degree in the last one-hundred years, these small changes have big effects on the Earth's temperature (Stillman & Green, 2014). Climate can change on its own by the earth's distance from the

sun, the sun sending out more or less energy, the ocean changing, and even volcanic eruptions. Scientists tend to think that Earth's temperatures will continue to go up over the next one-hundred years. If the temperature were to continue to rise it would cause more snow and ice to melt, oceans to rise higher, some places would get hotter, other places could potentially have colder winters with more snow, and even get more or less rain. This could also cause stronger hurricanes. But, according to the National Aeronautics and Space Administration, also known as NASA, scientists say that humans can change climate too (Stillman & Green, 2014). Almost everyone drives cars, they cool and heat their houses, and even cook food. Doing all of these things that people do on a daily basis uses energy. Just using energy does not seem like an issue, but one gets that energy from somewhere. People get most of their energy by burning coal, oil, and gas. Burning these puts gasses into the air, which can cause the air to heat up. Even though this process only changes the climate and weather of a place, it still has an effect on the earth's overall climate. Even small actions can help make a positive impact, like using less energy and water. For example, turning off lights or a television when one leaves the room, or turning off the water and planting trees. Climate change could possibly not sound too important, but in the long run, it can affect not only our weather, but also the world's businesses in all aspects (Stillman & Green, 2014).

The impact of climate change causes challenges for both consumers and governments throughout the world. Depending on how a business deals with climate changes is essential to survival in the marketplace. Marketing factors in as an important role through providing products and services that have a low carbon footprint. When making these products by reducing the carbon footprint, companies' costs and demands are affected. This is because the more sustainable the product is, the more costly it is for a business to produce it. On the other hand, when the product has a lower carbon footprint, more consumers will purchase it at the given price. According to Daniel Halbheer, "designing greener products can therefore be in conflict with the objective of meeting climate targets mandated by law. This points to a potential tension between the objectives of marketers and their senior managers and their seniors who are in charge of reducing the organization's climate impact" (Halbheer, 2019). Just because a company lowers a product's carbon footprint, this does not mean the organization is benefiting the climate. It was found that "offering a greener product in response to stronger climate concerns does not necessarily reduce the firm's overall level of carbon emissions" (Halbheer, 2019). This means that even though a company is making the products sustainably, the process in which they make that product is not sustainable (Halbheer, 2019).

The government has also made an impact on businesses through the cap-and-trade schemes and carbon taxes. An emission trading scheme, also known as the cap-and-trade scheme, is a market-based, cost-effective approach to reducing greenhouse gas emissions (Halbheer, 2019). Governments economically motivate firms, corporations and other businesses to cut emissions through setting limits on emissions and issuing permits. These permits have to be from the government or through trade with other corporations. This scheme is effective, because it tends to let the market decide how to reduce emissions at the lowest cost (Lam, 2022). On the other hand, the government also has a carbon tax. A carbon tax is a tax on the carbon emissions required to produce goods and services. These taxes play a major role in our business world. Most of the products that are made in large factories are using a big carbon footprint to produce these products. This way, if a product is made sustainable and green, the factory that is running off of these gasses, oils and/or coal is being charged a tax that goes to the government, that will go towards the fund of making the country as a whole more sustainable (Lam, 2022).

Marketers have a major role in climate change. People nowadays are trying to stay sustainable and use recyclable items to help contribute to preventing climate change, also known as global warming. A marketer's role is to promote all these products and show how they actually are following the regiment to be considered "green." The sustainable way of life is extremely new to our world now, not many people know about it (Aarons-Mele, 2012). There are so many new technologies to keep us all sustainable, such as solar power plants. The only way we will find out about these new technologies and ways of life is through marketing. The problem is not a lack of branding or advertising, it is more of a how can we, as marketers, get these new technologies in the hands of customers (Zucker, 2020). Marketers are trying to adjust to bring customers a better experience with new ways to help the planet. Climate change does not seem like a big issue, but in the long run, it is slowly affecting us (Zucker, 2020). For example, our earth's temperature goes up one or two degrees, it does not seem like a problem. But that small increase is causing more rain and colder weather in some areas. That leads to increased snow, ice and overall bad weather conditions. This can cause a disruption in the supply chain. The distribution center, such as Ryder, cannot drive their trucks in this weather, therefore the factory, or business, cannot get their products to sell or make the products. The same thing can happen anywhere. It could get so cold the heaters cannot handle it. On the other hand, it could get so hot that the workers cannot do their labor without raising health concerns. The air conditioning could break due to the overworking of the

HVAC system. All of these issues are caused by climate change and global warming, which will negatively affect our business world (Aarons-Mele, 2012) (Zucker, 2020).

The world is being disrupted in so many ways that the world's marketing departments are trying to understand. The role of marketing is to adapt and transform to protect the business ecosystems and make them more resilient. The Covid-19 pandemic, Russian-Ukrainian war, technology changes, supply chain disruptions, social media impacts, and growing climate change are just some of the issues that the business world has had to conquer. The world's marketers, sales representatives, managers, accountants, financiers, economists, doctors, and others are major attributes to making these changes in a smooth and successful way. Therefore, one can see that marketing has helped to better shape our business ecosystems' resilience overall and increase the world's understanding of these many challenges, all while also ensuring that these businesses are able to respond sustainably, proactively and equitably.

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ECONOMIC GROWTH IN NEW ZEALAND: ARE THERE ASYMMETRIC OR SYMMETRIC EFFECTS FROM EXCHANGE RATES AND TOURISM?

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ABSTRACT

Earlier literature, in the case of New Zealand, focused on the effects of exchange rates, tourist arrivals, and economic growth are linear. Using disaggregated data from 10 major tourist arrival countries, we re-evaluate symmetry and asymmetry cointegration using the data from 1990Q1-2021IV. In most cases, we find support for short-run asymmetric effects and significant asymmetric effects in the long-run three major tourist arrivals to New Zealand.

INTRODUCTION

The relationship between tourism and economic development has long been discussed. Tourism increases foreign exchange reserves through airfare, travel, and hotel bookings, miscellaneous spending by tourists such as entertainment, and other hospitality services such as movies, amusement parks, places of interest, museums, organized tours, etc. Another major foreign exchange source is medical tourism, where the trip's primary goal is to receive medical treatment in a foreign country, accompanied by sightseeing and other popular tourist activities.

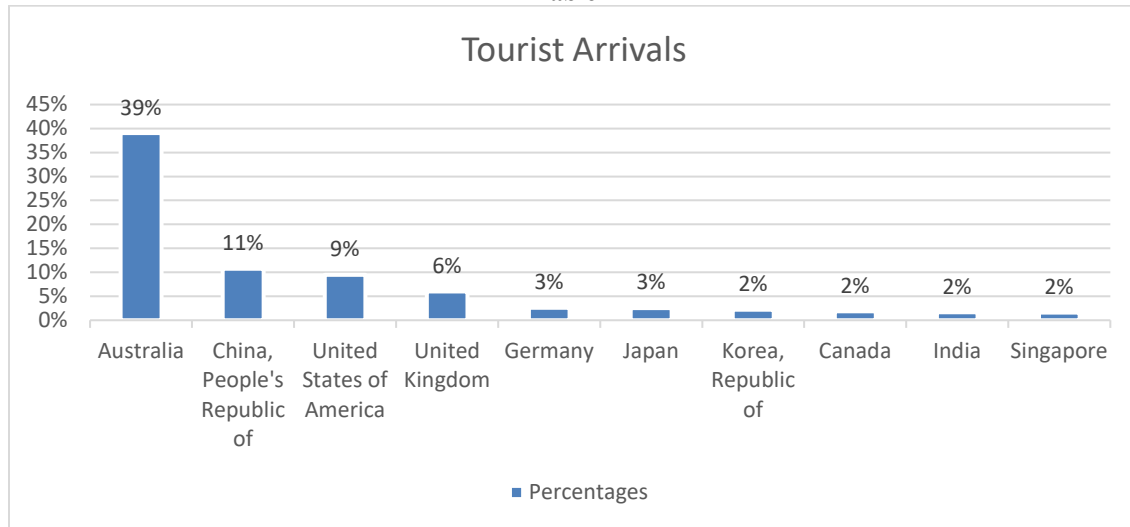
Several countries, especially those with natural beauty and/or artificial attractions, rely solely or mainly on tourism as one of their primary sources of income. Tourism revenue helps propel their economic development, primarily through tourism-related activities, such as revenue earned through airfare, gate receipts at places of interest, amusement parks, theaters, and museums. In addition, hotels, restaurants, and private and public transportation garner considerable earnings from tourists, all of which add to the GDP of the host country.

But tourism impacts the host economy through non-hospitality revenue earnings as well. Promoting and sustaining tourist attractions requires considerable investment in infrastructure, such as airlines, airports, border control, visa and immigration services, medical facilities, public transportation in the form of road, rail, and water, sanitation services, childcare, etc. depending on the length of stay and the location. Investment in such diverse infrastructure generates employment for the host economy, thereby leading to a multiplier effect on GDP growth.

In this paper, we explore the effect of tourism on the GDP growth of New Zealand, one of the countries that heavily relies on tourism as a significant source of foreign income. Specifically, we investigate the relationship between tourist arrivals, economic growth, and exchange rates in the case of New Zealand.

Table 1 shows the number of tourist arrivals in New Zealand. The results suggest that the effects of tourism and exchange rates significantly affect GDP growth in New Zealand in the long run, only in the cases of Australia, the US, the UK, Germany, Singapore, and Korea. Regarding the long-run effects of income variables, the US, Singapore, and Japan display a more significant coefficient for the nonlinear than in the linear model, while in the case of tourist receipts, the US and Canadian tourist receipts also play an important role in the long run.

Table 1



Source: [Stats NZ Tauranga Aotearoa](#)

LITERATURE REVIEW

According to Statista, the top ten countries with the highest share of tourism-generated GDP are as follows: Macau (50%), Maldives (33%), Aruba (32%), Seychelles (26%), British Virgin Islands (26%), US Virgin Islands (23%), Former Netherlands Antilles (23%), Bahamas (20%), St. Kitts and Nevis (19%), Grenada (19%) and Cape Verde (19%), which buttresses the fact that tourism plays a significant role in the survival and development of many smaller economies (Statista, 2023). Arguably, considerable research has focused on tourism's impact on New Zealand's GDP, revealing mixed results (Ashmun, 2021; Prayag et al., 2019; Balli et al., 2019). Ashmun concluded that the exchange rates of Australia, the US, and China were not significant, whereas per capita GDP turned out to be a good indicator of willingness and ability to travel to New Zealand. Prayag et al. (2019) found that increased domestic and international visitor spending was followed by a significant increase in GDP, although exchange rates had a small and non-significant impact on international tourist spending. Even though these findings were about Christchurch (a city in New Zealand), there is no reason to believe that the results cannot be extrapolated to the country as a whole.

On the other hand, Balli et al. (2019) conclude that significantly negative tourism demand shocks increase tourism arrivals' volatility more than positive tourism demand shocks (of equal magnitude) in the case of Germany, Japan, South Korea, and UK tourists to New Zealand.

Tourism, as an industry or entertainment/educational activity, comes in all shapes and sizes, such as medical tourism, eco-tourism, wildlife tourism, and sustainable tourism (Dymond, 1997); as such, even 'cycle tourism' has had its impact on the economic development of New Zealand, as Richie et al. (1999) found in their study of 588 cycle tourists. Specifically, the authors conclude that cycle tourists spend considerable resources in specific regions, owing to the nature of their tourism activity.

In this context, the role and implications of the tourism-led growth hypothesis (TLGH) cannot be overemphasized. The TLGH states that tourism fuels economic growth through foreign exchange earnings, tourism receipts, hospitality industry development, and an overall boost to the host country's economy. The impact of TLGH has been magnified post-COVID when several economies have been reeling from the dearth of tourist footfalls engendered by border, travel, and social distancing and hygiene restrictions and protocols (Turkcan, 2021). Jaforullah (2015) also found that the TLGH holds for New Zealand, where the author used data on real international tourism expenditure, real GDP, and the exchange rate for New Zealand. Specifically, the data reveals that the long-run elasticity of real GDP with respect to real tourism expenditure is 0.4. While this may not necessarily be a large magnitude of elasticity, the findings, nonetheless, suggest a positive association between tourism receipts and real GDP. In other words, the theoretical grounds for our study are reasonably robust.

THE MODELS AND METHODS

Our model closely follows the model adopted by Harvey and Furuoka (2020) and Harvey and Barat(2023). Besides the accepted model and literature, we included a measure of economic growth based on three major determinants: growth of trading partners, tourist arrivals, and real exchange rates.

The models are specified into short-run and long-run. The long-run model is established as follows:

$$LnG_{NZ,j} = \alpha + b LnG_{j,t} + c LnTA_{j,t} + d Ln EX_{j,t} + \varepsilon t \quad (1)$$

Where equation (1), G_{NZ} depended on partners' income G_j . Tourist arrivals, TA_j , and real exchange rate, EX . As for expected signs of coefficients, economic growth in partners' income leads to NZ growth; we expect estimates of b to be positive. In addition, tourist arrival will further promote economic growth, c to be positive. A depreciation of EX will also enhance economic growth. If the New Zealand dollar depreciates, reduce its imports, and stimulate exports, hence improving the New Zealand output, d should be positive. (Refer to the appendix for the additional definition of variables.)

To evaluate the impact in the short run, we transformed equation (1) into the error-correction model version of autoregressive distributed lag (ARDL) and replaced equation (1) with equation (2).

$$\Delta G_{NZ,t} = \alpha + \sum_{k=1}^{n1} \beta_k \Delta LnG_{NZ,t-k} + \sum_{k=0}^{n2} \gamma_k \Delta LnG_{j,t-k} + \sum_{k=0}^{n3} \delta_k \Delta LnTA_{j,t-k} + \sum_{k=0}^{n4} \theta_k \Delta LnEX_{j,t-k} + \mu_1 LnG_{NZ,t-1} + \mu_2 LnG_{j,t-1} + \mu_3 LnTA_{j,t-1} + \mu_4 LnEX_{j,t-1} + \mu_t \quad (2)$$

Our focus will be on EX in which the short-run effects are judged by the estimates of θ_k 's and the long-run effects by the estimate of $\mu_2 - \mu_4$ normalized on μ_1 . Pesaran et al. (2001) recommended applying the F-test using their calculated critical F-values to confirm cointegration. The long-run effect of real depreciation from devaluation is estimated indirectly from θ_k as negative or insignificant, followed by μ_4 positive and significant. If we are unable to observe this trend, it may be that the exchange rates are symmetric. We implement an adjusted model that Shin, Yu, and Greenwood-Nimmo (2014) proposed to consider the asymmetry effects on exchange rates. The approach isolates the $\Delta Ln EX$ into negative (New Zealand dollar depreciation) and positive (New Zealand dollar appreciation) values. As such, two variables will be generated and defined as POS and NEG.

These partial sum processes of positive and negative in $\Delta Ln EX$ are specified as follows:

$$POS = \sum_{j=1}^t \max (\Delta LnEX_j, 0)$$

$$NEG = \sum_{j=1}^t \min (\Delta LnEX_j, 0)$$

As recommended by Shin et al. (2014), $Ln EX$ in equation (2) will be replaced by POS and NEG as follows:

$$\Delta LnG_{NZ,t} = a' + \sum_{k=1}^{n1} \beta'_k \Delta LnG_{NZ,t-k} + \sum_{k=0}^{n2} \delta'_k \Delta LnG_{j,t-k} + \sum_{k=0}^{n3} \phi'_k \Delta LnTA_{j,t-k} + \sum_{k=0}^{n4} \chi'_k \Delta POS_{t-k} + \sum_{k=0}^{n5} \sigma'_k \Delta NEG_{t-k} + \theta_0 LnIPI_{NZ,t-1} + \theta_1 LnIPI_{t-1}^i + \theta_2 LnTA_{t-1}^i + \theta_3 POS_{t-1} + \theta_4 NEG_{t-1} + \xi_t \quad (4)$$

The introduction of POS and NEG into Equation (4) creates non-linearity. Shin et al. (2014) proposed the F test for both linear and non-linear models and handled them as one variable. The proposition to the asymmetric effect of the exchange rate will abide by the following outcome. If at a given lag order k , estimate of $\Sigma \hat{\chi}'_k \neq \Sigma \hat{\sigma}'_k$ short-run effects of exchange rate will be asymmetric.

Additional support from aggregate short-run asymmetric effects will be confirmed if the Wald test rejects the null hypothesis of $\Sigma\hat{\lambda}'_K \neq \Sigma\hat{\sigma}'_K$. Overall, asymmetric is confirmed if $-\frac{\hat{\theta}_3}{\hat{\theta}_1} \neq \frac{\hat{\theta}_4}{\hat{\theta}_1}$; which also needs a Wald test.

THE RESULTS

We evaluate the two linear and nonlinear models on 10 New Zealand tourist visitors using quarterly data, 1990Q1-2021IV (Refer to Tables 1 to 4). Since we are applying quarterly data, we enforce a maximum of four lags on each first differenced variable and use Akaike's Information Criterion (AIC) to select the best lags. In addition, we include dummy variables to identify the effect of the Asian Financial Crises 1998, the Global Financial Crisis 2008, and the Coronavirus disease (COVID-19) pandemic 2020. We organized the tables by country. For the linear model, we identified it as ARDL-L, while the nonlinear model is named NL-ARDL. These results are categorized as the short-run, long-run, and diagnostics tests.

Concentrating on the real exchange rate from the linear model, results show that it carries at least one short-run significant coefficient with most countries. In the long run, only the United States is significant. However, it has a negative sign indicating that the exchange rate does not favorably influence New Zealand's economic growth. This may be due to New Zealand's inelastic import demand from the US. Tourist receipts are significant, in the case of the U.K. and the U.S., but negative, indicating that it reduced economic growth. In addition, the income growth from New Zealand tourist partners promotes growth, as evidence shows in most cases, except for Singapore, Canada, and Japan.

Diagnostic tests and the cointegration result are needed to verify that these results are acceptable. Apart from Australia, F statistics are significant and thus support cointegration with its upper bound of 3.52. In addition, the ARDL-L models are free from serial correlation and supported by Lagrange Multiplier (LM) statistics. Furthermore, Ramsey's RESET statistic, distributed as χ^2 with one degree of freedom, is insignificant to most models. This means there is no misspecification, and most models are correctly specified. Understanding Harvey (2013), a stability test for all coefficient estimates by applying the CUSUM and CUSUMSQ tests to the residuals of the best model. The result clearly shows that most of the residuals are stable. Our next stage is to evaluate using the non-linear approach (NARDL). Is there going to be an added improvement in our results?

Observing Bahmani-Oskooee and Fariditavana (2015, 2016), they used a comparable definition proposed by Rose and Yellen (1989) with an extension towards applying the POS or NEG variable. In the short run, apart from Germany, both Δ POS and Δ NEG convey at least one significant lagged coefficient in all models. Shin et al. (2014) also promote Wald-S statistics to establish short-run asymmetry. They suggest using the Wald-S test to verify whether the sum of short-run estimates for Δ POS differs from short-run estimates for Δ NEG. The Wald-S test found that Singapore is significant. To evaluate long-run effects, we use the Wald-L test that found that in the case of Australia, the United States, the United Kingdom, Germany, Singapore, and Korea are significant. In addition, stemming Bahmani-Oskooee and Fariditavana (2016) J-curve definition, short-run deterioration effects followed by long-run significant positive estimation obtained from either NEG or POS, evidence shows only in the case of China, the United States, and United Kingdom, Singapore, and Korea.

As for the long-run effects of income variables, the United States, Singapore, and Japan support a more significant coefficient in the nonlinear model than in the linear model. Similarly, in the case of tourist receipts, United States and Canadian tourist receipts also play a significant role in the long run.

As for the diagnostics test, they show that residuals are autocorrelation-free in all models, and all models are correctly specified. In addition, the coefficient is stable in most instances.

CONCLUSION AND SUMMARY

An extensive investigation tries to explain the relationship between tourism and economic growth. Our paper empirically investigates the validity of the tourism-led growth hypothesis, exchange rate, and taring partner income utilizing a linear and non-linear approach of the ARDL. In both models, the real exchange rate in the short run proved significant in most cases. In the long run, using the linear approach, we identified 2 countries that generate economic growth from the depreciation of their exchange rate. When we switched to the non-linear method, we found that 6

countries promoted growth in New Zealand's economy. Regarding the trading partners' income, the linear approach identifies 7 countries, while the non-linear only identifies 3 countries. These results show that its trading partners' economic growth will indirectly assist New Zealand. The Global Financial Crisis in 1998 affected most of the trading partners.

Based on the 10 tourism arrival markets under consideration, only 1 (ARDL-L) could persistently support the tourism-led growth hypothesis in New Zealand as compared to 2 (ARDL-NL). It shows that the number of tourist arrivals plays a minor role in its economic growth. We recognize tourist arrivals are based on aggregate; we should have differentiated genuine tourists and those coming for business and jobs. Therefore, a country may experience a high volume of tourist arrivals but a low rate of tourism earnings because not all arrivals are genuine tourists. Furthermore, this study only looks at the role of inbound tourism in economic growth. It does not consider other aspects of tourism, such as domestic tourism revenue and investment in the tourism sector, which may also be important in stimulating economic growth. Therefore, any future study should include these added control variables when assessing the impact of tourism on economic growth.

Only simulation studies can satisfactorily deal with this hypothetical problem at this stage. More extensive research needs to be done to find fascinating and pertinent questions. Using actual economic data, should there be a policy change in New Zealand's exchange rate regime, would allow drawing empirically based conclusions. To improve resource operation, we suggest that tourism marketing policies should target those tourism markets that could persistently contribute to economic growth. Finally, this finding is important for policymakers and academicians in the field and shows that this issue still deserves further research for comparison purposes.

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Appendix

DATA DEFINITION AND SOURCES

Quarterly data over the period 1990Q1-2021IV are used to conduct the empirical analysis. They come from the following sources.

- a. International Financial Statistics (IFS)
- b. New Zealand's official data agency, [Stats NZ Tatauranga Aotearoa](#)
- c. **Note:**
 - China1992q1- 2021q4 : GDP
 - Germany 1990q1- 2021q4: GDP; 1991q1- 2021q4: Euro

VARIABLES

GDP_{NZ} = Measure of New Zealand's income, proxy by real gross domestic product. Data come from source b.

GDP_i = Trading partner i 's income. This is also proxied by real gross domestic product. Data come from sources a, b.

REX_i = The real bilateral exchange rate of the New Zealand dollar (NZD) against the currency of partner i . It is defined as $REX_i = (P_{NZ} * NEX_i / P_i)$, where NEX_i is the nominal exchange rate expressed as the number of units of partner i 's currency per New Zealand dollar, P_{SG} is the price level in New Zealand. (Measured by CPI) and P_i is the price level in country i (also measured by CPI). Thus, a decline in REX reflects a real depreciation of the New Zealand dollar. All nominal exchange rates and price levels data come from source.

TR_i = Tourist arrivals from country i . Data source from c.

Dummy:

- i) Asian Financial Crises, 1998.
- ii) Global Financial Crisis, 2018
- iii) Coronavirus disease (COVID-19) pandemic, 2020.

Table 1: Linear ARDL (L-ARDL) and Nonlinear ARDL (NL-ARDL) Models						
	I = Australia		I = China		I=United States	
	L – ARDL⁺⁺	NL – ARDL⁺⁺	L – ARDL⁺⁺	NL – ARDL	L – ARDL	NL – ARDL⁺
Panel A: Short-Run Estimates						
$\Delta \text{LnG}_{\text{NZ,t-1}}$	0.82*	0.61*	0.69*	0.65*	0.52*	0.47*
$\Delta \text{LnG}_{\text{NZ,t-2}}$	0.14**	0.12**	0.22*	0.17	-0.25*	-0.26*
$\Delta \text{LnG}_{\text{NZ,t-3}}$				0.28*	0.20*	-0.19*
$\Delta \text{LnG}_{\text{NZ,t-4}}$				-0.18*	0.29*	0.22*
ΔLnG_t	0.42*	0.44*	-0.05	-0.06*	0.87*	0.81*
ΔLnG_{t-1}	-0.38*	-0.43*	0.27*	-0.01	-0.50*	-0.49*
ΔLnG_{t-2}			0.02		1.01*	1.13*
ΔLnG_{t-3}			0.02		-0.93*	-0.96*
ΔLnG_{t-4}			-0.26*			
ΔLnLA_t	0.13*	0.01*	0.01*	0.02*	0.12*	0.01*
ΔLnLA_{t-1}	-0.03*	-0.02*	-0.02*	-0.03*	-0.02*	-0.02*
ΔLnLA_{t-2}	0.01*	0.01*	0.01*	0.01*	-0.001	0.01
ΔLnLA_{t-3}				-0.005	0.02*	0.02*
ΔLnLA_{t-4}				0.01*		
ΔLnEX_t	-0.004		0.03**		-0.002	
ΔLnEX_{t-1}	0.09*		-0.03*		0.04	
ΔLnEX_{t-2}	-0.06				-0.01	
ΔLnEX_{t-3}					-0.06*	
ΔLnEX_{t-4}						
ΔPOS_t		0.04		0.08*		-0.25*
ΔPOS_{t-1}		0.19				0.39*
ΔPOS_{t-2}						-0.21**
ΔPOS_{t-3}						
ΔPOS_{t-4}						
ΔNEG_t		-0.16		0.15*		0.17
ΔNEG_{t-1}		0.27		-0.21*		-0.18
ΔNEG_{t-2}		-0.22*				0.09
ΔNEG_{t-3}						-0.24*
ΔNEG_{t-4}						
Panel B: Long-Run Estimates						
$\ln G$	0.91*	0.03	0.41*	-1.13	1.87*	1.33*
$\ln \text{TA}$	0.02	0.003	-0.002	0.03	0.02**	0.01*
$\ln \text{REX}$	0.93		-0.03		-0.15*	
POS		0.86*		1.22*		-0.21*
NEG		-0.42		-0.95		-0.43*
Constant	-1.09	5.39*	1.93*	16.44*	-13.65*	-8.02*
Panel C: Diagnostic Statistics						
F	2.69	7.33*	4.77*	7.38*	6.93*	8.48*
ECM_{t-1}	-0.03	-0.26*	-0.08*	-0.06*	-0.24*	-0.37*
LM	0.09	0.94	0.20	1.13	1.88	1.66
RESET	1.73	0.33	9.47*	0.70	0.01	0.14
Adjusted R ²	0.99	0.99	0.99	0.99	0.99	0.99
CS (CS ²)	S(S)	S(S)	S(US)	S(US)	S(S)	S(S)
WALD – S		0.001		1.23		3.20
WALD – L		4.32*		0.01		53.08*

Notes: See notes at the end.

Table 2: L-ARDL and NL-ARDL Models						
	I = United Kingdom		I = Germany		I = Singapore	
	L – ARDL⁺⁺⁺	NL – ARDL⁺⁺	L – ARDL⁺⁺	NL – ARDL⁺⁺	L – ARDL⁺⁺	NL – ARDL⁺⁺
Panel A: Short-Run Estimates*						
$\Delta \text{LnG}_{\text{NZ},t-1}$	0.34*	0.24*	0.25*	0.23*	0.24*	0.19*
$\Delta \text{LnG}_{\text{NZ},t-2}$	0.55*	0.36*	0.44*	0.43*	0.03	0.01
$\Delta \text{LnG}_{\text{NZ},t-3}$	-0.31*	-0.33*	-0.35*	-0.36*	0.02	-0.02
$\Delta \text{LnG}_{\text{NZ},t-4}$	0.50*	0.52*	0.37*	0.35*	0.67*	0.66**
ΔLnG_t	0.37*	0.14	0.23	0.14	0.11	0.04
ΔLnG_{t-1}	-0.27	-0.14	0.10	0.10	0.06	0.10
ΔLnG_{t-2}	0.20	0.16	0.33*	0.31*	0.04	0.02
ΔLnG_{t-3}	-0.43*	-0.02	-0.44*	-0.43*	-0.14**	-0.10
ΔLnG_{t-4}		-0.27*			0.03*	
ΔLnLA_t	0.02*	0.03*	0.02*	0.02*	-0.03*	0.03*
ΔLnLA_{t-1}	-0.02	-0.02*	-0.02*	-0.02	0.01	-0.03*
ΔLnLA_{t-2}	-0.03*	-0.02*	-0.01*	-0.02		
ΔLnLA_{t-3}	0.03*	0.01*	0.02*	0.02		
ΔLnLA_{t-4}			-0.01	-0.01		
ΔLnEX_t	0.01		0.03		0.03	
ΔLnEX_{t-1}	0.05				-0.03	
ΔLnEX_{t-2}	-0.07**				-0.08**	
ΔLnEX_{t-3}						
ΔLnEX_{t-4}						
ΔPOS_t		0.15*		0.06		-0.09**
ΔPOS_{t-1}						
ΔPOS_{t-2}						
ΔPOS_{t-3}						
ΔPOS_{t-4}						
ΔNEG_t				-0.08		0.10
ΔNEG_{t-1}		-0.11				0.13
ΔNEG_{t-2}		0.26				-0.21
ΔNEG_{t-3}		-0.12				-0.27**
ΔNEG_{t-4}		-0.18				
Panel B: Long-Run Estimates						
$\ln G$	1.39*	-0.60	3.12*	0.77	1.78	0.34*
$\ln \text{TA}$	-0.12*	0.02	0.01	0.01	0.03	0.01
$\ln \text{REX}$	0.08		0.47		-1.78	
POS		0.73*		0.38		-0.57
NEG		-0.72*		-0.51		-1.62*
Constant	-4.13*	10.06*	-20.65*	-0.72	-4.94	3.58*
Panel C: Diagnostic Statistics						
F	5.75*	8.58*	8.59*	8.02*	10.69*	13.56*
ECM_{t-1}	0.08*	-0.20*	-0.07	-0.16*	-0.04*	-0.15*
LM	0.62	2.22	1.62	0.92	2.21	0.55
RESET	1.69	0.18	0.09	0.90	2.24	0.01
Adjusted R ²	0.99	0.99	0.99	0.99	0.99	0.99
CS (CS ²)	S(US)	S(US)	S(US)	S(US)	S(US)	US(US)
WALD – S		0.06		0.51		5.34*
WALD – L		13.29*		10.81**		17.19*

Notes: See notes at the end.

Table 3: L-ARDL and NL-ARDL Models						
	I=Canada		I=Japan		I=India	
	L – ARDL	NL – ARDL⁺⁺	L – ARDL	NL – ARDL⁺⁺	L – ARDL⁺⁺	NL – ARDL⁺⁺
Panel A: Short-Run Estimates						
$\Delta \text{LnG}_{\text{NZ},t-1}$	0.85*	0.62*	0.82*	0.86*	0.69*	0.65*
$\Delta \text{LnG}_{\text{NZ},t-2}$	0.02	-0.02	-0.02	0.15*	0.02	0.03
$\Delta \text{LnG}_{\text{NZ},t-3}$	0.15**	0.34*	0.02	0.06	0.16	0.19**
$\Delta \text{LnG}_{\text{NZ},t-4}$	-0.32*	-0.18	0.01	0.18*	-0.49*	-0.48*
ΔLnG_t	0.66*	0.57*	0.23*	-0.15*	0.16*	0.14*
ΔLnG_{t-1}	-0.92*	-0.63*	0.01	0.01*	-0.07	-0.10*
ΔLnG_{t-2}	0.27*		0.13*	-0.03*	0.14*	0.14*
ΔLnG_{t-3}			-0.16*	0.01*	-0.13*	-0.14*
ΔLnG_{t-4}			-0.14*			
ΔLnLA_t	0.03*	0.01*	0.01*		0.01*	0.01*
ΔLnLA_{t-1}		-0.01	-0.03*		-0.03*	-0.02*
ΔLnLA_{t-2}		0.01*	0.01*		0.01**	0.01
ΔLnLA_{t-3}		-0.01*			0.01**	0.01*
ΔLnLA_{t-4}		0.004				
ΔLnEX_t	0.01		0.01		-0.04	
ΔLnEX_{t-1}						
ΔLnEX_{t-2}						
ΔLnEX_{t-3}						
ΔLnEX_{t-4}						
ΔPOS_t		0.16*		0.02		-0.16
ΔPOS_{t-1}						0.28**
ΔPOS_{t-2}						
ΔPOS_{t-3}						
ΔPOS_{t-4}						
ΔNEG_t		-0.13*		-0.05*		-0.01
ΔNEG_{t-1}						
ΔNEG_{t-2}						
ΔNEG_{t-3}						
ΔNEG_{t-4}						
Panel B: Long-Run Estimates						
$\ln G$	-0.68	-0.23	-10.49	1.77*	0.99*	0.23
$\ln \text{TA}$	-0.54	0.02**	-0.22	-0.01	0.03	0.04
$\ln \text{REX}$	-1.81		0.02		0.19	
POS		0.66*		0.19*		1.00
NEG		-0.54*		-0.40*		-0.08
Constant	14.21	7.25*	143.75	-19.12*	-6.54	2.35
Panel C: Diagnostic Statistics*						
F	5.37*	7.98*	7.54*	7.87*	5.78*	5.99*
ECM_{t-1}	0.01*	-0.24*	0.01*	-0.13*	-0.11*	-0.12*
LM	0.06	0.52	0.02	1.19	2.65	1.83
RESET	8.21*	0.01	0.23	0.09	2.01	1.18
Adjusted R ²	0.99	0.99	0.99	0.99	0.99	0.99
CS (CS ²)		S(US)	S(US)	S(US)	S(US)	S(S)
WALD – S		0.04		0.53		0.07
WALD – L		2.33		28.06**		0.01

Notes: See notes at the end

Table 4: L-ARDL and NL-ARDL Models		
	I = Korea	
	L – ARDL⁺⁺	NL – ARDL⁺⁺
Panel A: Short-Run Estimates		
$\Delta \text{LnG}_{\text{NZ,t-1}}$	0.63*	0.84*
$\Delta \text{LnG}_{\text{NZ,t-2}}$	0.17	-0.09
$\Delta \text{LnG}_{\text{NZ,t-3}}$	0.31*	0.28*
$\Delta \text{LnG}_{\text{NZ,t-4}}$	-0.22*	-0.28*
ΔLnG_t	0.30*	0.30*
ΔLnG_{t-1}	-0.19**	0.05
ΔLnG_{t-2}		-0.09*
ΔLnG_{t-3}		0.08**
ΔLnG_{t-4}		-0.08*
ΔLnLA_t	0.01*	0.02*
ΔLnLA_{t-1}	-0.02**	-0.03*
ΔLnLA_{t-2}	0.01*	0.02*
ΔLnLA_{t-3}	-0.01	-0.01*
ΔLnLA_{t-4}	0.01*	0.01*
ΔLnEX_t	-0.04*	
ΔLnEX_{t-1}		
ΔLnEX_{t-2}		
ΔLnEX_{t-3}		
ΔLnEX_{t-4}		
ΔPOS_t		-0.08
ΔPOS_{t-1}		0.24*
ΔPOS_{t-2}		-0.23*
ΔPOS_{t-3}		0.11
ΔPOS_{t-4}		
ΔNEG_t		-0.08*
ΔNEG_{t-1}		
ΔNEG_{t-2}		
ΔNEG_{t-3}		
ΔNEG_{t-4}		
Panel B: Long-Run Estimates		
$\ln G$	0.94*	-0.51
$\ln \text{TA}$	-0.03	0.04
$\ln \text{REX}$	-0.38*	
POS		0.44
NEG		-1.05*
Constant	-4.97*	
Panel C: Diagnostic Statistics*		
F	4.16*	4.42*
ECM_{t-1}	-0.11*	-0.08*
LM	1.55	0.60
RESET	18.33*	2.09
Adjusted R ²	0.99	0.99
CS (CS ²)	S(S)	S(US)
WALD – S		0.01
WALD – L		20.37*

Notes: See notes at the end.

Note:

- Absolute value of t-ratios. **, * denote significance at the 10% and 5% levels, respectively.
- We observe Pesaran et al. (2001, Table CI, Case III, p. 300).
- We observe Banerjee et al. (1998, Table 1).
- Lagrange Multiplier (LM) test is distributed as χ^2 with one degree of freedom (first order).
- RESET is distributed as χ^2 with one degree of freedom.
- Wald tests are distributed as χ^2 with 1 degree of freedom.
- The symbol shows dummy is significant; +Asian Financial Crises, 1998; ++ Global Financial Crisis, 2018; +++ Coronavirus disease (COVID-19) pandemic, 2020.
 - Dummy1: Asian Financial Crises, 1998.
 - Dummy2: Global Financial Crisis, 2018,
 - Dummy3: Coronavirus disease (COVID-19) pandemic, 2020.

EVOLUTION OF THE C-SUITE: THE GROWTH OF C-LEVEL POSITIONS IN AMERICAN CORPORATIONS

John Keiser, SUNY Brockport

ABSTRACT

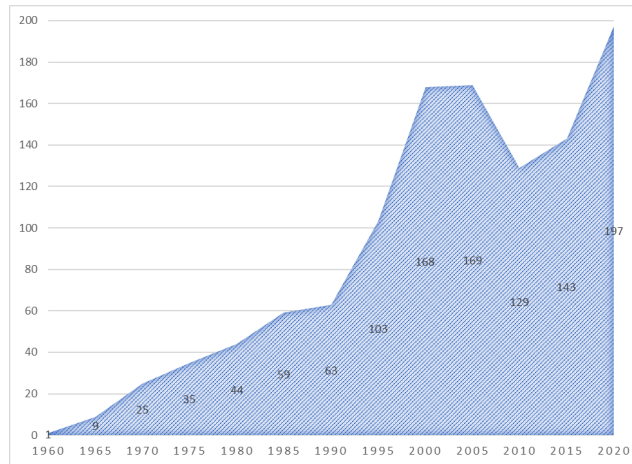
In American business, the title of Chief Executive Officer (CEO) is the apex of corporate success. Reporting to the CEO are functional titles such as Chief Operating Officer, Chief Financial Officer, Chief Marketing Officer, etc. As common as these titles are, they do not have a long history in American business. As recently as the 1960s, very few companies had a “Chief Executive Officer”, but now the title has become ubiquitous. It’s not only CEOs, but other C-level titles (Chief Operating Officer, Chief Financial Officer, etc.) have proliferated and we find corporations have entire tiers of C-level managers, otherwise known as the “C-Suite.” Ironically, there is no legal requirement for publicly held corporations to have a CEO or any other titled “C-Officer.” This paper will present archival research documenting the growth of the C-Suite over the last 60 years in companies comprising the Dow Jones Industrial Average.

INTRODUCTION

In American corporations, the top management position within an organization is typically the Chief Executive Officer, commonly referred to by its initials of CEO. CEOs report to a board of directors, and the board’s leader is the Chairman of the Board, a position of significant status and responsibility. Very commonly, but not necessarily, the CEO simultaneously serves as the Chairman of the Board. Interestingly, the title Chief Executive Officer title has been around since the 1770s, but then it was used by the government to describe the top official of any of the states, “...shall be opened by order of any military officer, or chief executive officer of either of the states.” (*Journals Of Congress*, 1782). It wasn’t until the 1970s that the CEO title became common in corporate governance (Keiser, 2004), despite there being no legal requirements for a company to have a Chief Executive Officer. As the CEO title grew in popularity, other “Chief” titles began to appear such as the “Chief Operating Officer,” “Chief Financial Officer,” “Chief Administrative Officer,” and others. Now companies typically have a cohort of C-titled executives who collectively make up the “C-Suite.”

If one were to hold a convention of all the C-level executives, the Chief Executive Officers the Chief Operating Officers, the Chief Financial Officers, etc. in the 30 Dow Jones Industrial Index Average companies in 1960, there would only have been only one attendee, Morse G. Dial the CEO of Union Carbide (*Standard and Poor’s Register of Corporations, Directors and Executives*, 1960). At that time, large companies were headed by a president surrounded by a handful of vice presidents. With the exception of Dial, the C-Suite did not exist. However, 60 years later, across the 30 DJIA companies there were nearly 200 executives with “Chief” and “Officer” in their titles. Moreover, during those 60 years we find that these corporations added 69 other C-titles to that of the Chief Executive Officer. Figure 1 displays the growth C-Level Executives across the study. These are CEOs, COOs, CFOs, and any other executive with a C-title.

Figure 1: Number of Executives with C-Titles



Chief Executive Officers have been the subject of much research (Westphal & Zajac, 1995). The public reporting of corporate information provides mountains of data, and as a result there are thousands of papers covering CEO succession (Berns & Klarnar, 2017; Miller, 1993; Wangrow et al., 2022); CEO pay (Edmans & Gabaix, 2016), CEO attributes (Kaur & Singh, 2018; Morresi, 2017; Saidu, 2019; Thong & Yap, 1995), CEO/board dynamics (Nyberg et al., 2021), CEO/firm performance (Nguyen & Fan, 2022; Saidu, 2019), etc. However, research on the title itself is virtually nonexistent (Keiser, 2004). Scarcer still is research on other C-titles.

The purpose of this paper is to document the evolution of the C-Suite in American corporations between 1960 and 2020. Studying C-level positions allows us to better understand corporate governance as C-level executives are among the most powerful and influential in organizations. In doing so, this paper is divided into four sections. The first explains the sample and methodology of collecting data. Next comes findings focusing on the growth of the number of executives in certain titles (CEO, CFO, etc.), as well as the growth of the number of C-titles found in the sample. The third section contains observations with a discussion concluding the paper.

SAMPLE AND METHODOLOGY

Executives in this study all work(ed) for companies listed in the Dow Jones Industrial Average (DJIA). The DJIA, “the Dow” is a stock market index established in 1896 by Charles Dow and Edward Jones consisting of 12 leading companies (Judge, 2015). In 1916, the list of companies expanded to 20, and in 1928 it increased to its current number of 30. Company inclusion in the DJIA changes as the index updates its membership to maintain 30 companies that are significant and represent the American economy, although transportation and utility companies are not included in the index (*Dow Jones Industrial Average Fact Sheet*, 2023). This study begins in 1960 with the 30 companies listed on the Dow at that time. The data includes information in five-year increments (1960, 1965, 1970, etc.) until 2020 the last year of the study. Over the course of the study, no firm from 1960 was still in the index 2020, and 78 individual companies were eventually in the sample. General Electric, one of the original members of the Dow, dropped from the index in 2018, which makes it the longest running company in the sample. Table 1 in the Appendix has a list of all DJIA companies in the study.

Listings of executives and their titles came from several sources. Between 1960 and 1995, *Standard and Poor’s Register of Corporations, Directors and Executives* was the primary source of company officers and their titles. From 200-2020, officers and their titles came from a combination of online annual reports and Form 10-K filings.

FINDINGS

Over the course of the study, the frequency and number of C-level titles grew dramatically. As mentioned in the Introduction, only one person among the DJIA had a C-level title in 1960. By 2020, the end of the study, there were 197 C-level executives occupying 48 different C-titles among the 30 Dow Jones companies. In fact, between 1960 and 2020 there were 70 C-titles used among the companies. Some like Chief Executive Officer have become

ubiquitous with nearly every company reporting having a CEO, often more than one. Other titles such as Chief Procurement Officer (1995) and Chief Learning Officer (2000) appeared only once and dropped out of the population of C-titles altogether. Table 2 provides an overview of the titles, when they first appeared, and how frequently they were used among the companies in the sample. Among the 70 different titles identified in the study, three stand out from the others in terms of frequency of usage.

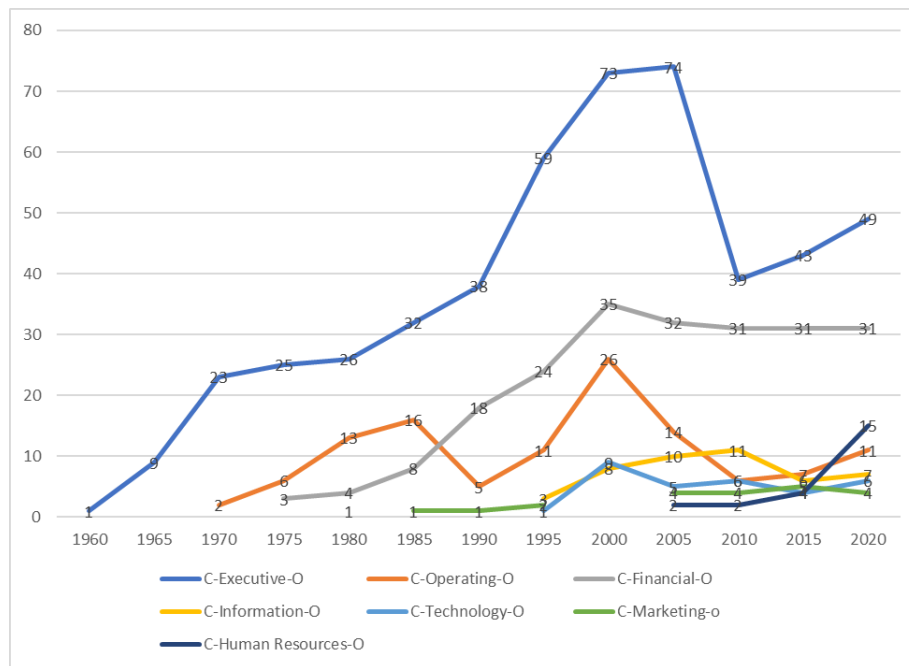
Chief Executive Officer: Previously mentioned, there was only one CEO in the 1960 data set of thirty companies. By 1965, nine companies adopted the title, and usage of CEO continued to grow. In 1985 there were more CEOs than companies with 32 found in the sample. This meant that a few companies listed more than one CEO. The number of CEOs continued to grow until 2005 when there were 74 CEOs listed across the DJIA companies. In 2010, there was a sharp decrease in the usage of CEO as it was listed 39 times. Since then, it has grown modestly such that by 2020, 49 individuals held the title of Chief Executive Officer. Throughout the 13 data points in the study, 491 CEOs were listed as CEOs. It will be interesting to explore further why the title seemed to lose favor between 2005 and 2010.

Chief Operating Officer: The first COOs entered the sample in 1970 when two companies reported having one among their officers. The title grew steadily through 2000 when 26 of the 30 companies reported having one. Interestingly, the popularity of the title then started to wane and by the end of the study, only 11 companies out of 30 reported having a Chief Operating Officer. Over the course of the study, 117 COOs were identified.

Chief Financial Officer: The first time Chief Financial Officer (CFO) appeared was in 1975 when three companies listed having a CFO. Its usage increased steadily such that by the end of the study every company reported having a CFO, and a CFO was mentioned 217 times across all data points.

Figure 2 charts the growth of CEO, COO, CFO, as well as three other common C-titles, Chief Information Officer (CIO), Chief Technology Officer (CTO), and Chief Human Resource Officer (CHRO).

Figure 2: Evolution of Key C-Titles

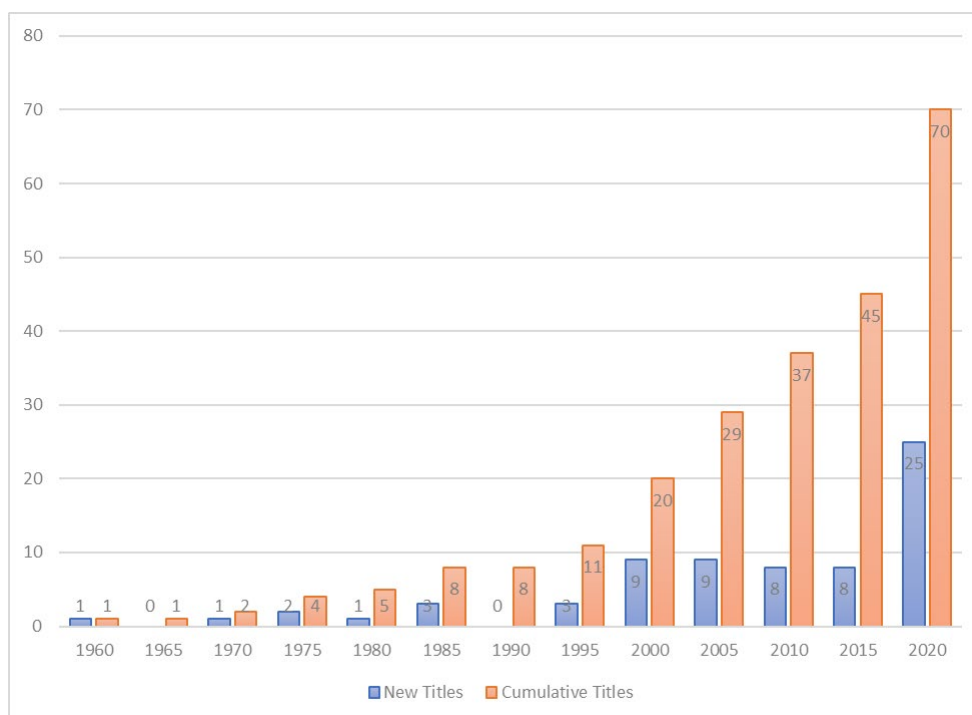


After CEO, COO, and CFO, C-titles become much less common. While COO was mentioned 117 times, the next most popular title was Chief Information Officer (CIO), mentioned 45 times across the length of the study. Other titles mentioned at least 10 times were Chief Technology Officer (mentioned 32 times), Chief Administrative Officer (25), Chief Human Resource Officer (23), Chief Marketing Officer (21), Chief Legal Officer (20), Chief Risk Officer (15), Chief Accounting Officer (13), Chief Compliance Officer (12).

Next came titles identified more than five times. Chief Investment Officer (8), Chief Risk Officer (8), Chief People Officer (7), Chief Strategic Officer (7). Four titles (Chief Innovation Officer, Chief Medical Officer, Chief Underwriting Officer, and Chief Ethics & Compliance Office) were listed four times, and six titles were listed three times (Chief Science & Technology Officer, Chief Customer Officer, Chief Brand Officer, Chief Governance Officer, Chief Development Officer and Chief Digital Officer). The remaining 44 titles were listed once or twice. Sometimes, it was the same company that reported the title more than once. For example, McDonalds was the only company that reported having a Chief Restaurant Officer, who were evident in the 2005 and 2010 samples.

New Titles, the Growth of the C-Suite: Within this study, the first C-title appeared in 1960 with Chief Executive Officer or CEO. By the end of the study in 2020, there were 70 C-titles. Figure 3 shows the growth of new C-titles into the sample.

Figure 3: Growth of New C-Titles



CEOs become more common in 1965, but that was still the only C-title evident. However, in 1970 we found the next C-title, Chief Operating Officer, or COO which was a position in two of the companies. Five years later, in 1975, we found two new titles, Chief Financial Officer and Chief Legal Officer, and in 1980 another C-title appeared, Chief Technology Officer. Chief Administrative Officer, Chief Accounting Officer, and Chief Marketing Officer made their debuts in 1985. In 1990, no new titles appeared, but by 1995 there were three more titles: Chief Corporate Information Officer, Chief Information Officer, and Chief Procurement Officer. After that, the growth in new C-titles really took off. In 2000, nine new titles appeared for the first time: Chief Compliance Officer, Chief Merchandising Officer, Chief People Officer, Chief Strategic Officer, Chief Technology and Information Officer, Chief Learning Officer, Chief Operations & Technology Officer, Chief Investment Officer, and Chief Science and Technology Officer. In the 2005 sample, another nine C-titles joined the growing list: Chief Tax Officer, Chief Risk Officer, Chief Human Resources Officer, Chief Information and Global Services Officer, Chief Restaurant Officer, Chief Credit Officer, Chief Customer Officer, Chief Innovation and Technology Officer, and Chief Strategy and Technology Officer. By this time, 29 different C-titles appeared in the study. Moving on to 2010, eight new titles joined the C-Suite: Chief Innovation Officer, Chief Brand Officer, Chief Communications Officer, Chief Medical Officer, Chief Research and Strategy Officer, Chief Governance Officer, Chief Category and Marketing Officer, and Chief Underwriting Officer. Another eight titles joined in 2015: Chief Audit Officer, Chief Ethics and Compliance Officer, Chief Development

Officer, Chief Public Affairs and Communication Officer, Chief Digital Officer, Chief Engineering Officer, Chief Scientific Officer, and Chief Compliance and Risk Officer. The last year of data collection, 2020 brought the biggest increase in new titles with 25: Chief Colleague Experience Officer, Chief Corporate Affairs Officer, Chief Sales and Marketing Officer, Chief Customer Experience Officer, Chief Government Strategy Officer, Chief Platform Services Officer, Chief Inclusion Officer, Chief Global Supply Chain Officer, Chief Global Impact Officer, Chief Commercial Officer, Chief Patient Officer, Chief Digital and Technology Officer, Chief Compliance, Quality and Risk Officer, Chief Business Officer, Chief Design Officer, Chief Research, Development & Innovation Officer, Chief Sustainability Officer, Chief Equity and Inclusion Officer, Chief Product and Supply Officer, Chief Analytics and Insights Officer, Chief Sales Officer, Chief Transformation Officer, Chief Diversity Officer, Chief Technology and Operations Officer, Chief Data and Analytics Officer, bringing the total number of C-titles to 70. Figure 2 graphs the growth of C-Titles during the study.

All but one title was recorded verbatim from the officer lists. The only instance in which I combined titles was Chief *Technology* Officer and Chief *Technological* Officer, as they were nearly identical. There are quite a few titles that although different likely have the same responsibilities. The Chief Marketing Officer at one company probably has the same role as the Chief Sales and Marketing Officer at another, but I include them separately.

OBSERVATIONS

Industry Effects: While some C-titles became common across all companies and industries, others were more industry specific. For example, we found “Chief Risk Officer” and “Chief Underwriting Officer” in insurance companies, but not in companies from other industries. Not surprisingly, titles such as “Chief Medical Officer” and “Chief Patient Officer” were found only in the pharmaceutical and healthcare corporations. “Chief Restaurant Officer” was listed by one company, McDonalds, the only restaurant company in the sample. More thorough studies within industries might find more usage of these titles. It is also worth noting that the make-up of the DJIA has changed significantly over the course of the study. During the early years, the DJIA was heavily populated with manufacturing and heavy industrial companies. By the end of the study, the DJIA the representation of industrial companies had declined with higher representation of service providers (financial, healthcare, insurance, etc.) (Judge, 2015).

Rise of Technology: The first time “Technology” was included in a C-title, was 1975 (Chief Technology Officer). By the new millennium, there were seven other C-titles using “Technology:” Chief Technology & Information Officer (2000), Chief Operations & Technology Officer (2000), Chief Science & Technology Officer (2000), Chief Innovation & Technology Officer (2005), Chief Strategy & Technology Officer (2005), Chief Digital & Technology Officer (2020), and Chief Technology and Operations Officer (2002). A related title, Chief Information Officer, debuted in 1995 as did Chief Corporate Information Officer. Chief Technology and Information Officer (2000) came next followed by Chief Information & Global Services Officer (2005). Similarly, “Digital” entered the lexicon of C-titles in 2015 (Chief Digital Officer) and 2020 (Chief Digital & Technology Officer). “Analytics” appeared for the first time twice in 2025 with Chief Analytics & Insights Officer, and Chief Data & Analytics Officer (the first time “Data” appeared in a C-title).

Corporate Social Responsibility: Corporate Social Responsibility is acting “in a way that enhances society and its inhabitants and be held accountable for any of its actions affect people, their communities, and their environment” (Lawrence & Weber, 2020, p. 51). It commonly refers to a corporation’s initiatives in the areas of governance, environmental protection, and social justice. In 2020 there were three new titles that address corporate Equity, Diversity and Inclusion (EDI) efforts: Chief Inclusion Officer, Chief Equity & Inclusion Officer, and Chief Diversity Officer. That same year there were two new titles addressing environmental concerns, Chief Sustainability Officer and Chief Global Impact Officer.

DISCUSSION

This intention of this study was to document the growth of C-titles in American corporations. The growth has been remarkable, starting from a single Chief Executive Officer among the DJIA in 1960 to 197 executives with dozens of C-titles in 2020. The adaptation of these new titles is evidence that executive governance has changed. At the beginning of the study, corporations were typically led by a President surrounded by Vice Presidents. By the end of the study, a new layer, the C-Suite became prevalent. This is especially true for the titles Chief Executive Officer and

Chief Financial Officer which exist in virtually every company in the sample. Most interesting is that companies are not required to have those titles. State articles of incorporation require presidents and treasurers for corporations, but not necessarily C-titled executives. That CEOs and CFOs have become so institutionalized (DiMaggio & Powell, 1983) without external mandates is a remarkable phenomenon.

It's important to emphasize that this study uses a relatively small sample of 30 companies. While the DJIA is an index meant to represent the broad American economy, a sample of 30 cannot fully capture all the corporations in the country. A larger sample would certainly uncover many other C-titles, not mentioned here. One could even argue that this sample provides a conservative picture of the growth of the C-Suite. Members of the DJIA are among the largest and most established firms, and these firms aren't known for making organizational changes rapidly (Gerstner, 2004). Moreover, research in institutional change suggests peripheral organizations are more likely to instigate changes, not the most embedded organizations (Leblebici et al., 1991).

In terms of governance, C-titles reflect organizational priorities. Having C-status symbolizes importance and meaning to an organization as a C-level executive has a 'seat at the table' when determining significant organizational decisions. For example, the field of human resources didn't achieve a C-title until 2000 (Chief People Officer) but has grown more common in the ensuing 20 years. By the end of the study nearly a third of the sample had a C-level executive heading its HR function. This suggests the human resources function has become more prominent in American corporations. This is true for many other areas as well.

Management is evident in many forms. In the latter half of the 20th century and into the beginning decades of the 21st, the management ranks have been growing with a category of senior executives whose titles begin with "Chief" and end with "Officer." One can find a lot of significance and symbolism in these titles and this level of management. This paper is a preliminary effort to document the increased use of these titles, and the advent of the C-Suite.

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APPENDIX

Table 1: List of DJIA Companies 1960-2020

3M Company	Johnson & Johnson
Alcoa Inc.	JPMorgan Chase & Co.
Allied Chemical	Kraft Foods Inc.
AlliedSignal Incorporated	McDonald's Corporation
Altria Group Incorporated	Merck & Co., Inc.
Aluminum Company of America	Microsoft Corporation
American Can Company	Minnesota Mining & Manufacturing Company
American Express Company	Navistar International Corporation formerly International Harvester Company
American International Group, Inc.	Nike, Inc.
American Telephone and Telegraph Company	Owens-Illinois, Inc.
American Tobacco Company (B shares)	Pfizer Inc.
Anaconda Copper Mining Company	Philip Morris Companies Inc.
Apple Inc.	Raytheon Technologies Corporation
AT&T Inc.	SBC Communications Inc.
Bank of America Corporation	Sears Roebuck & Company
Bethlehem Steel Corporation	Standard Oil Co. of California
Caterpillar Inc.	Standard Oil Co. of New Jersey
Chevron Corporation	Swift & Company
Chrysler Corporation	Texaco Incorporated
Cisco Systems, Inc.	The Boeing Company
Citigroup Inc.	The Coca-Cola Company
Dow Inc.	The Goldman Sachs Group, Inc.
E.I. du Pont de Nemours & Company	The Home Depot, Inc.
Eastman Kodak Company	The Procter & Gamble Company
Exxon Corporation	The Texas Company
Exxon Mobil Corporation	The Travelers Companies, Inc.
F. W. Woolworth Company	The Walt Disney Company
General Electric Company	Union Carbide Corporation
General Foods Corporation	United Aircraft Corporation
General Motors Corporation	United States Steel Corporation
Goodyear Tire and Rubber Company	United Technologies Corporation
Hewlett-Packard Company	UnitedHealth Group Inc.
Honeywell International Inc.	USX Corporation formerly United States Steel Corp.
Inco Limited	Verizon Communications Inc.
Intel Corporation	Visa Inc.
International Business Machines Corporation	Walgreens Boots Alliance, Inc.
International Harvester Company	Wal-Mart Stores, Inc.
International Nickel Company, Ltd.	Westinghouse Electric Corporation
J.P. Morgan & Company	
Johns-Manville Corporation	

Table 2: Titles, Frequency, and Years Recorded

Title	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
C-Executive-O	1	9	23	25	26	32	38	59	73	74	39	43	49
C-Operating-O			2	6	13	16	5	11	26	14	6	7	11
C-Financial-O				3	4	8	18	24	35	32	31	31	31
C-Legal-O				1					2	1	3	5	8
C-Technology-O					1			1	9	5	6	4	6
C-Administrative-O						1		1	6	3	4	6	4
C-Accounting-O						1	1			3	2	2	4
C-Marketing-o						1	1	2		4	4	5	4
C-Corporate Information-O								1					
C-Information-O								3	8	10	11	6	7
C-Procurement-O								1					
C-Compliance-O									1	6	3	1	1
C-Merchandising-O									1				
C-People-O									1			2	4
C-Strategic-O									1		2	1	3
C-Technology & Information-O									1				
C-Learning-O									1				
C-Operations & Technology-O									1	1			
C-Investment-O									1	3	1	1	2
C-Science & Technology-O									1	1		1	
C-Tax-O										2			
C-Risk-O										2	4	4	5
C-Human Resources-O										2	2	4	15
C-Information & Global Services-O										1			
C-Restaurant-O										1	1		
C-Credit-O										1			
C-Customer-O										1		2	
C-Innovation & Technology-O										1			
C-Strategy & Technology-O										1	1		
C-Innovation-O											1	1	2
C-Brand-O											1	1	1
C-Communications-O											1	3	4
C-Medical-O											2	2	
C-Research & Strategy-O											1		
C-Governance-O											1	1	1
C-Category & Marketing-O											1		
C-Underwriting-O											1	1	2
C-Audit-O												1	
C-Ethics & Compliance-O												2	2
C-Development-O												1	2
C-Public Affairs & Communication-O												1	
C-Digital-O												1	2
C-Engineering-O												1	
C-Scientific-O												1	
C-Compliance & Risk-O												1	
C-Colleague Experience-O													1
C-Corporate Affairs-O													2
C-Sales & Marketing-O													1
C-Customer Experience-O													1
C-Government Strategy-O													1
C-Platform Services-O													1
C-Inclusion-O													1
C-Global Supply Chain-O													2
C-Global Impact-O													1
C-Commercial-O													1
C-Patient-O													1
C-Digital & Technology-O													1
C-Compliance, Quality & Risk-O													1
C-Business-O													1
C-Design-O													1
C-Resesarch, Development & Innovation-O													1
C-Sustainability-O													1
C-Equity & Inclusion-O													1
C-Product & Suply-O													1
C-Analytics & Insights-O													1
C-Sales-O													1
C-Transformation-O													1
C-Diversity-O													1
C-Technology & Operations-O													1
C-Data & Analytics-O													1

IDENTIFYING CRITICAL FACTORS THAT IMPACT LEARNING ANALYTICS ADOPTION BY HIGHER EDUCATION FACULTY

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ABSTRACT

Higher education institutions (HEI) invest heavily in learning analytics as a compliment to their existing suite of technologies used to enhance the pedagogical practices of instructors. With promises of reduced student dropout rates, improved student outcomes, better course pedagogy, and backed by pressures of assessment and accountability, learning analytics is being trumpeted as the next best solution to our educational woes. However, instructors have been slow, if not resistant, to adopt learning analytics. The following paper demonstrates how the technology-pedagogy-content knowledge framework (TPACK) can be used to extend traditional technology adoption models to include professional identity expectancy in an effort to explain intention to use behavior. A quantitative analysis of 222 United States based survey respondents is used to inform results. The results support effort expectancy, pedagogical expectancy, and professional identity expectancy to be key factors of willingness to adopt learning analytics. These results may inform additional research into the influence of professional identity expectancy on technology adoption as well as research, development, and marketing opportunities within the consumer space of learning analytics tools.

INTRODUCTION

A data revolution is upon us. For-profit businesses have successfully capitalized on using vast amounts of data and sophisticated analytical tools to drive huge profits and tremendous market share (Thirathon, Wieder, Matolcsy, & Ossimitz, 2017; Davenport, 2006; LaValle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011; Choo, et al., 2006). It is clear that organizations, as they always have, seek to make good strategic and operational decisions. However, the processes and tools available to make these decisions is rapidly changing. Organizations are beginning to adopt a culture of analytics (Gupta & George, 2016) and it becomes an interesting challenge to understand where higher education institutions (HEI) stand in the landscape of internalizing learning analytics.

While a multitude of different definitions of learning analytics have evolved over the years, the definition provided at the inaugural international conference on LA in 2011 provides a sound base (Siemens, Long, Gasevic, & Conole, 2010); *“The measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and environments in which it occurs.”*. The use of the word ‘optimizing’ is noteworthy. LA imparts an economic lens on the educational process. It is possible that this economic lens will run orthogonal to instructors’ traditional view of education and to their own professional identity. Such a belief may influence a higher education faculty member’s willingness to adopt LA into their pedagogical practices.

HEIs are slowly adopting a culture of LA but there is not consensus on the value and effectiveness of the tools and practices that make up the culture. There exists tremendous variability in how individual faculty members interface with LA as it relates to adoption, sense making, and influence on professional identity (Avella, Kebritchi, Nunn, & Kanai, 2016). A demand for more research to understand the beliefs of users of the LA systems exists (Ferguson, et al., 2016). An important research agenda is to better understand key constructs that serve to enable an individual higher education faculty member to be willing to adopt learning analytics into their daily practice. LA in part is just one of the latest manifestations of new technologies. Most LA are embedded into existing learning management systems which are already adopted on a very large scale. Given that learning analytics is just a different flavor of technology, it is easy to assume that existing technology adoption models will seamlessly apply. But LA have characteristics which differentiates itself from other typical educational technology. First, LA is not a standalone device like a graphing calculator or an interactive smartboard. It is not just one technology, but an amalgamation of many technologies. Second, there is an inherent feedback loop incorporated into the design of LA. LA are intended to evaluate a given pedagogical experience, transparently report on that experience, and then be interpreted by the stakeholders in the pedagogical experience in order to inform the future direction of the experience. And lastly, LA focus multiple aspects of pedagogy that most educational technologies do not. Specifically, learning analytics brings into focus technical knowledge, pedagogical knowledge and discipline or content knowledge. The LA research corpus lacks research placing the higher education faculty stakeholder front and center. Certainly, faculty buy-in plays a large role in LA adoption (Dawson, et al., 2018; Kaliisa, 2021). This guides the following fundamental research questions.

RQ1: What are the emergent enablers to a higher education faculty member's willingness to adopt learning analytics into their professional practice?

RQ2: What role does the concept of professional identity expectancy fill in determining a higher education faculty member's willingness to adopt learning analytics?

The purpose of this quantitative theory testing study is to examine how extent technology adoption theory models may be adjusted to incorporate the influence of professional identity into the specific adoption of learning analytics. Additionally, the study is intended to more clearly understand the enablers that exert a positive influence on the willingness of fulltime higher education faculty to adopt LA into their professional practice. Of particular research interest is fulltime faculty that teach undergraduate courses at universities that offer traditional two year associate degrees, four year bachelor degrees or advanced professional level doctorate degrees. The research study fills a gap in the learning analytics research literature as it pertains to adoption and perceptions of LA from higher education faculty. The research also serves the practitioner community by offering insight into challenges and opportunities of learning analytics usage and adoption within HEIs.

LITERATURE REVIEW AND RESEARCH MODEL

Literature Review

HEIs are interesting organizations to study due to the relatively new exploration of analytics and the wide diversity of the analytics being used (Avella, Kebritchi, Nunn, & Kanai, 2016). A number of years ago, a call to arms was put forth to HEIs to migrate beyond traditional uses of analytics in management of enrollment, retention and alumni relations and explore the integration of analytics in the pure academic and learning space (Campbell, Deblois, & Oblinger, 2007). Early exploration of this space pushed HEIs to invest in analytics that provided true measurement of institutional goals (Norris, Baer, Leonard, Pugliese, & Lefrere, 2008). HEIs don't only use analytics to improve revenue or profit margins (traditionally viewed as business analytics), they also use analytics within the curriculum landscape (Norris, Baer, Leonard, Pugliese, & Lefrere, 2008). It is within the curriculum landscape where things get interesting as the broad field of analytics narrows to learning analytics (LA). In the ensuing years, the field of LA begins to take shape. The first annual international conference in learning analytics and knowledge was held in 2010. The first edition of the Journal of Learning Analytics was published in 2013. In the inaugural issue, Seimens (2014) points out that higher education is comparatively late to the analytics game but their presence is important as data continues to play a key role in how learning transpires and how faculty make decisions within the learning context.

LA research conducted to date has primarily focused on LA design (Bakharia, et al., 2016; Greller & Drachsler, 2012), data visualization design (Echeverria, et al., 2018), or use cases that support using LA as a retention or early warning system (Gasevic, Dawson, & Siemens, 2015). Literature reviews in LA also show emerging concerns over data ownership, privacy, and ethics (Viberg, Hatakka, Balter, & Mavroudi, 2018; Avella, Kebritchi, Nunn, & Kanai, 2016). While there exists a generally shared belief in the positive impact and potential of learning analytics, institutions and individual faculty show surprisingly slow (perhaps even resistant) adoption rates (Herodotou, et al., 2017; Alzahrani, 2023). Determining factors that influence this resilience poses an interesting research challenge. An important perspective is that LA represents a disruptive influence on the current culture in HEI (Avella, Kebritchi, Nunn, & Kanai, 2016). LA push the barriers of accountability and assessment (Sergis & Sampson, 2017). While prior LA research projects point to the importance of the stakeholders and specifically the individual faculty member (Campbell, Deblois, & Oblinger, 2007; Kaliisa, 2021), a research gap exists as it pertains to the perspective of the individual faculty member. Campbell, et al., (2007) specifically point to the importance of faculty in the process of utilizing learning analytics, *"Faculty are key to "interventions" ... For some faculty, analytics may provide a valuable insight into which students are struggling or which instructional approaches are making the greatest impact."* The faculty perspective gap opens an opportunity for further study. Specifically, it becomes interesting to explore the various personal and organizational constructs that affect the willingness of a higher education faculty member to adopt LA. The existing body of LA research does not sufficiently represent the perspective of the higher faculty member. This perspective is critical in understanding how various constructs may threaten or enable willingness to adopt LA.

Theoretical Foundation

The true underlying issues with LA in higher education is adoption and integration. Similar research that focuses on the phenomenon of learning management system integration within secondary schools (Towne, 2018), reveals several theories applicable to this research. The phenomenon of LA usage by higher education faculty in part represents an example of technology adoption. As such, theories such as the Technology Adoption Model (TAM) (Davis F. , 1989) or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) provide a good base. While TAM and UTAUT are historically widely used theories, they continue to prove helpful in understanding why certain technologies are adopted and why certain technologies are not. UTAUT represents a valuable theory as this theory specifically addresses concepts of performance expectancy, effort expectancy, and social influence. However, TAM or UTUAT as an overarching theory base lack specificity to the education domain and the perspective of the higher education faculty member. The higher education faculty member is assumed to be a rational actor in the culture of analytics. Psychology based theories such as the Theory of Reasoned Action (TRA) (Sheppard, 1988) or the Theory of Planned Behavior (TPB) (Ajzen, 1991) are reasonable theory bases to draw from. Yet here again, these theories fail to address the unique characteristics of HEIs. Cognitive science theories on decision-making such as Rational Choice Theory (Tversky & Kahneman, 1981) were also considered but fell short against the strength of the Technological Pedagogical Content Knowledge Framework (TPACK) (Mishra & Koehler, 2006).

Higher education faculty are expected to incorporate new tools and new processes into their day-to-day workflow. Their ability to leverage LA tools and information effectively may hinge in large part on both their self-identified analytical skillsets and their personal beliefs in learning new ways to evaluate student learning. TPACK provides a strong theoretical foundation for examining LA adoption. Mishra and Koehler (2006) introduced TPACK in order to provide a stronger theoretical framework for the adoption and usage of educational technology. TPACK seeks to explain the complex interactions of three distinct knowledge areas; technology, pedagogy and content. These interactions exist on a binary level between two distinct knowledge areas and on a multifaceted level where all three knowledge areas come together as one. Using this conceptual framework as a theory base, willingness to adopt can be explored along the same three basic vectors. Technology knowledge can be framed as efficacy with LA technologies. Pedagogy knowledge relates to how an individual higher education faculty member reconciles LA against their pedagogical practices. Content knowledge speaks directly to the specific disciplinary knowledge that a faculty member possesses. Content knowledge can be extended to include beliefs about what is required to be a professional within a respective discipline. Lastly, willingness to adopt a certain educational technology can be examined by the manner in which all three forces come together. The TPACK framework is visually depicted in Figure 1 (Koehler, Mishra, & Cain, 2013). The framework establishes seven core knowledge constructs that work in concert with each other to help explain technology integration in education; Technology Knowledge (TK), Content Knowledge (CK), Pedagogy Knowledge (PK), Technology-Content Knowledge (TCK), Technology Pedagogy Knowledge (TPK), Content-Pedagogy Knowledge (CPK) and Technology-Content-Pedagogy Knowledge (TPACK).

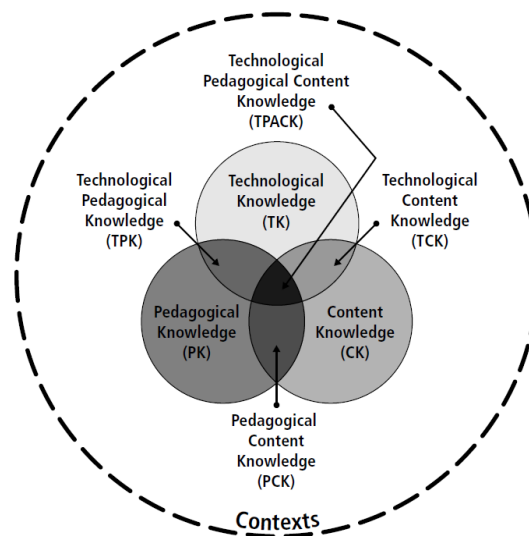


Figure 1. TPACK Framework

Research Model

Effective integration of LA into professional practice requires the higher education faculty member to embody certain knowledge and skills. This is the heart of the TPACK framework used as the theoretical base for this research. The foundational technical skills and knowledge for LA reside in analytical technologies and tools and data cycle literacy. Dunn, et al., explore data tools and technology as well as data literacy in their research on teacher efficacy and anxiety in the data-driven decision process (Dunn, Airola, Lo, & Garrison, 2013). Efficacy has also played a key role in major technology adoption theories such as TAM and UTAUT (Davis F. , 1986; Venkatesh, Morris, Davis, & Davis, 2003). While efficacy in the tools and technology of LA is important, an understanding of the foundational data life cycle also has value. Clow (2012) envisions the conceptual framework of LA as a cycle. Learners are at the top of this cycle and while a cycle does not technically have a true starting position, the framework assumes learners initiate the LA cycle. Learners create data that is collected, measured and analyzed through metrics. The metrics lead to interventions with learners. In turn, learners create new data and the cycle continues. The central concept of this data model is the existence of an inherent cycle in LA; a built-in feedback loop within the teaching-learning process.

Pedagogical knowledge from TPACK can be envisioned as the degree to which the higher education faculty member perceives the goals and purpose of LA run congruent to their specific pedagogical practices performed in a given instructional setting. The pedagogical alignment can be envisioned along two basic constructs; effort expectancy and performance expectancy.

The role that effort expectancy plays in technology adoption has roots in Davis's seminal work with the Technology Acceptance Model (TAM) and more specifically his investigation into perceived ease of use (Davis F. , 1986). Perceived ease of use is very similar to the concept of task-fit. Task-fit focuses on the degree to which the characteristics of the technology meet the requirements needed to complete the task. Goodhue and Thompson posit the importance of task-technology fit in explaining how an individual's performance may be impacted by the alignment of the task characteristics and the characteristics of the technology (Goodhue & Thompson, 1995). This is a vital element of technology adoption theory with overlaps to compatibility as explored by Moore and Benbasat (Moore & Benbasat, 1991) and to job relevance as detailed in the TAM 3 model (Venkatesh & Bala, 2008). Effort expectancy as an explicit construct was detailed in the UTAUT model (Venkatesh, Morris, Davis, & Davis, 2003). In this model, effort expectancy explains the ease of use of the system as perceived by the individual interacting with the system. Within the LA adoption framework, effort expectancy is defined as the ease of using LA tools and technology as perceived by the higher education faculty member.

Performance Expectancy is the degree to which the higher education faculty member believes that using LA will help them to better achieve their pedagogical goals. Behavioral intention and action are often based on a value proposition. In the original TAM model, the value proposition states intention to use is predicated on the value of ease of use and perceived usefulness (Davis F. , 1986). What is implied here is the user sees value in adopting a system because the system will not only prove to be useful, but the system is also easy to use and thus does not impart a high cognitive load. The value proposition is further explored in the foundational UTAUT model (Venkatesh, Morris, Davis, & Davis, 2003). Here the researchers specifically incorporate performance expectancy into the research model and define the construct as the degree to which the user believes using the system will help them to perform their job. As it pertains to LA, higher education faculty will likely need to see a value proposition for adoption. Performance expectancy speaks directly to this interpreted value proposition.

Content knowledge from TPACK correlates to the knowledge that a faculty member has on their profession and content domain. In essence, content knowledge embodies what it means to a professional educator within a specific area of expertise. I.e., one's professional identity. The multi-faceted nature of professional identity results in difficulty establishing a strict definition (Trede, Macklin, & Bridges, 2012). But the research does purport elements of attitude, beliefs and standards that are consistent with one's primary area of profession. Professional identity is an important area of study (Barbour & Lammers, 2015) and certainly within education (Day, Kington, Stobart, & Sammons, 2006; Barbara-i-Molinero, Cascon-Pereira, & Hernandez-Lara, 2017; Trede, Macklin, & Bridges, 2012; Haamer, Lepp, & Reva, 2012). However, professional identity has not been an area of study within traditional technology adoption research. Trede et al., (Trede, Macklin, & Bridges, 2012) specifically point to the importance of professional identity and how professional identity shapes practice, "*All point towards the notion that professional identity is a way of being and a lens to evaluate, learn and make sense of practice.*". If professional identity is truly a lens for how one approaches their professional practice, there is a strong possibility that it plays an important role in adopting

technologies. Teachers tend to have a very strong professional identity as teaching can tend to be more of something you are versus something you do (Korthgen, 2004).

Incorporating learning analytics into day-to-day professional practice is a complex undertaking. HEIs may or may not be well positioned for such a task. Factors such as leadership & stakeholder involvement, analytics culture & capabilities, and existing technologies all play a key role in determining how well a HEI is positioned to incorporate LA (Alzahrani, 2023). The strength of the HEI's LA readiness embodies the strength of these factors. A faculty member's perception of the institutional LA readiness is an important area of study as it pertains to adopting new technology.

Using TPACK as the theoretical lens, the research model depicted in Figure 2 extends traditional technical adoption models to include professional identity expectancy and perceived LA readiness. Within the model, the independent constructs are operationalized through Data Tools & Technology Efficacy, Data Cycle Literacy, Effort Expectancy, Performance Expectancy, and Professional Identity Alignment. The dependent construct is Willingness to Adopt Learning Analytics. An interaction effect is hypothesized through the impact of Perceived Institutional Learning Analytics Readiness on the relationship between Effort Expectancy and Performance Expectancy on the dependent construct.

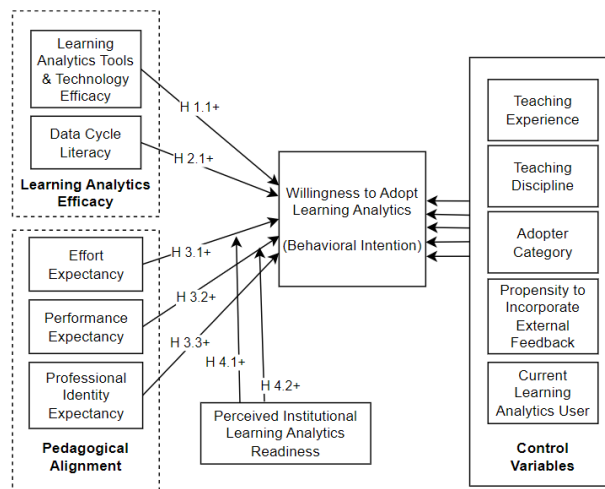


Figure 2. Research Model

The model presents the following hypotheses.

- H 1.1: The stronger a higher education faculty member perceives their efficacy with LA tools and technology, the more willing they will be to adopt LA into their professional practice.
- H 1.2: The stronger a higher education faculty member perceives their literacy with the data cycle, the more willing they will be to adopt LA into their professional practice.
- H 2.1: The higher the effort expectancy (ease of use) as perceived by the higher education faculty member, the more willing they will be to adopt LA into their professional practice.
- H 2.2: The higher the performance expectancy as perceived by the higher education faculty member, the more willing they will be to adopt LA into their professional practice.
- H 3.1: The higher the professional identity expectancy as perceived by the higher education faculty member, the more willing they will be to adopt LA into their professional practice.
- H 4.1: Perceived institutional LA readiness will moderate the relationship between effort expectancy and willingness to adopt. The moderated relationship is hypothesized to strengthen the relationship such that the higher the perceived institutional LA readiness, the stronger the effect will be on willingness to adopt.
- H 4.2: Perceived institutional LA readiness will moderate the relationship between performance expectancy and willingness to adopt. The moderated relationship is hypothesized to strengthen the relationship such that the higher the perceived institutional LA readiness, the stronger the effect will be on willingness to adopt.

METHODOLOGY AND SURVEY INSTRUMENT

The main subject of study is the higher education faculty member. As compared to elementary and secondary schools, LA are emerging on a greater scale within HEIs. The Signals program at Purdue University is one such example (Arnold & Pistilli, 2012). For the purposes of this study, HEIs institutions include any institution that awards a two year associates or master's degree, a four year bachelor's degree, or any doctoral degree. To be eligible for the study, the survey respondent must be a full-time faculty member at such an institution. This research focused on the adoption of LA as seen through the lens of the higher education faculty member. A pilot survey was constructed in Survey Monkey and the link to complete the survey was distributed via email to faculty at a small university located in the Midwest region of the United States. A representative at the university emailed the link via a generic faculty distribution list. As such, the principal researcher of this project was not directly involved in determining survey respondents. Additionally, by using a generic faculty distribution list, individual faculty members were not explicitly targeted. The analysis of the pilot study showed weaknesses in factor loadings and overall question design. Consultation with a psychometrician and better alignment to existing technology adoption measurement instruments informed the creation of the final survey. The final survey was also built in Survey Monkey and distribution was completed using their distribution support services. The Survey Monkey distribution mechanism can target individuals that work in the education sector, but it cannot specifically target higher education faculty. As such, a filter question was added at the beginning of the final survey. The filter question asked the respondent what their primary role was in the education industry. If a respondent selected, "Full time higher education faculty at an institution that awards 2 year, 4 year and/or doctoral degrees", they were presented with an opportunity to complete the full survey. Otherwise, the respondent was not allowed to complete the survey and the survey process terminated.

The final survey aligns to the final research model. LA efficacy is envisioned through two independent constructs; LA tools and technology efficacy (eight items using a five point Likert scale) and data cycle literacy (four items using a five point Likert scale). The items chosen for LA tools and technology efficacy are author created, but heavily influenced from prior work in efficacy and LA usage (Dunn, Airola, Lo, & Garrison, 2013). Prior work in data cycle theory and LA design (Clow, 2012; Greller & Drachsler, 2012; Bakharia, et al., 2016) provided a framework for the author created items of data cycle literacy.

Pedagogical alignment is comprised of the independent constructs of effort expectancy (four items using a five point Likert scale) and performance expectancy (six items using a five point Likert scale). The instrument used in testing the Unified Theory of Acceptance and Use of Technology (UTAUT) provides a strong foundation for this research (Venkatesh, Morris, Davis, & Davis, 2003). The four final items used for effort expectancy in the UTAUT study were adapted with slight wording changes. The initial survey used in UTAUT included twenty-four items to measure performance expectancy. A review of the original twenty four items revealed six that were appropriate for this study. Two of the final items used to measure performance expectancy in UTAUT were used in this study and were slightly adapted for appropriate wording changes. Additionally, four additional items were taken from the original list of items used in UTAUT.

The final independent construct is professional identity expectancy (four items using a five-point Likert scale). Previous work in institutional logics to measure professional identity (Barbour & Lammers, 2015) helped to shape the author created items to measure professional identity expectancy.

The interaction effect as influenced by perceived institutional LA readiness was measured with five items; each using a five point Likert scale. Organizational culture and infrastructural readiness are important elements of successful business intelligence project implementation success (Hasan, Miskon, Ahmad, Syed, & Maarof, 2016; Norris, Baer, Leonard, Pugliese, & Lefrere, 2008). This notion also holds true for HEIs and LA adoption (Alzahrani, 2023). The principal focus of study for the current LA adoption study is the higher education faculty member. It is through their lens that willingness to adopt is being investigated. Congruent to that line of thinking, institutional readiness is measured through the faculty member's perception of the institution's readiness. It is understood that perceptions will widely vary, even within the same institution. Future work could include data collection that more objectively measures an institution's data centric culture.

The dependent construct measuring the behavioral intention of willingness to adopt was modified from its original version in the pilot study of a single item to include four distinct items that sought to uncover differences between

hope and intention as well as temporal differences between short- and long-term willingness to adopt. The number of control variables was also increased in order to validate a more robust model.

DATA COLLECTION AND PRELIMINARY ANALYSIS

The broad target audience for this research project was individuals who work within the educational sector and reside in the United States. Since higher education faculty could not be individually targeted, a filter question was added to the final survey. If a survey respondent indicated they were a faculty member at a HEI that awards two-year associates or master's degrees or four bachelor degrees or doctoral degrees, they were permitted to respond to the entire survey. Otherwise, the respondent bypassed the survey questions and were presented with a message indicating they did not qualify for the survey. All survey responses, regardless of full completion, were collected by Survey Monkey and made available for download in various formats. The collected surveys were initially downloaded from Survey Monkey into a CSV format that was later opened using Microsoft Excel 2016. A total of 1330 individual survey responses were collected. Of this total, 259 respondents indicated they were a higher education faculty member. These 259 responses represented the initial list for further analysis. However, of the 259, 37 surveys were not fully completed. These 37 were removed from future analysis leaving a total of 222 respondents. The 222 completed surveys were used in all future analysis.

The initial preprocessing of the data occurred in Microsoft Excel 2016. After the total number of surveys was filtered down to the final 222, unique names were created for each individual data elements. For example, DTT_01, DTT_02, DTT_03, ... , DTT_08 were given to the eight items used to measure learning analysis tools and technology construct. EE_01, ... EE_04 were assigned to the four items used to measure effort expectancy. This process was repeated for all items used to measure the independent and dependent constructs as well as the control variables and other demographic data collected by default in Survey Monkey. Where appropriate, numeric data was recoded as nominal data. For example, the control variable of technology adopter category was recorded in Survey Monkey as a numerical response. Utilizing VLOOKUP, the numerical response was translated into a nominal response like "Late Majority". A similar process was completed for questions like teaching discipline. If a nominal response was left unanswered by the survey respondent, #N/A was coded. Microsoft Excel was not used to aggregate any of the responses by construct. That analysis was completed in JMP. The final surveys with recoded responses were saved and then later imported into JMP Pro 15.0 for complete analysis.

Exploratory factor analysis (EFA) was performed as a preliminary step to assessing construct reliability and validity. A maximum likelihood with Varimax rotation was used when performing the factor analysis. EFA was performed with 7 identified factors in an effort to match the number of factors in the theoretical model (see Table 1). Opinions seem to differ on minimum viable factor loadings. A quick Google search will find minimum thresholds as low as 0.3 with other recommended values of 0.4, 0.6 or even 0.7. Using a rule of thumb that states a CFA loading of 0.5 or greater reflects the items extract sufficient variance from the respective variable (Hair, Black, Babin, & Anderson, 2015), the data supports strong communal loadings within the constructs and relative strength of differentiation between constructs. The items measuring LA tools and technology efficacy (DTT items) load very strongly together (all loads ≥ 0.5) and do not load well on other factors. Data cycle literacy (DCL items) exhibits very similar results. All items for LA readiness (LAR items) load higher than 0.5 and many are closer to the more stringent value of 0.7. The items load stronger as a separate factor than associated with any other factors. Effort expectancy (EE items), performance expectancy (PE items), and professional identity expectancy (PI items) did demonstrate loading on a communal factor. With the exception of one item (PE_04 factor load = 0.68), all performance expectancy loadings were 0.7 or greater. Effort expectancy loads were closer to 0.5 than 0.7 but did cluster well within a factor. All professional identity expectancy loads are 0.64 or greater which is higher the 0.5 rule of thumb and very close to the higher metric of 0.7. The dependent construct items (ITU items) loaded stronger as a separate factor, but also showed some strength loading with effort expectancy, performance expectancy, and professional identity expectancy. Overall, the factor loadings support the strength of the measurement items for the individual latent constructs in the theoretical model with an observation that effort expectancy, performance expectancy, and professional identity expectancy are closely related constructs. Future work may value from additional item analysis and an effort to untangle effort, performance, and professional identity expectancy.

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
DCL_01	0.318	0.427	0.662	0.176	0.071	0.108	0.188
DCL_02	0.264	0.450	0.664	0.255	0.114	0.078	-0.140
DCL_03	0.284	0.413	0.744	0.208	-0.176	0.008	0.079
DCL_04	0.293	0.390	0.690	0.215	0.117	0.214	-0.062
DTT_01	0.221	0.715	0.080	0.118	0.097	0.062	0.237
DTT_02	0.202	0.784	0.124	0.143	0.128	0.083	-0.084
DTT_03	0.205	0.795	0.198	0.092	0.170	0.128	0.096
DTT_04	0.150	0.719	0.250	0.209	0.142	-0.003	0.085
DTT_05	0.209	0.773	0.188	0.113	0.139	0.077	0.008
DTT_06	0.228	0.754	0.115	0.041	0.079	0.157	-0.072
DTT_07	0.181	0.699	0.361	0.143	0.027	0.105	-0.063
DTT_08	0.219	0.779	0.203	0.228	0.069	-0.022	-0.071
EE_01	0.463	0.406	0.348	0.310	0.096	0.322	0.135
EE_02	0.457	0.287	0.179	0.204	0.207	0.542	0.027
EE_03	0.498	0.259	0.295	0.219	0.174	0.472	-0.057
EE_04	0.436	0.243	0.346	0.220	0.321	0.216	0.045
ITU_01	0.527	0.239	0.184	0.219	0.472	0.156	0.145
ITU_02	0.467	0.299	0.255	0.222	0.413	0.112	-0.028
ITU_03	0.434	0.220	0.080	0.216	0.585	0.070	-0.081
ITU_04	0.460	0.209	0.140	0.154	0.635	0.083	0.057
LAR_01	0.502	0.196	0.094	0.479	0.127	0.153	0.267
LAR_02	0.333	0.224	0.175	0.524	0.072	0.301	0.212
LAR_03	0.343	0.251	0.081	0.618	0.147	0.152	-0.152
LAR_04	0.305	0.205	0.269	0.678	0.223	-0.003	-0.060
LAR_05	0.347	0.145	0.238	0.699	0.109	0.031	0.058
PE_01	0.709	0.224	0.211	0.151	0.054	0.158	0.253
PE_02	0.720	0.286	0.112	0.223	0.157	0.185	0.050
PE_03	0.723	0.178	0.110	0.174	0.193	0.161	-0.090
PE_04	0.683	0.190	0.141	0.209	0.130	0.276	0.133
PE_05	0.704	0.131	0.220	0.183	0.209	0.040	0.130
PE_06	0.773	0.270	0.125	0.189	0.178	0.106	-0.004
PI_01	0.634	0.191	0.238	0.292	0.038	-0.144	0.008
PI_02	0.710	0.205	0.122	0.228	0.225	0.071	-0.238
PI_03	0.668	0.231	0.268	0.162	0.181	0.012	-0.052
PI_04	0.656	0.280	0.208	0.274	0.158	0.053	-0.084

Table 1. EFA Factor Loadings

Constructs were assessed for reliability and validity. As a first step, construct reliability was calculated using Microsoft Excel 2016. See Table 2. A reliability metric of 0.7 or greater tends to indicate solid reliability (Hair, Black, Babin, & Anderson, 2015). However, it is possible that construct reliability may calculate lower and still represent good reliability when compared to multiple other goodness of fit metrics (Hair, Black, Babin, & Anderson, 2015). As can be seen, most all constructs have a reliability score greater than 0.7. Effort expectancy presents the lowest value at 0.52 and the dependent construct of willingness to adopt learning analytics has a reliability measurement of 0.61. Loading values less than 0.5 will propagate to construct reliability scores that fall short of ideal targets. While these two reliability scores are slightly less than 0.7, they remain in the model for future analysis.

Construct	Construct Reliability
Learning Analytics Tools and Technology Efficacy	0.91
Data Cycle Literacy	0.78
Effort Expectancy	0.52
Performance Expectancy	0.87
Professional Identity Expectancy	0.76
Perceived Learning Analytics Readiness	0.74
Willingness to Adopt Learning Analytics	0.61

Table 2. Construct Reliability Values

Construct validity can be examined multiple components with average variance extracted (AVE) being one of the most common. (Hair, Black, Babin, & Anderson, 2015). AVE was manually calculated using Microsoft Excel 2016. See Table 3. Using a rule of thumb of 0.5 or greater to indicate acceptable convergence, some constructs show high convergence and others are weaker. Learning analytics tools and technology efficacy, data cycle literacy, performance expectancy, and professional identity expectancy all show adequate convergence. Effort expectancy, perceived learning analytics readiness, and willingness to adopt learning analytics do fall short of the desired threshold. It should be noted that perceived learning analytics readiness is theorized to have a moderating effect on the effect of effort and performance expectancy and not a direct effect on willingness to adopt. The relatively low AVE for willingness to adopt learning analytics may indicate that effectively measuring behavioral intention is a challenging undertaking.

Construct	AVE
Learning Analytics Tools and Technology Efficacy	0.57
Data Cycle Literacy	0.48
Effort Expectancy	0.22
Performance Expectancy	0.52
Professional Identity Expectancy	0.45
Perceived Learning Analytics Readiness	0.37
Willingness to Adopt Learning Analytics	0.28

Table 3. Average Variance Extracted (AVE) Values

Correlation analysis between constructs is used as a preliminary technique to assess the strength of each of the hypotheses. Table 4 provides a summary of the correlations between each of the constructs. Effort expectancy, performance expectancy, and professional identity expectancy show these highest correlations. These metrics provide early support for hypotheses 2.1, 2.2, and 3.1. Learning analytics tools and technology and data cycle literacy show the weakest correlations. These metrics do not provide strong support for hypotheses 1.1 and 1.2.

	DTT_TOT	DCL_TOT	EE_TOT	PE_TOT	PI_TOT	LAR_TOT	ITU_TOT
DTT_TOT	1.00						
DCL_TOT	0.71	1.00					
EE_TOT	0.63	0.72	1.00				
PE_TOT	0.54	0.61	0.79	1.00			
PI_TOT	0.55	0.64	0.72	0.85	1.00		
LAR_TOT	0.53	0.62	0.71	0.70	0.70	1.00	
ITU_TOT	0.55	0.60	0.72	0.76	0.73	0.65	1.00

Table 4. Correlation Matrix for Constructs

Using JMP Pro 15.0, a multiple linear regression model was run using DTT_TOT, DCL_TOT, EE_TOT, PE_TOT, and PI_TOT as the independent variables and ITU_TOT as the single dependent variable. Table 5 shows the estimates for the coefficients. The linear regression model supports the correlations in that learning analytics tools and technology and data cycle literacy are likely not predictors for willingness to adopt. However, effort expectancy, performance expectancy, and professional identity expectancy show strength for predicting willingness to adopt.

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	2.567	0.552	4.65	<.0001*
DTT_TOT	0.029	0.019	1.53	0.1278
DCL_TOT	0.021	0.036	0.58	0.5629
EE_TOT	0.165	0.059	2.78	0.006*
PE_TOT	0.164	0.045	3.67	0.0003*
PI_TOT	0.167	0.061	2.74	0.0067*

Table 5. Linear Regression Model Parameters

Figure 3 is a visualization to help evaluate the strength of the interaction effect of perceived learning analytics readiness on the relationship between effort expectancy and willingness to adopt. The figures depict effort expectancy along the x-axis and willingness to adopt learning analytics along the y-axis. Additionally, the graph is partitioned by binning the total perceived learning analytics readiness scores. The graphs provide early support for the notion that willingness to adopt scores will be higher for individuals that show relatively equal effort expectancy scores but demonstrate a higher perceived learning analytics readiness score.

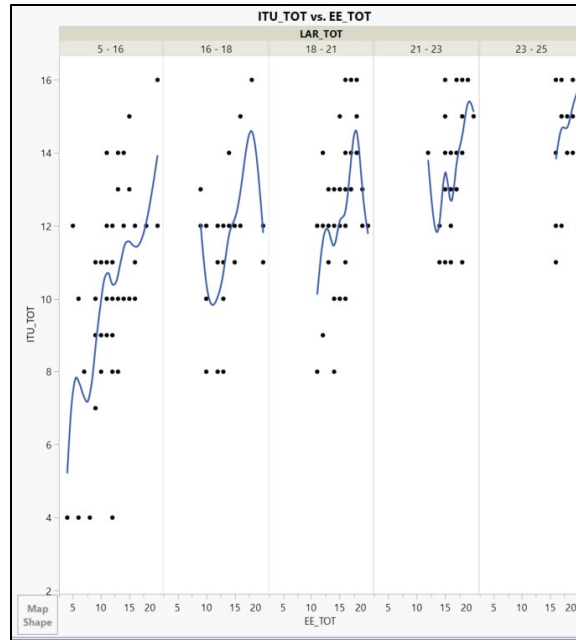


Figure 3. Influence of LAR on EE and ITU

In a similar fashion, Figure 4 helps to evaluate the strength of the interaction effect of perceived learning analytics readiness on the relationship between performance expectancy and willingness to adopt. Here again, the data provides early support for the notion that perceived learning analytics readiness increases the willingness to adopt behavior within individuals of similar performance expectancy scores.

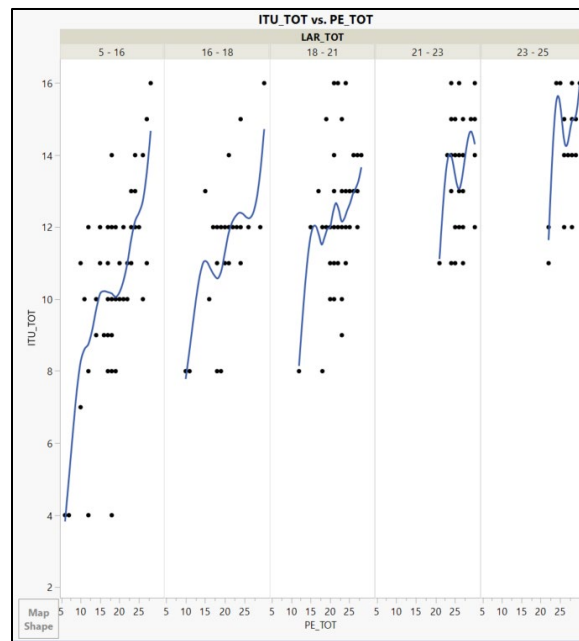


Figure 4. Influence of LAR on PE and ITU

Taken in totality, the early analysis of the data provides support for the following conclusions.

H 1.1 (not supported; poor correlation and insignificant regression estimate) – The results of the analysis do not support the hypotheses of a positive relationship between the strength of LA tools and technology and willingness to adopt LA.

H 1.2 (not supported; poor correlation and insignificant regression estimate) – The results of the analysis do not support the hypotheses of a positive relationship between the strength of data cycle literacy and willingness to adopt LA.

H 2.1 (supported; strong correlation and significant regression estimate) – The stronger the effort expectancy, the stronger the willingness to adopt LA.

H 2.2 (supported; strong correlation and significant regression estimate) – The stronger the performance expectancy, the stronger the willingness to adopt LA.

H 3.1 (supported; strong correlation and significant regression estimate) – The stronger the professional identity alignment, the stronger the willingness to adopt LA.

H 4.1 (supported; strong differentiation between LAR bins) – The strength of the perceived LA readiness had a positive effect on the dependency relationship between effort expectancy and willingness to adopt LA.

H 4.2 (supported; strong differentiation between LAR bins) – The strength of the perceived LA readiness had a positive effect on the dependency relationship between performance expectancy and willingness to adopt LA.

IMPLICATIONS AND FUTURE RESEARCH

The model gives credence to the importance of effort expectancy, performance expectancy, and professional identity expectancy on willingness to adopt. As such, research and development into LA would be well served to ensure the tools are deemed to be easy to use, have high value and alignment to existing pedagogical practices, and fully embrace the alignment to professional identity. The data also supports close linkage between effort expectancy, performance expectancy, and professional identity expectancy. Future research could explore these linkages in more detail and even seek out how to disentangle them. Additional analysis using Structural Equation Modeling (SEM) will help to provide better statistical evidence to support or refute the proposed hypotheses.

The model does show some weaknesses in places. Future research could help to determine if design gaps exist with the role that efficacy plays in adoption. Additionally, there is value in continued work with the interaction role of perceived institutional LA readiness on willingness to adopt LA.

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TCQ IN THE USA: PERCEPTIONS, MOTIVATIONS, AND PROMOTIONAL STRATEGIES

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ABSTRACT

The growing interest in holistic health in the U.S. has made Tai Chi & Qigong (TCQ), an ancient Chinese martial art known for its slow, graceful movements, deep breathing, and meditation, increasingly popular. Understanding how American TCQ practitioners perceive this practice, what influences their perceptions, and what motivates people to engage in TCQ can offer invaluable insights for TCQ studios seeking effective strategies to attract more customers.

In our survey conducted in April 2023 with 681 valid responses, we found that American TCQ practitioners primarily perceive TCQ as both a healing and a martial art. Logistic regression analysis further demonstrated that individuals who perceive TCQ in this dual light may be more inclined to practice TCQ, suggesting that the appeal of TCQ lies in its potential health benefits in combination with self-defense elements. To broaden their customer base, TCQ studios can use a multifaceted approach. This may include offering classes that highlight both the healing and martial aspects of TCQ to reach a wider and more diverse audience.

INTRODUCTION

As the demand for holistic health continues to grow in the United States, activities like TCQ, an ancient Chinese martial art characterized by slow, graceful movements, deep breathing, and meditation, have garnered significant popularity (Jahnke, Larkey, Rogers, Etnier, & Lin, 2010; Larkey, Jahnke, Etnier, & Gonzalez, 2009; Claudia Wang, Li, Choudhury, & Gaylord, 2019). The practice of TCQ is shaped by a complex interplay of motivating and inhabiting factors, encompassing perceived benefits related to physical health and psychological well-being as well as constraints associated with cost and accessibility. TCQ sometimes is taught as a complex series of choreographed movements or "forms" (Chodzko-Zajko et al., 2005). However, the essential components of TCQ are easy to learn and practice, and many modified forms of TCQ exist. The essential components are:

- Body posture adjustment and gentle movement
- Meditation and purposeful relaxation
- Deep breathing
- Focused intention

While TCQ has been practiced in China for hundreds of years, TCQ historically came to the USA starting in the 60's, and in recent years has been studied as a mindful health exercise with many benefits (Peter M. Wayne & Fuerst, 2013). While the relationship between Tai Chi (also known as T'ai Chi Ch'uan or Taijiquan) and Qigong (also known as Chi Kung or Qigong) is a complex one, for purposes of this research, they can be considered a single practice (Chodzko-Zajko et al., 2005).

While there are scads of studies on the benefits of TCQ, (Baumgarden, Rhoads, Fiddes, Siddons, & Garretson, 2023; Penelope J. Klein, Baumgarden, & Schneider, 2019; P. J. Klein, Schneider, & Rhoads, 2016), there is a paucity of research on how perceptions of these types of mindfulness exercises influence their practice. Understanding how American TCQ practitioners perceive this art, the sources of these perceptions, and what perceptions motivate people to engage in TCQ practice can offer valuable insights for TCQ studios seeking tailored promotional strategies to attract customers. This study takes a novel approach to explore the relationship between perceptions and TCQ practice.

To provide a theoretical framework for our research, we focused on the Theory of Planned Behavior (TPB), developed by Icek Ajzen. This theory is a widely recognized model in psychology that explains how individual attitudes, beliefs, and perceptions influence their behavioral intentions and actions (Ajzen, 1985; Liao, 2023). It highlights the pivotal role of perception in shaping behavioral intentions and actions. The varying perceptions of TCQ between practitioners and non-practitioners, combined with the TPB framework, led us to build a predictive model for TCQ practice using perceptions as predictors. Logistic regression was the chosen modeling tool due to the binomial nature of the response variable (practicing TCQ or not).

Perceptions were often found, in research, to influence purchase and practice activities. Liu, et al, found that public sports space perception influenced the quality of life of middle-aged and older adults through light-intensity physical activity (Liu, Gao, Jia, & Zhao, 2023). Also based upon the TPB, Liao found that perceptions and attitudes were positively associated with altruistic behavior, and attitude was found to mediate the relationship between perceptions about mass media news and altruistic behavior (Liao, 2023). Using a logistic regression model, Ghai and Sharma found that trust and perceived benefits are the main influencers for the purchase and consumption of organic foods (Ghai & Sharma, 2019).

Ruksakulpiwat, et al, found that perceptions about their medication and illness have an influential impact whether or not they took their medication. They recommended that the relationship between these perceptions and the action of taking the medication should be considered by caregivers (Ruksakulpiwat, Liu, Yue, & Fan, 2020). Yi, et al, studied the perceptions of the landscaping environments and its influence on walking behaviors in order to find the factors that would promote more walking (Yi, Harumain, & Mohidin, 2023).

There is also evidence that the use of perceptions can positively influence the options that are made available to the consumer, indicating that knowledge of the customer's perception is a valuable strategy in attracting more consumers. Lowe and Maijanen used dominant logic and sense-making frameworks to study the decision-making process of strategic managers of public service media messages in order to improve the response of youth audiences (Lowe & Maijanen, 2019). Mas, et al, found that TPB was a relevant theory to apply to an exploration of determinants of physical activity and promotion behavior among smoking cessation advisors. They determined that the physical activity levels of the advisors influenced their promotion behavior for physical activity (Mas, Bernard, & Gourlan, 2018). Otten, et al, used a multivariate regression analysis to study the market-driven predictors of the sales of children's books and found that author power (which includes the media exposure such as Amazon reviews) was an especially strong predictor of sales volume (Otten, Clement, & Stehr, 2019).

Based on the literature, it seems apparent that logistic regression analysis is a valid statistical methodology for this type of study, and that TPB is a valid framework for the work.

METHODS

This study aims to understand the perceptions of TCQ among American practitioners and non-practitioners, the sources influencing these perceptions as well as what perceptions can be used to predict whether a person will engage in TCQ practice. In our pursuit of answers, we conducted a survey study in April 2023 involving both TCQ practitioners and individuals within their social circles who do not practice TCQ. The survey aimed to ascertain respondents' perceptions of TCQ, categorizing it as a healing art, a martial art, a performing art, or an embodiment of eastern philosophy. Additionally, we sought to identify the media sources influencing these perceptions, which included friends, family, teachers, mainstream media, movies and TV shows, advertisements, social media, professional publications, TCQ practitioner groups, and books. Furthermore, the survey gathered information on whether the respondents themselves practice TCQ or not.

The research questions are:

1. What perceptions do people hold regarding what TCQ is?
2. Is there a relationship between an individual's perceptions of TCQ and whether the individual practices it or not? This question led to the hypothesis: There is a significant relationship between perceptions of TCQ and practice of TCQ.

Data Collection

We designed an online survey using Google Forms. Following a pilot version of the survey, we made necessary revisions before distributing it to a broader audience. The survey was electronically disseminated to subscribers of newsletters from well-established TCQ organizations and groups, as well as members of TCQ-related social media communities. These organizations and groups encompassed:

- World TCQ & Qigong Day (<https://www.worldtaichiday.org/>), a non-profit organization dedicated to promoting TCQ since 1999.
- The TCQ practitioner group led by a well-received and respected TCQ master (Violet Li) whose blog (www.VioletLiTaiChi.com) and classes (<https://www.violetli.com/>) have a popular following.

- HPL Consortium, Inc.(<https://www.hplconsortium.com/web/hplcorp/index.html>), a non-profit organization focused on technology tools for health, prosperity, and leadership since 2001.
- Kungfu magazine (<https://www.kungfumagazine.com/>), a specialty magazine specializing in Chinese martial arts and TCQ since 1993.

In addition to sending email invitations, we posted the survey across more than 40 TCQ social media groups on platforms like Facebook, LinkedIn, and Twitter. In order to include as many non-practitioners as possible, we requested that people send out the survey to their friends and family who may not practice TCQ. The survey resulted in 1045 responses, 681 of which were from American TCQ practitioners and non-practitioners who were exposed to TCQ. We chose to focus this study on respondents from the USA because marketing and promotion of TCQ may look very different in other countries. In China and other Asian countries, for example, TCQ is often taught in schools and is promoted by the government for health. In other countries such as Australia, Canada, and the UK, TCQ is often considered a healthcare therapy and is commonly prescribed by physicians and healthcare professionals so the cost is covered. Our focus is on the American competitive marketplace for TCQ.

We expected to have a much larger number of respondents who practiced TCQ than non-practitioners due to the survey distribution methodology. We considered creating a stratified weighted sample, but after further review dismissed that idea. According to Kaombe and Hamuza, a logistic regression model's probability weights have very little effect on the bias of the dependent variable, so that ignoring the weighting during the model fitting does not change the predicted value. A small sample size only affects the standard errors of a dependent variable, which widen confidence intervals for the estimates but doesn't impact the model (Kaombe & Hamuza, 2023).

After data preparation conducted in Excel, the data was analyzed with a logistical regression using R version 4.3.1.

Variables Under Investigation

The dependent variable, whether the respondent practiced TCQ, was binary.

TCQ Practitioner and Non-practitioner

The question on the survey related to this variable was: *Do you practice Tai Chi and/or Qigong?* Those who answered "no" were categorized as non-practitioners, and those who answered "Yes, I'm an experienced practitioner" or "Yes, but only a little" or "Yes, I have done Tai Chi and/or Qigong but not a lot" were considered practitioners.

The independent variables were Perception of TCQ and Sources of Knowledge of TCQ.

Perceptions of TCQ

Our choice to investigate perceptions related to TCQ practice behavior was based on a volume of evidence that the knowledge and perception of a potential course of action influences behavior. In our survey, the perceptions of Tai Chi and Qigong were collected separately. To discern whether practitioners and non-practitioners of TCQ held differing views of the Tai Chi practice, we asked survey respondents to identify what they believed TCQ represented: "What do you think Tai Chi is?" Respondents were directed to check all that apply, so they could select multiple options.

- A healing art
- A martial art
- A performing art
- Eastern philosophy
- Not sure

For the purposes of this study, we focused on the perceptions of Tai Chi, since that is the more well-known term for the art. We coded the perceptions and classified them as one of the listed perception classifications, as seen in **Table 6**.

Table 5
Perceptions of TCQ

Survey Options Answered	Perception Classification
A healing art, A martial art, A performing art, Eastern philosophy	Holistic Perception
A healing art	Healing Perception
A healing art, A martial art	DuoHlgMrt Perception
A healing art, A martial art, A performing art	TrioHlgMrtPerf Perception
A healing art, Eastern philosophy	DuoHlgPhl Perception
A martial art	Martial Perception
A healing art, A martial art, Eastern philosophy	TrioHlgMrtPhl Perception
A healing art, A performing art	DuoHlgPerf Perception
A performing art	Performing Perception
A martial art, Eastern philosophy	DuoMrtPhl Perception
Eastern philosophy	Philosophical Perception
A healing art, A performing art, Eastern philosophy	TrioHlgPerfPhl Perception
Not sure	Unknown

RESULTS

TCQ Practitioners and Non-Practitioners

As previously mentioned, the survey included a question regarding the respondents' TCQ practice level, offering options such as “experienced”, “not a lot”, “only a little”, and “no”. For this study, respondents who selected “no” were categorized as non-practitioners, while those who chose any option other than 'no' were considered practitioners, regardless of their level of experience. Out of the 681 respondents from the USA, 53 (7.8%) indicated that they do not practice Tai Chi and Qigong (TCQ), while 628 (92.2%) identified themselves as TCQ practitioners, as seen in Table 2.

Table 2
Counts of TCQ Practitioners and Non-Practitioners

Practice Taichi	Count	Percentage
No	53	7.78%
Yes	628	92.22%
Grand Total	681	100.00%

TCQ Perceptions and Practice

As can be seen in Table 3, 150 practitioners perceived TCQ as a healing art, a martial art, and an Eastern philosophy at the same time and this trio view was the most common perception of practitioners. The second most common perception of practitioners was to view TCQ as a healing art, a martial art, a performing art, and an Eastern philosophy at the same time, that is, a holistic view; 140 practitioners displayed a holistic view. Perceiving TCQ as both a healing art and a martial art was the third most common perception, and 129 practitioners indicated this duo view. From another perspective, perceiving TCQ as both a healing art and a martial art is an essential component shared by practitioners who have either the trio, the holistic or the duo view. Among 628 practitioners, 419 (66.72%) of them share this perception.

Non-practitioners, on the other hand, viewed TCQ primarily as a healing art only (19 out 53). None of the non-practitioners saw it as an Eastern philosophy, while only 2 of the practitioners perceived it solely that way. In summary, the practitioners and non-practitioners of TCQ seem to have different perceptions of it. The TCQ practitioners tend to view it as multifaceted practice with both healing benefits and self-defense characteristics, while non-practitioners tend to view it as a healing art only.

Table 3
Perception Counts for Non-Practitioners and Practitioners

Perception	Non-Practitioner	Practitioner	Grand Total
TrioHlgMrtPhl		5	150
Holistic		6	140
DuoHlgMrt		2	129
Healing		19	76
Martial		2	57
TrioHlgMrtPerf		3	30
DuoHlgPhl		11	21
DuoMrtPhl		3	8
TrioHlgPerfPhl			7
Unknown			5
DuoHlgPerf		1	2
Performing		1	1
Philosophical			2
Grand Total		53	628
			681

Furthermore, we used logistic regression to investigate the relationship between an individual's perceptions of TCQ and the individual's likeliness to practice it. As "an art of healing" was the most common perception among the respondents, we used this as the reference perception to identify other perceptions that might increase an individual's likelihood of practicing TCQ. Based on the logistic regression analysis conducted in R, several perceptions of TCQ were found to be statistically significant in predicting the likelihood of practicing TCQ at a 95% confidence level ($\alpha = 0.05$). The odds ratios indicate the change in odds of practicing TCQ associated with each perception, compared to the reference group, those who view TCQ as a healing art only. Please refer to Table 4 for the logistic regression results of using TCQ perceptions to predict its practice.

Table 4
Logistic Regression Results of Using TCQ Perceptions to Predict Practice

	Coefficients	Std. Error	z value	Pr(> z)
(Intercept)	1.3863	0.2565	5.405	0.0000000649***
DuoHlgMrt	2.7804	0.7573	3.671	0.000241***
TrioHlgMrtPhl	2.2380	0.5679	3.941	0.0000811***
Holistic	1.7636	0.4895	3.603	0.000315***
Martial	1.9636	0.7638	2.571	0.010141**
TrioHlgMrtPerf	0.9163	0.6576	1.393	0.163512
DuoHlgPerf	-0.6931	1.2513	-0.554	0.579623
TrioHlgPerfPhl	15.1798	906.9427	0.017	0.986646
DuoHlgPhl	-0.7397	0.4520	-1.636	0.101761
DuoHlgPerf	15.1798	2399.5447	0.006	0.994953
DuoMrtPhl	-0.4055	0.7240	-0.560	0.575436
Performing	-1.3863	1.4373	-0.965	0.334784
Philosophical	15.1798	1696.7344	0.009	0.992862
Not sure	15.1798	2399.5447	0.006	0.994953

*** significant at the .001 level, **significant at the .05 level

Null deviance: 366.97 on 677 degrees of freedom

Residual deviance: 301.17 on 663 degrees of freedom

AIC: 331.17

Number of Fisher Scoring iterations: 15

The logistic regression results show that the following perceptions of TCQ are significant predictors of TCQ practice.

Perception of TCQ as both a Healing Art and a Martial Art

The perception of TCQ as both a healing art and a martial art was found to be statistically significant in predicting the likelihood of practicing TCQ ($p=0.000241$). This suggests that individuals who view TCQ as having both healing and martial aspects are more likely to practice it. Specifically, individuals who perceive TCQ as both a healing art and a martial art have 1512% ($e^{2.7804} - 1 = 15.12$) higher odds of practicing TCQ, compared to those who view it as a healing art only.

Perception of TCQ as a Healing Art, a Martial Art, and Embodiment of Eastern Philosophy

The perception of TCQ as a healing art, a martial art, and an embodiment of eastern philosophy was also identified as a significant predictor of TCQ practice ($p=0.0000811$). This implies that individuals who see TCQ as a multifaceted practice encompassing healing, martial, and philosophical elements are more inclined to practice it. Individuals who view TCQ as a healing art, a martial art and eastern philosophy have 837% ($e^{2.238} - 1 = 8.37$) higher odds of practicing TCQ compared to those see it as a healing art only.

Perception of TCQ as Holistic Health Approach (including Healing Art, a Martial Art, a Performing Art, and Eastern Philosophy)

The perception of TCQ as a healing art, a martial art, a performing art, and eastern philosophy was another significant predictor of TCQ practice ($p=0.000315$). This finding suggests that individuals who perceive TCQ as a holistic practice that includes healing, martial, performance, and philosophical aspects are more likely to practice it. Individuals who perceive TCQ as a healing art, a martial art, a performing art and eastern philosophy have 483% ($e^{1.7636} - 1 = 4.83$) higher odds of practicing TCQ compared to those who view it as a healing art only.

Perception of TCQ as a Martial Art

Additionally, the perception of TCQ solely as a martial art was found to be statistically significant in predicting TCQ practice ($p=0.010141$). This indicates that individuals who primarily view TCQ as a martial art are more likely to practice it. Individuals who view TCQ primarily as a martial art have 612% ($e^{1.9636} - 1 = 6.12$) higher odds of practicing TCQ compared to those who perceive it as a healing art only.

Summary statistics for TCQ Perception and TCQ Practice

The model's goodness of fit statistics, including the null deviance, residual deviance, and AIC are also seen at the bottom of Table 4. The null deviance, with a value of 366.97, represents the goodness of fit when only the intercept (the expected log-odds of practicing TCQ when all perception categories are set to zero) is considered in the model. It serves as a reference point to assess how well the model with predictors explains the data. The residual deviance, with a value of 301.17, measures the unexplained variability in the response variable by the model after including the predictors. The reduction from the null deviance to the residual deviance indicates the amount of variability in the response variable that the model explains. In this case, there's a substantial reduction, which suggests that the model with predictors provides a better explanation of the data compared to a null model with no predictors.

The AIC, with a value of 331.17, is a measure that balances the goodness of fit with model complexity. It penalizes models with too many parameters to prevent overfitting. A lower AIC value indicates a better fit, as it suggests a good balance between model complexity and explanatory power. In this case, the AIC is lower than the null model's AIC, which indicates that the model with predictors provides a better fit to the data.

In summary, the goodness of fit statistics, including the reduction in deviance from the null model, and the lower AIC value, all suggest that the logistic regression model with perceptions as predictors provides a reasonable fit to the data. The model effectively explains a significant portion of the variability in TCQ practice while accounting for model complexity, making it a good representation of the relationship between perceptions and practice of TCQ. The results underline the influential role of perceptions in motivating individuals to practice TCQ.

CONCLUSIONS AND IMPLICATIONS

The findings of our study shed light on the factors that influence perceptions and the practice of TCQ among Americans. The key conclusions drawn from the data and analysis are valuable.

First, American TCQ practitioners and non-practitioners hold varying perceptions of TCQ, with non-practitioners often viewing it as a gentle healing art, while practitioners perceive it as both a healing and martial art, combined with elements of eastern philosophy. Understanding the diverse perceptions of TCQ can help TCQ studios and promoters to tailor their marketing strategies to attract a broader customer base to this holistic mind body practice. For example, marketing TCQ as an art of healing can attract senior customers who have health issues, highlighting the martial art aspects of TCQ can attract young generation who are interested in the self-defense characteristics of the art, while promoting the philosophical aspects of TCQ can be instrumental in attracting practitioners who are drawn to eastern philosophy.

Second, perceptions of TCQ play a pivotal role in predicting an individuals' likelihood of practicing TCQ. Americans who perceive TCQ as both a healing art and a martial art are the most likely to engage in TCQ practice. TCQ studios and promoters should resonate with their customers and offer classes that emphasize both the healing and martial art aspects of TCQ.

This study makes significant contributions to the understanding of TCQ's perceptions and practice in the American context. It highlights the importance of addressing diverse perceptions and leveraging them for more targeted marketing and promotion. Additionally, the application of the Theory of Planned Behavior (TPB) in this context and the use of logistic regression to link perceptions with actual practice contribute to the body of knowledge in sports marketing and health promotion. As the demand for holistic health approaches continues to grow, these insights can assist TCQ studios and practitioners in their efforts to share the benefits of this ancient art with a broader audience.

LIMITATIONS AND FUTURE RESEARCH

There are several limitations to this study. The distribution channel of the survey targeted TCQ practitioners, their friends and acquaintances. Further study would be needed to see if this information can be generalized to the American public. Additionally, logistical regression analysis does not indicate causation. It would be expected that TCQ practitioners would have a better understanding of the underlying holistic nature of TCQ than non-practitioners. It cannot be said that the perception of TCQ practitioners of TCQ directly led them to practice TCQ; we can establish only a correlation between the perception and the practice. Further research with experimental designs and controlled trials would be required to establish which direction informs the relationship.

While this study provides valuable insights into the perceptions and motivations of TCQ practice among Americans, several avenues for future research can extend our understanding of this ancient art and its role in holistic health. It should be noted that the survey also collected data on the specific health challenges that studies have shown are impacted by TCQ not analyzed in this investigation. As noted earlier, the health benefits of TCQ are very well established and wide-ranging. It is beyond the scope of this paper to discuss those benefits in detail, but there are many information sources on the evidence of its health benefit . (Baumgarden et al., 2023; Chodzko-Zajko et al., 2005; Penelope J. Klein et al., 2019; P. J. Klein et al., 2016; C. Wang et al., 2010; Peter M. Wayne & Fuerst, 2013; P. M. Wayne et al., 2012; P. M. Wayne et al., 2014; Yang, Sibbritt, & Adams, 2017; Yeh et al., 2011) Another question that poses a rich analysis might be what health benefits, if any, had the respondents heard about from the media. We asked that question "Which of the following health benefits of Tai chi and/or Qigong have you heard about in the mainstream media? (Check all that apply)". The choice options:

- Cardiovascular Diseases (i.e. Hypertension, Heart Attack, Stoke, etc.)
- Lung Diseases (i.e. Asthma, COPD, etc.)
- Parkinson's Disease, Physical Balance, and Leg Muscle Strengthening
- Alzheimer's Disease & other Dementia diseases
- Chronic Pain (i.e. Fibromyalgia, Arthritis, etc.)
- Immunity
- Depression, Anxiety, and Stress
- Drug Addiction
- Diabetes and Obesity

- Sleep Quality and Insomnia
- Cancer Prevention and Recovery
- Other

Additionally, the survey also collected data on the age of the respondents. Both of these warrant a follow-up study that may also provide insights into the marketing of TCQ.

Comparative studies that examine how TCQ differs in perception and practice when compared to other mind-body practices, such as yoga or meditation, could offer valuable insights into the unique appeal of TCQ. Comparative studies between American TCQ practitioners and practitioners in countries with a longer history of TCQ practice, such as China, could provide cross-cultural insights into the motivations and perceptions of this art. Longitudinal studies tracking individuals' TCQ practice over time can reveal changes in perceptions and motivations.

Future research in these directions can contribute to a comprehensive understanding of the motivators behind TCQ practice and can inform more effective promotion and support strategies, ultimately promoting holistic health practices like TCQ among a wider audience.

Our data analysis uncovered that the most notable perceptions among American TCQ practitioners are their recognition of TCQ as both a healing art and a martial art. Moreover, our study utilized logistic regression analysis to investigate the connections between these perceptions and actual TCQ practice. The results revealed that individuals who perceive TCQ as both a healing art and a martial art are more inclined to engage in TCQ practice, or that TCQ practitioners are more inclined to perceive TCQ as both a healing art and a martial art. This suggests that individuals are drawn to TCQ for its potential health benefits and its self-defense aspects. Further research into the level of practice along with the perception may also reveal a more definitive answer.

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PERCEPTIONS OF EMPLOYERS AND STUDENTS ABOUT CAREER READINESS

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ABSTRACT

Active learning techniques are an essential component in academic programs. Business programs frequently utilize internships as part of their curriculum. However, there is inconsistent guidance and recommendations for these internships from the two primary accrediting programs; The Accreditation Council for Business School Programs (ACBSP) and the Association to Advance Collegiate Schools of Business (AACSB).

Consequently, students may experience dissimilar outcomes from their internship and employers may have differing experiences from interns attending different universities. This may lead to a confusion and conflicting opinions between a students' self-perception of essential skills for career readiness and employers' perception of a student's readiness.

We analyzed these perceptions to determine where the two intersect on a series of questions. Our research indicates that students rate their performance less favorably than their supervisor's evaluation in every category except professionalism, communications, and equity and inclusion, suggesting that employers perceived the students' skills better than the students did themselves.

INTRODUCTION

Active learning techniques are an essential component in academic programs. Business programs frequently utilize internships as part of their curriculum. However, there are inconsistent guidelines and recommendations for these internships from the two primary business accreditation programs; The Accreditation Council for Business School Programs (ACBSP) and the Association to Advance Collegiate Schools of Business (AACSB). This often leads to inconsistent curriculum designs between different institutions, as well as within the same institution. Consequently, the experiences can vary not only between two interns, but also between two different employers. The ultimate result is that analyzing a student's career readiness may be difficult to ascertain, leading to inconsistent expectations for employers and students.

In this study, we analyze data from exit surveys provided to employers and students over a two-year period. This survey asks both sets of respondents to rate the student intern and their career readiness as it relates to a series of skills. These characteristics include professionalism, communication, leadership, critical thinking, technology, teamwork, and equity and inclusion. This paper will examine the assessment of these skills by employers and also the interns, who self-reported, in an attempt to discover if the two parties are in agreement as it relates to career-readiness. Using t-tests, we will also review disparities in the results to determine if there are statistically significant differences in responses at .10. Consequently, we will be able to make determinations about where students exhibit overconfidence or lack confidence, and allow us to explore possible explanations for the outcomes.

LITRATURE REVIEW

Understanding the alignment between student self-perception of skills and an employer perception is crucial in bridging the gap between education and employment. These include several studies conducted analyzing these perceptions, as well as the need for alignment between all active stakeholders.

According to Lee (2022) a students' perception of career readiness is significantly impacted by the curriculum contained in certain programs; in this instance hospitality management. Consequently, industries and partners such as institutions of higher education need to collaborate to ensure that academic programs are sufficiently maintained and updated to meet specific industry demands and changes.

Similarly, a study conducted by Rodriguez (2020) in Miami/Dade County Florida during the 2018-2019 academic school year examined the relationship between an entrepreneurial mindset and career-readiness among high school students in grades 10-12. The students enrolled in entrepreneurship education exhibited statistically significant higher

outcomes than their peers who were not enrolled when analyzing communication and collaborative mindset, critical thinking, opportunity recognition, and problem-solving.

Supporting the idea that curriculum changes and integrating industry partners into the design of student outcomes are meaningful, Ward and Grant (2019) noted that employers no longer ask “What do you know?” but instead “What have you done?” when meeting with students during interviews for entry-level jobs. As a result, the need for higher education to adjust to the ever-changing landscape of employer-driven demands reflects a need to adopt curriculum changes that may include advisory boards, recruiters, faculty, and other vested stakeholders.

There is also literature analyzing what employers’ value and what perceptions they hold about students and career-readiness.

One study conducted by Kleckner and Butz (2022) analyzed the communication skills deemed essential for students to possess upon graduating from college. The authors noted that essential communication skills vary for entry-level positions based upon different points in time; likely leading to the results indicating that employer satisfaction with these skills also shifted over specific periods of time.

A second study directly examined the communication skills students considered important. Specifically, Rubenking (2022) discovered that students believe a basic communications course emphasizing workplace preparation is an appropriate forum to teach career readiness. The same study also concluded that the business communication course itself is an ideal curriculum to allow for the previously mentioned shifting sentiments of both employers and students, appropriately adjusting based upon best practices and newly accepted norms.

Needless to say, the complexities surrounding career readiness perceptions are linked through institutions of higher learning – most often the career services center or career placements offices. Evolving since their inception in the 1970s, these offices face significant challenges such as ever-changing industry needs, an evolving social contract between employers and employees, shifting norms in work/life balance, and societal trends in general. Faculty interaction with students has also changed as a result of these offices emerging into these roles, and oftentimes, faculty perception of students is one of merely an overall grade in a class. This may contribute to a student’s self-perception prior to engaging in an internship. Because of this, Schlesinger, O’Shea, and Blesso (2021) contend that it is imperative that faculty gets integrated into the process of career readiness.

EMPIRICAL MODEL

Methodology

In this study, we employed a rigorous empirical approach to analyze the data and test the hypotheses outlined in our research objectives. Our primary statistical tool for hypothesis testing was the independent samples t-test, which is a powerful method for comparing means between two groups. Utilizing the t-test due to its suitability for assessing differences in key variables of interest in our empirical model, the authors compared means by employers and students to eight primary questions and a number of supporting questions contained in a skill assessment survey.

The empirical model employed in this study was designed to investigate the responses of employers and student interns to detailed questions regarding career-readiness on student self-perceptions. To assess the statistical significance of the relationships and differences within the model, the t-test was utilized to compare the means of student self-reported career readiness and employers’ perceived career readiness of those students and determine whether there exists a statistically significant difference.

We carefully followed established procedures for conducting the t-test, ensuring that the assumptions underlying this test, such as normality and homogeneity of variances, were met or appropriately addressed in our analysis. The choice of the t-test as our primary statistical method allowed us to make robust inferences about the relationships between the variables under investigation in the context of our empirical model.

Furthermore, the results of the t-test were interpreted and discussed in the context of our research objectives and theoretical framework, enabling us to draw meaningful conclusions and insights from the empirical analysis.

In summary, the application of the t-test within our empirical model served as a crucial component of our analytical methodology, providing a solid foundation for hypothesis testing and contributing to the rigor of our research findings.

The formula for the independent two-sample t-test is as follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Data:

Our sample covered two successive summer internship sessions in 2022 and 2023. During that timeframe, 49 undergraduate business students successfully completed internships. These students were juniors and seniors (60+ credit hours) with specific finance, accounting, economics, management, marketing, and human resource management majors.

The survey completed by the employers and students is administered by The Career Readiness Project, which was designed to assist students in their competencies and behaviors deemed necessary by the National Association of Colleges and Employers (NACE). There are eight critical competencies: critical thinking, communications, teamwork, equity & inclusion, professionalism, technology, career & self- development, and leadership. Contained within each of the sections are between 3-5 statements pertaining to the primary topic, which requires each respondent to answer Likert scale questions on the student’s performance, 1 being “none” and 7 being “100% complete.” The eight key category ranges are below in Graph 1. For more information on this nationally recognized survey that contains data on over 24,000 respondents, please visit www.skillsurvey.com.

Graph 1 – Skills Survey Categories



* Source: Job Outlook 2022, National Association of Colleges and Employers

RESULTS

We were interested in analyzing the career readiness undergraduate business students possessed. Consequently, we utilized T-tests measuring the responses by students and the employers at the end of an internship experience to determine if both groups evaluated the skills equally. The results of this empirical analysis are found below. Table 1 at the end of this report will show the full results.

Descriptive Statistics:

Question one: (Professionalism) The student demonstrated dependability, attention to detail, initiative, consistently met or exceed goals, and expressed a high level of dedication.

The 47 employer respondents ($M = 6.573$, $SD = .636$) compared to the 26 students that self-reported ($M = 6.623$, $SD = .571$) demonstrated no significant difference in the professionalism of the students $p > .10$. Students did rate themselves more professional than their supervisors, however.

Question two: (Communication) The student communicated in a clear and organized manner that was understandable. Student wrote in a way that conformed to the basic principle of spelling, grammar, and punctuation while promptly informing relevant others when needing guidance with an assigned task.

46 employers responded to this question ($M = 6.584, SD = .676$), while 26 students answered this question ($M = 6.603, SD = .446$), reflecting no statistically significant difference in the groups, $p > .10$.

Question three: (Technology) The student displayed proficiency with relevant computer applications, uses technology to improve efficiencies, and quickly adapts to new or unfamiliar technologies.

Like question two, there were 46 employer responses ($M = 6.648, SD = .524$) and 26 student responses ($M = 6.589, SD = .496$). These results indicate that there was no statistically significant difference at .10 between the two groups.

Question four: (Teamwork) The intern listened carefully to others, taking time to understand the appropriate questions without interrupting. Additionally, the student collaborated with others to help build strong, positive working relationships with team members and supervisors.

In this instance, there were 46 supervisor responses ($M = 6.60, SD = .826$) and 27 students completed the question ($M = 6.573, SD = .571$). This reflects no significant difference at .10 between either of the two populations.

Question five: (Critical thinking) The student was able to gather information from multiple sources in order to summarize and interpret data in order to understand a problem. Additionally, the student was able to multi-task in a fast paced environment to make sound reasoning judgement to solve a problem.

46 employers ($M = 6.457, SD = .737$) responded to this question, while 26 students answered ($M = 6.42, SD = .658$). This indicates no statistically significant difference between the groups $p > .10$.

Question six: (Career and self-development) While employed, the intern sought out opportunities to learn, displayed curiosity, and showed awareness of own strengths and areas needing development. The student also feedback in a positive manner without becoming angry or defensive.

46 supervisors ($M = 6.555, SD = .689$) and 26 student interns responded to this question ($M = 6.513, SD = .661$), indicating $p > .10$. Consequently, there was no significant difference in responses to this question.

Question seven: (Leadership) The student motivated others by building trust and serving as a role model by approaching assignments with confidence and a positive attitude. Additionally, the intern used innovative thinking beyond traditional methods.

Once again, there were 46 employers that responded ($M = 6.272, SD = .924$) and 26 students ($M = 6.179, SD = .839$), inferring no statistically significant difference between the two groups.

Question eight: (Equity and inclusion) The student was flexible and adaptable to a diverse environment, treating other people with different backgrounds, ethnicity, gender, and beliefs with respect. The student kept an open mind to diverse ideas and new ways of thinking.

46 employers answered this question ($M = 6.645, SD = .619$) and 26 students responded ($M = 6.814, SD = .29$). The responses from this question resulted in a p value .06, reflecting a statistically significant difference between the two groups at .10.

Upon further analysis of these results, the positive difference between student responses and employer responses about equity and inclusion corresponds to graph 1 above from NACE, indicating that students do place an emphasis on equity and inclusion in the workplace. This may be the result of a deliberate attempt to identify DEI in classrooms, boardrooms, and workplaces over recent years. According to a recent PEW Research (2023) report 56% of all workers believe that that focusing on DEI in the workplace is a good thing.

Employers placed much less emphasis on this career readiness skill, however, ranking it only fourth on the list.

Employers and students completing the survey both rated the leadership skills exhibited by the interns as the lowest average score out of all categories (employers 6.272 and students 6.179). This reaffirms the survey results from NACE, as employers ranked student career readiness in leadership last, while students self-reported their skills as sixth out of eight.

DISCUSSION AND FURTHER RESEARCH

There are several interesting components of this study from both a practical application and psychological analysis.

First is the reality that a disparity between employer expectations and students on key skills and career readiness exists. For example, employers rank critical thinking skills as the most essential skill a student should have upon entering the workforce. The survey from NACE indicates that skill is least common among students, and our analysis confirms this finding as students in our study were ranked 7th out of 8 possible skills by employers. This suggests that more needs to be done at the university level to improve critical thinking.

Also, employers only rank DEI in the middle of importance when ranking the critical skills necessary (4th out of 8), while students appear to have a heightened awareness of DEI both nationally and as part of our empirical review (1st out of 8 in both instances). Reinforcing this idea, the students in this study gave themselves the highest overall average score in the entire study (6.814) and the lowest standard deviation (.219), as did the employers (6.645). This adds support to the literature suggesting that more is being done in the workforce and at the university level to make students aware of the importance of inclusion, but perhaps at the cost of critical thinking skills deemed essential and lacking by employers. The fact that this category was the only statistically significant result from the study may indicate psychological biases or other areas worth exploring.

Communication skills and professionalism assessments were contradictory to the other 5 essential skills, with students rating themselves higher than their supervisors did. This supports the literature from Kleckner and Butz indicating communication skills are essential. Additionally, the results from employers grading the students' results lower lends support for better business communication courses in the curriculum, such as the study from Rubenking suggested. Upon closer review, this finding may also reflect a bigger misunderstanding about acceptable communication methods and professional dialogue.

The students identified in this study were between the ages of 19-23; an age group that has always had digital technology, including cell phones and social media accounts, at their immediate disposal. While it's unclear what age their supervisors are, logic would dictate that they were older since they were already working and had several years of experience. This may indicate that the demographics have different expectations of *how* to effectively communicate and *what* to communicate.

We found it interesting that overall the students rated their preparedness lower than their supervisors did during the internship. Additionally, employers scored the interns higher in technological readiness and teamwork than the students scored themselves. There may be several reasons for this, including the idea that students are quite familiar with cellphones and laptop computers or notebooks. But when they were required to learn specific software for a business, they may have felt intimidated by how long it took to learn it, while their supervisors were amazed at how quickly they became familiar with the new technology. We suspect that the students judged themselves harshly because they are used to handheld devices that they adapt to quickly. Workplace software oftentimes involves passcodes, accessing virtual private networks (VPNs), or proprietary software that is unlike anything they've experienced before. Their self-perception may not have matched the reality of their abilities.

Limitations

The study included business-specific students rather than students majoring in all disciplines such as STEAM (science, technology, engineering, arts, math), or other liberal arts studies such as sociology, philosophy, or languages. Consequently, extensions of this study could include an analysis of different programs.

We also did not dissect the participants based upon their self-identified gender. As a result, no correlation or causation can be garnered from our analysis to determine if one gender perceives their career-readiness differently than another, or comparatively to their employers. This also provides another opportunity to extend the study.

Finally, no participant was forced to respond to the survey, resulting in less than 100% participation by either group. This may have led to outliers not being reported, or in some instances, respondents may have simply checked the same number for each question. Because of this, an analysis of the assessment tool or the use of a different survey instrument would be interesting. This would enable researchers to test the hypothesis under different constraints for self-reporters.

Table 1 – Descriptive Statistics

Overall	n	48	29	Professionalism	n	47	26
	mean	6.509	6.502		mean	6.573	6.623
	std dev	0.680	0.563		std dev	0.636	0.571
	t test	0.481			t test	0.365	
Communications	n	46	26	Technology	n	46	26
	mean	6.584	6.603		mean	6.648	6.589
	std dev	0.676	0.521		std dev	0.524	0.496
	t test	0.446			t test	0.317	
Teamwork	n	46	27	Critical Thinking	n	46	26
	mean	6.600	6.573		mean	6.457	6.420
	std dev	0.826	0.571		std dev	0.737	0.658
	t test	0.399			t test	0.414	
Career Readiness	n	46	26	Leadership	n	46	26
	mean	6.555	6.513		mean	6.272	6.179
	std dev	0.689	0.661		std dev	0.924	0.839
	t test	0.399			t test	0.333	
Equity/inclusion	n	46	26				
	mean	6.645	6.814				
	std dev	0.619	0.290				
	t test	0.062 *					
		* significant at .10					

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UNDERSTANDING COLLECTIVE FORMS OF LEADERSHIP THROUGH TEXT MINING-BASED REVIEW OF LITERATURE

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ABSTRACT

Collectivistic leadership has been widely discussed in various studies to involve multiple individuals in a leadership process in which a hierarchical and single-leader form of leadership is not effective in modern organizations. Although the literature in collectivistic leadership provides various leadership concepts and approaches, they have been represented by similar collectivistic leadership labels without clear characterization. As a response, this study uses a text mining approach to identify underlying key themes discussed in a large collection of articles relevant to collectivistic leadership and thereby to provide new categorization of collectivistic leadership studies. First, the collected article sets associated with the common labels of collectivistic leadership – team leadership, shared leadership, distributed leadership, collaborative leadership, collective leadership, complexity leadership, and relational leadership – were analyzed by extracting frequently occurring terms and their correlations through text mining. The results showed that the different leadership labels in the extant literature share similar keywords and thereby provide ambiguous leadership concepts. To identify appropriate categorization and conceptualization of collectivistic leadership approaches in the existing literature, latent topics in the collectivistic leadership literature were extracted by correlated topic modeling. As a result, seven latent topics were identified as main themes in the existing studies. The findings from this study imply the necessity of a new viewpoint to understand collectivistic leadership approaches from domain- and context-specific aspects.

INTRODUCTION

The concept of collectivistic leadership has gained increasing attention in recent years. Collective capacity is becoming more essential as the interdependence of society accelerates, and collectivistic leadership plays a larger role in solving various societal problems under complexity (Deloitte, 2019). Correspondingly, academic interest in collectivistic leadership has grown within the management and leadership literature. For instance, the keyword “shared leadership” yields only 113 publications for the period from 2000 to 2010 in the Web of Science database (<https://www.webofscience.com/>), whereas the same keyword generates 398 peer-reviewed publications in the period from 2011 to 2019. Due to the increase in the number of articles published in the past few decades, a comprehensive analysis of diverse research topics and contexts of collectivistic leadership discussed in the existing literature is necessary for properly understanding the changing nature of collectivistic leadership. The extant literature shares similar concepts of collective leadership that represent collectivistic leadership as a phenomenon among multiple individuals (Yammarino et al., 2012) and as a dynamic interaction process regarding reciprocal and collective influence (Pearce & Sims., 2002). Nonetheless, collective forms of leadership tend to be described with different labels (e.g., shared leadership, distributed leadership, collective leadership, collaborative leadership, and co-leadership) depending on scholars’ subjective categorization to best describe their research contexts. Indeed, different labels of collectivistic approaches to leadership are used to represent similar collectivistic leadership concepts (Denis et al., 2012; Ospina et al., 2020), and several terminologies are used interchangeably according to each scholar’s country of origin and academic discipline (Bolden, 2011; Denis et al., 2012).

To tackle the above issue, this study aims to clarify the significant themes and contexts of collective leadership approaches in a large set of extant studies. In particular, this study examines what latent topics exist in existing studies for collective forms of leadership and analyzes characteristics in collectivistic leadership approaches from identified topics. For this, an objective topic extraction process through text mining is performed based on the text information of the literature to discover hidden topics in a comprehensive set of the collectivistic leadership literature beyond prevailing top-down approaches to subjectively define and theorize collective dimensions of leadership. Extracted topics for collectivistic leadership approaches through text mining can be effective to summarize their key features from a bottom-up viewpoint that considers all possible conceptualizations. This viewpoint provides not only the characteristics of current collectivistic leadership studies but also of emerging topics of collectivistic leadership. This is distinct from prevailing top-down viewpoints to collectivistic leadership, which are based on a conventional literature review to subjectively classify leadership approaches.

This study performs two analysis steps using advanced text mining techniques – term frequency analysis and correlated topic modeling – for existing collectivistic leadership studies. The first step focuses on determining which meaningful and featured keywords can be found in a comprehensive set of the existing literature associated with current collective leadership labels. The second step focuses on identifying underlying topics in the existing literature relevant to collective leadership. Using text mining to analyze a large collection of articles, this study effectively discovers common ground and emerging themes in collective leadership to enable leadership scholars to perform prospective future research topics on the subject.

LITERATURE REVIEW

Previous Research on Mapping Collectivistic Leadership Approaches

Leadership has generally been defined in terms of individuals' traits, behaviors, situations, and its consequences. Leadership involves the process of influence (Vroom & Jago, 2007), but the perspective of looking at leadership phenomena varies depending on individual interests and experiences (Bass & Bass, 2008). One of the controversial arguments is whether leadership is considered to exist within a specialized role position or a process of shared influence (Yukl, 2013). Organizations can jeopardize organizational effectiveness if leadership is shared too broadly, and therefore organizations need a specialized role such as a leadership position. However, a leadership influence-process occurs naturally through social interactions within a social system (Gronn, 2002). Thus, decisions are made through an interactive process involving many people who influence each other. Leadership studies with this perspective claim that it is more useful to study leadership as a social-psychological process rather than a specialized role in the physicality of organization structures (Cunliffe & Eriksen, 2011; Uhl-Bien et al., 2007). Thus, leadership in a shared and distributed process are emphasized by focusing on a complex and relational process among members (Ospina & Uhl-Bien, 2012)

Collective leadership phenomena posit shared and distributed leadership functions among different individuals in interaction (Denis et al., 2012; Yammarino et al., 2012). A collectivistic leadership approach refers to a leadership approach that enables multiple leaders to work together toward a goal. Leaders do not have to be officially appointed for collectivistic leadership; rather any individual who exerts influence over others can be a leader. The statement that “collective leadership represents an emerging theoretical umbrella that captures diverse scholarship on the shared, distributed, pooled, and relational aspects of leadership” (Ospina et al., 2020) applies the term “*collective*” to leadership roles of all members within a group as opposed to a single subject for leadership.

Although researchers have begun to apply collectivistic approaches to leadership (Bolden, 2011; Carter et al., 2015), collectivistic leadership scholarship is still a nascent field in organizational and management studies (Ospina et al., 2020; Pearce et al., 2010). Since collectivistic leadership needs more clarification to distinguish itself from the traditional views of a hierarchical leader, relevant studies have tried to build a concrete theoretical foreground of collectivistic leadership scholarship. For example, Carson et al. (2007) distinguished shared leadership from other seemingly relevant team constructs such as team autonomy, team empowerment, cooperation, and team cognition. Meta-analyses on shared leadership performed by D’Innocenzo et al. (2016) and Nicolaidis et al. (2014) confirmed its positive impact on performance. Within theoretical studies for collectivistic leadership, there also have been significant efforts to categorize existing collectivistic leadership approaches through critical literature and conceptual review methods in the previous works (e.g., Contractor et al., 2012; Denis et al., 2012; Ospina et al., 2020; Ulhøi & Müller, 2014; Yammarino et al., 2012).

Responding to the necessity of advanced theoretical research on collectivistic leadership, leadership studies have attempted to categorize collectivistic approaches to characterize them. Yammarino et al. (2012) elaborated differences among five collectivistic approaches to leadership - team, network, shared, complexity, and collective leadership - in terms of key constructs, levels of analysis, focal leader’s role, empirical support, practical implications, and other areas. Denis et al. (2012) identified four distinct streams of plural forms of leadership studies – sharing, pooling, spreading, and producing leadership – from a literature review. They established that each stream has distinct epistemological, theoretical, and methodological assumptions. Ospina et al. (2020) plotted various leadership theories in the collective leadership landscape into a map that exhibits the domains of collective leadership. This map categorizes leadership approaches by considering both the locus of leadership in the group or system and the view of collectivity as type or lens. They identified four distinct categories: 1) plural forms of leadership in interpersonal relationships such as dual/co-leadership, shared leadership, social network leadership, and team leadership; 2) plural

forms of leadership in systemic dynamics such as multiteam systems leadership, distributed leadership, network leadership, collective leadership practices, and complexity leadership; 3) a theoretical lens in interpersonal relationships such as practice theory studies and relational leadership; and 4) a theoretical lens in systemic dynamics such as collective constructionist leadership, discursive/communicative leadership, and critical leadership studies (p. 443). Moreover, Fairhurst et al. (2020) examined 935 collectivistic leadership articles with seven most significantly utilized collectivistic leadership labels: collective leadership, shared leadership, distributed leadership, complexity leadership, discursive leadership, relational leadership, and network leadership to identify research trends in terms of naming, number of studies, and research methods through the Rapid Appraiser Method. They identified distributed leadership, shared leadership, and collective leadership as the most popular leadership concepts based on the number of relevant studies.

The above efforts to build a framework for collectivistic leadership approaches helped researchers understand various collectivistic leadership concepts. Nevertheless, unclear boundaries across collectivistic leadership approaches are still a major concern (Pearce et al., 2008) because of the lack of in-depth discussion of comprehensively structuring collectivistic leadership approaches that are evolving over time in the research community (Ospina et al., 2020; Park & Zhu, 2017). Although the extensive literature review in Denis et al. (2012) and the rapid appraisal of collective leadership literature between 2012 and 2018 in Fairhurst et al. (2020) contributed to a more comprehensive understanding of collectivistic leadership approaches, most previous studies characterized the different perspectives of collectivistic leadership based on a small set of relevant studies. This gap may occur because the ever-growing body of research relevant to collectivistic leadership poses methodological challenges in conducting comprehensive scientific reviews. That is why the extant studies of mapping collective leadership approaches have relied on a top-down analysis, which subjectively pre-defines collective leadership concepts and assigns related theories and methods to each leadership label based on perceived theoretical similarities and differences. Therefore, a more scientific and quantitative method is necessary to ensure the suitability of characterizing an expanding stream of collectivistic leadership; text mining for a massive number of research articles in collectivistic leadership can be effective to characterize underlying topics that are commonly addressed in the subsets of the leadership studies.

Text Mining and Correlated Topic Modeling

Text mining is a statistical quantitative research method to automate the analysis of text by transforming unstructured text data into a structured format (Miller, 2004). The aim of text mining is to use a large set of observed documents (e.g., journal articles in this study) to convert raw data into meaningful information which can then be used to explore underlying knowledge in an efficient way (Lee et al., 2010). Indeed, the use of text mining can be more beneficial as the amount of text data to be analyzed rapidly increases (Kobayashi et al., 2018).

Text mining is still in a nascent stage for organizational research (Kobayashi et al., 2018) although it has been widely applied to various research domains in information science, statistics, and engineering with the blossom of Big Data (Boyd & Crawford, 2012; Kitchin, 2014). Although previous management and organization researchers employed a computer-aided text analysis (CATA) (Short et al., 2018) for qualitative research design, text mining is more powerful and can be used for a wider range of purposes than CATA (Kobayashi et al., 2018). While most CATA procedures extract patterns by counting term frequencies, text mining considers not only term frequencies but also utilizes techniques from statistics, natural language processing, corpus linguistics, and machine learning for algorithmic approaches. That is, researchers can objectively identify the underlying concepts across vast literature by using text mining that can transform unstructured text in a document set into structured data suitable for interpretation and analysis.

Topic modeling is a generative statistical technique for extracting latent topics through the patterns of term frequencies (Alghamdi & Alfalqi, 2015). Major topic models commonly applied to various domain applications are Latent Dirichlet Allocation (LDA) (Blei et al., 2003) and Correlated Topic Model (CTM) (Blei & Lafferty, 2007). In both the models, a set of documents is considered as composed of a mixture of latent topics, and these topics are generated from terms occurring with a probabilistic distribution in the documents. Although LDA assumes the conditional independence of topics that follow a Dirichlet distribution in each document, CTM considers correlations between topics in the model by replacing the Dirichlet distribution condition of LDA with a logistic normal distribution (Blei & Lafferty, 2007). Actual documents tend to accompany related topics rather than independent topics. For example, an article about collectivistic leadership in an organization may be likely to be regarding organizational settings and leadership roles. CTM considers that the existence of one latent topic can be correlated with another topic in topic

extraction. Therefore, CTM is often regarded as a more realistic means of capturing latent topics in a document set than the assumption of uncorrelated topics in LDA (Chang et al., 2009).

Topic modeling prevents the implicit manual coding bias of researchers in that topics are inductively generated by topic modeling algorithms. Therefore, the identification of latent topics is not constrained by the researcher's knowledge and prejudice. The increasing application of text mining in various fields of the social sciences suggests new research opportunities that can be also achieved by text mining applications in the field of management and leadership scholarships. From this point of view, this study employs a text mining approach not only to objectively analyze an existing collectivistic leadership typology but also to identify latent topics from a large set of previous collectivistic leadership articles.

METHODS

This study performed term frequency analysis and CTM through text mining of collectivistic leadership studies not only to compressively understand existing topics in collectivistic leadership but also to provide a new framework to view existing collectivistic leadership approaches. The first step aims to characterize prevailing collectivistic leadership labels to evaluate whether the existing collectivistic leadership categorization can be clarified across article sets with conventional collectivistic leadership labels. For this, the term frequency analysis of text mining was performed to identify frequent used terms and their correlations within the articles associated with each conventional leadership label. This analysis step classifies meaningful and featured keywords in the research articles that use prevailing collectivistic leadership labels. In the second step, CTM is applied to propose new categorization of collectivistic leadership by investigating what underlying topics exist in a total set of the existing literature on collective leadership scholarship. Beyond prevailing top-down and subjective determination approaches of collectivistic leadership labeling, the objective topic extraction of CTM offers a new basis of effectively understanding collectivistic leadership approaches and issues that have been addressed in a large set of relevant research articles.

Term Frequency Analysis

Text mining was conducted for the full text of research publications relevant to the common labels of collectivistic leadership to comprehensively examine the concepts and approaches of collectivistic leadership in the literature. Articles were collected by various document search engines. The article collection was conducted on the PsycINFO, ABI/Inform, Web of Science, Business Source Premier, ProQuest, and Science Direct databases that include theses, dissertations, and journal publications to the end of 2018. In the initial stage, major studies in collectivistic leadership (D'Innocenzo et al., 2016; Ospina et al., 2020; Yammarino et al., 2012) were reviewed to identify common collectivistic leadership labels, and resultant 15 labels were considered as search criteria for research articles: "team leadership," "network leadership," "shared leadership," "complexity leadership," "collective leadership," "distributed leadership," "horizontal leadership," "collaborative leadership," "co-leadership," "cooperative leadership," "relational leadership," "decentralized leadership," "pluralized leadership (plural leadership)," "dispersed leadership," and "rotated leadership." As a result, a total of 1,353 articles that are associated with at least one of the 15 collectivistic labels were collected. The domains of the collected articles include management, organization studies, psychology, sociology, economics, political science, architecture, education, engineering, health, law, and nursing. The leadership labels that are not related to a significant number of articles can have insufficient descriptive information to generalize leadership features through text mining. Therefore, articles for the following top seven leadership labels, which account for over 90% of the total collected articles, were only considered for analysis: "team leadership," "shared leadership," "distributed leadership," "collaborative leadership," "collective leadership," "complexity leadership," and "relational leadership." A total of 1,224 articles (i.e., 226 articles in team leadership, 299 articles in shared leadership, 354 articles in distributed leadership, 118 articles in collaborative leadership, 72 articles in collective leadership, 75 articles in complexity leadership, and 80 articles in relational leadership) were finally collected for text mining analysis.

A term frequency analysis for the collectivistic leadership articles was performed based on the bag-of-words model, which is a traditional natural language processing model, to represent each article as a numerical vector consisting of a group of descriptive words and their frequency in the document (Park & Kremer, 2017; Zhang et al., 2010). All the documents and their terms were expressed as a matrix with the number of associated terms in each document through Eq. 1. The bag-of-words model assumes that information embedded in text can be captured regardless of the order of

words appearing in a document (Baeza-Yates & Ribeiro-Neto, 1999). Thus, each document in the model is represented as the bag of the words that appear in the document without considering grammar and word order.

$$\vec{t}_d = (f(d, t_1), \dots, f(d, t_m)), \quad (1)$$

where $D = \{d_1, \dots, d_n\}$ is a set of documents, $T = \{t_1, \dots, t_m\}$ is a set of terms appearing in D , $f(d, t)$ is the frequency of a specific term ($t \in T$) in a document ($d \in D$), and \vec{t}_d is a m -dimensional document-term vector representing d .

Terms for the bag-of-words model indicate meaningful and featured words that can characterize information in a set of documents. To extract analyzable terms from all occurring words, several pre-processing steps for original text data can be performed (Haddi et al., 2013; Ramasubramanian & Ramya, 2013). The first step extracts raw text data from original documents by eliminating specific symbols such as characters, numbers, figures, punctuations, and whitespaces. Then, stop-words, which are non-descriptive words such as “a,” “the,” and “that,” are eliminated from text data since they do not provide important context information. Furthermore, words sharing the same stem are retrieved as a single term. This stemming process standardizes words derived from the same root so that they can be regarded as providing the same meaning in text. For example, “educate,” “educates,” “educating,” and “education” that have the same stem are transformed into “educ” to indicate the same information of these word variants. Streamlined text data are then structured based on the bag-of-words model to form a document-term matrix, where rows and columns respectively represent documents and all terms occurring in the document set. Values in a document-term matrix indicate the frequencies of all terms in the document set.

The following pre-processing procedure was performed by the “tm” package of R statistical programming language (Feinerer & Hornik, 2020). The PDF files of the research articles in each leadership label were collected from web databases, and they were separately stored in each file folder. Each article stored in the pre-defined labeling folder was converted into a “text” file to only include text information. All text data in each article were converted to lower case, and non-descriptive elements (i.e., numbers, punctuation, stop-words, and empty spaces) were eliminated. Then, each word was stemmed by the SnowballC package (Bouchet-Valat, 2020) to construct a document-term matrix for text mining analysis. After organizing a document-term matrix for each leadership label, highly infrequent terms (i.e., sparse terms) across articles within each leadership label were removed to construct a concise document-term matrix for each document set since those infrequent terms can be regarded as too specific terms that may not be useful to characterize each leadership label. Herein, terms that appear in less than 5% of each document set were removed from the document-term matrix, which is the sparse term elimination rule employed in Park and Kremer (2017). In other words, a term was excluded for analysis if the number of the documents that contain the term was less than 5% of the total document number of each leadership label.

In addition, each original term frequency was transformed into the Term Frequency-Inverse Document Frequency (TF-IDF) (Salton & Buckley, 1988) to treat common terms frequently occurring in a small document set as more important than terms widely occurring in every document (see Eq. 2) (Park & Kremer, 2017). This is because a term that occurs in every article (e.g., “have”) does not represent an important feature that can distinctively characterize each leadership label. Instead, frequent terms in a specific subset of the articles of each leadership labels are highly possible to represent some specific features in collectivistic leadership approaches. In this step, relative term frequency, the number of a term in a document (i.e., term frequency) divided by the sum of all the term frequency values in the document, was used for $f(d, t)$ in Eq. 2 to avoid the situation where each of frequently appearing terms in a lengthy document relatively have a larger TF-IDF value than other documents. Then, the TF-IDF values of each term in all the documents were calculated by Eq. 2. The average of the TF-IDF values for each term was examined to remove the terms that have the TF-IDF value less than the overall average TF-IDF value of all the terms. Consequently, very frequently occurring common terms over all the documents were eliminated from the original document-term matrix. The above procedure was performed using the R statistical programming language by following the TF-IDF transformation in R shown in Grün and Hornik (2011). The final number of terms considered for the descriptive text mining analysis of each leadership label is summarized in Table 1.

$$f(d, t)^* = f(d, t) \times \log (n/n_t), \quad (2)$$

where n is the number of all documents considered for text mining, and n_t is the number of documents in which the term t is included.

Table 1. Number of terms considered for each leadership label

Collectivistic leadership labels	# of terms after eliminating non-descriptive elements	# of terms after removing sparse terms	# of terms after removing terms with low TF-IDF
Team leadership	44,047	3,584	929
Shared leadership	50,596	4,228	1,239
Distributed leadership	69,588	4,500	1,251
Collaborative leadership	31,588	4,704	1,194
Collective leadership	19,445	4,353	1,055
Complexity leadership	28,151	5,758	1,579
Relational leadership	23,525	4,323	1,181

Very frequently occurring terms in each leadership label can be considered as forming a main theme of the respective leadership label. Based on the document-term matrix of each leadership document set, the term-frequency distribution of the 20 most frequent terms in each document set was derived and visualized to capture the overall context of each leadership approach first. Then, term correlation between the frequent terms in each leadership label was derived to examine the co-occurrence of two specific terms within each document set (Yan et al., 2013).

The correlation analysis provides possible association between frequent terms that characterize the leadership theme. If two terms in a document-term matrix have a high correlation coefficient in term frequency (i.e., close to 1), the two terms are considered as highly dependent concepts occurring simultaneously in the document set. On the other hand, the terms can be considered as nearly independent if the two terms have a very low correlation coefficient (i.e., close to 0). For the top 20 frequent terms in each leadership label, the Pearson's correlation coefficients were calculated from the document-term matrix of each leadership label; a 20-by-20 symmetric term-correlation matrix for 20 frequent terms was built for each label. Then, term pairs associated with correlation coefficients greater than 0.6 were sorted to represent highly dependent terms in each leadership label.

Correlated Topic Modeling

Collectivistic leadership has been represented in the literature with pre-defined leadership labels as specified in Section 3.1. This top-down categorization tends to result in ambiguous associations of existing studies to the pre-defined leadership labels. To address this problem, topic modeling was used as a bottom-up approach to conceptualize a comprehensive set of existing articles relevant to collectivistic leadership. Latent topics in collectivistic leadership articles can be correlated to each other because similar concepts are interrelated in the existing leadership labels. Accordingly, this study employed CTM (Blei & Lafferty, 2007) for collectivistic leadership categorization. Topics identified by the CTM of collectivistic leadership articles can represent primary groups of concepts and themes that are likely to be observed in the literature.

For correlated topic modeling, articles that clearly specify title, abstract, and keywords were sorted from the initial document set of 1,353 research articles; a total of 1,299 research articles were collected and saved as txt files in the same folder. The input text data for implementing CTM contained concise research information, including title, abstract, and keywords, to eliminate any possible noise factors in topic derivation. Research articles in social science such as collectivistic leadership articles may use more narrative and rhetorical statements with various terms than general science and engineering research articles; various terms that contextually provide the same meaning can be frequently used in collectivistic leadership articles. In addition, article structures can be varied depending on journal formats and authors' writing styles. Such variability in articles can negatively affect the topic extraction of CTM since contextual and structural similarities among occurring terms are not reflected in the original CTM technique. Due to the above reasons, the concise article information was used to build a CTM for the collectivistic leadership literature.

Next, each text file was pre-processed through the “tm” package in R (Feinerer & Hornik, 2020) using the procedure described in Section 3.2. After constructing a document-term matrix for the collected articles, sparse terms occurring in only a few documents were removed from the document-term matrix since sparse terms can negatively impact topic modeling results (Hong & Davison, 2010). If all specific terms uniquely appearing in an article are reflected in a CTM, those sparse terms impose more variability in topic extraction and fitting. Herein, terms occurring in less than 5% of all the documents were removed. Moreover, common terms frequently occurring across the documents, which have the mean TF-IDF value less than the first quartile of all the calculated mean TF-IDF values, were excluded in the document-term matrix. Consequently, the document-term matrix consisting of 1,299 documents and 216 terms was used for fitting a correlated topic model through the “topicmodels” package of R statistical programming language (Grün & Hornik, 2011, 2021).

A CTM was repeatedly generated by increasing the number of topics from 2 to 40 to identify an appropriate topic number through the perplexity of each CTM, which indicates how well the topic model fits a set of documents. A relatively lower perplexity value indicates that the particular topic model with the specific number of topics can more precisely reflect the actual document set (Chang & Hsiao, 2013; Wang et al., 2012). Perplexity was calculated by Eq. 2 as shown below (Blei et al., 2003).

$$Perplexity(D) = \exp \left\{ -\frac{\sum_{d=1}^M \log p(t_d)}{\sum_{d=1}^M N_d} \right\}, \quad (3)$$

where D is a corpus, d is a document in M document set ($d \in \{1, \dots, M\}$) consisting of a corpus, N_d is the number of terms in d , and $p(t_d)$ represents the occurrence probability of a term in document d .

RESULTS

Term Frequency Analysis of Literature with Existing Collectivistic Leadership Labels

The term-frequency distribution of each leadership label is summarized in Appendix (see Figure A.1) for the top 20 terms frequently appearing in each label. Additionally, 50 frequent terms in each leadership document set are illustrated by the word clouds in Figure 1. The word clouds in Figure 1 display the more frequent terms with the bigger font sizes. These figures show a visualized overview of each leadership document set. Table 2 shows highly dependent terms among the frequent terms in each leadership label. It is noted that noise terms, that are not directly related to the contents of articles (i.e., copyright information and journal information), were not considered in **Table 2**.

The results in Figure 1 and Table 2 show that the different leadership labels in the extant literature share contextual similarity. Indeed, studies across different labels of collectivistic leadership commonly include leadership roles in educational settings because every label contains keywords relevant to education such as school, teacher, and student as frequent terms. On the other hand, specific research foci and concepts that are distinguished from each other are also observed in the term correlation matrix in Table 2. For example, studies in the complexity leadership labels have “data,” “network,” and “interview” that are not frequently observed in other leadership labels. However, it is difficult to clearly separate essential characteristics of the existing collectivistic leadership labels from their associated studies due to the similarity of the keywords and research contexts across the leadership labels.

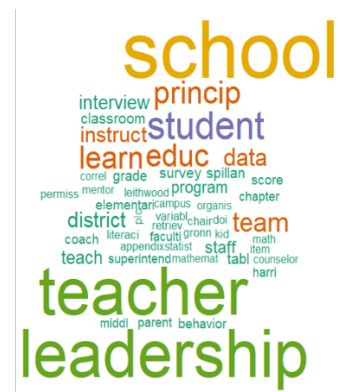
The major collectivistic leadership labels demonstrate the ambiguity of the prevailing collectivistic leadership concepts in the literature, and they cannot clearly characterize associated collectivistic leadership. That is, the extant collectivistic approaches to leadership require a new categorization process to effectively represent their research contexts and themes against extant ad-hoc conceptualization of collectivistic leadership. The next section shows proposed collectivistic leadership categories derived from the CTM of extant collectivistic leadership articles.



a) Team Leadership



b) Shared Leadership



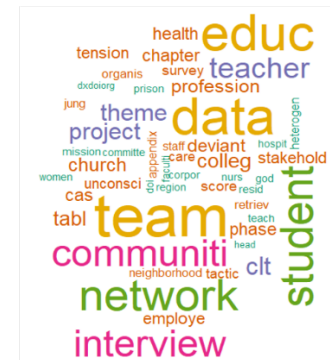
c) Distributed Leadership



d) Collaborative Leadership



e) Collective Leadership



f) Complexity Leadership



g) Relational Leadership

Figure 1. Word cloud of top 50 frequent terms in each leadership label

Table 2. Correlated terms in each leadership label

Labels	Correlated term pair (>.6)
Team Leadership	“patient” – “care” (.74), “care” – “nurs (e.g., nurse)” (.73), “leader” – “team” (.68), and “student” – “teacher” (.60)
Shared Leadership	“instruct” – “princip (e.g., principal)” (.80), “educ (e.g., education)” – “student” (.78), “student” – “school” (.77), “educ (e.g., education)” – “school” (.74), “instruct” – “student” (.73), “instruct” – “teacher” (.73), “student” – “teacher” (.72), “school” – “teacher” (.70), “princip (e.g., principal)” – “school” (.69), “princip (e.g., principal)” – “teacher” (.69), “educ (e.g., education)” – “teacher” (.64), “instruct” – “school” (.64), “princip (e.g., principal)” – “survey” (.63), and “profession (e.g., professional)” – “teacher” (.62)
Distributed Leadership	“classroom” – “teacher” (.75), “classroom” – “teach” (.72), “teach” – “teacher” (.72), “school” – “student” (.70), “educ (e.g., education)” – “school” (.68), “princip (e.g., principal)” – “school” (.67), “classroom” – “instruct” (.66), “classroom” – “learn” (.64), “leadership” – “school” (.64), and “interview” – “school” (.61)
Collaborative Leadership	“colleg (e.g., college)” – “director” (.94), “school” – “teacher” (.85), “collabor (e.g., collaborative)” – “director” (.83), “collabor (e.g., collaborative)” – “colleg (e.g., college)” (.82), “student” – “teacher” (.80), “data” – “educ (e.g., education)” (.79), “educ (e.g., education)” – “school” (.79), “educ (e.g., education)” – “student” (.79), “educ (e.g., education)” – “teacher” (.79), “school” – “student” (.78), “director” – “school” (.77), “data” – “interview” (.76), “collabor (e.g., collaborative)” – “school” (.76), “colleg (e.g., college)” – “school” (.74), “data” – “school” (.73), “collabor (e.g., collaborative)” – “data” (.69), “collabor (e.g., collaborative)” – “teacher” (.69), “director” – “teacher” (.69), “data” – “teacher” (.68), “colleg (e.g., college)” – “teacher” (.67), “data” – “research” (.67), “interview” – “research” (.67), “collabor (e.g., collaborative)” – “student” (.66), “collabor (e.g., collaborative)” – “educ (e.g., education)” (.64), “colleg (e.g., college)” – “student” (.64), “administr (e.g., administration)” – “school” (.62), “data” – “student” (.62), “colleg (e.g., college)” – “educ (e.g., education)” (.60), “data” – “director” (.60), and “team” – “manag (e.g., manage)” (.60)
Complexity Leadership	“cas (e.g., case)” – “deviant” (.77), “data” – “interview” (.75), “profession (e.g., professional)” – “teacher” (.70), “educ (e.g., education)” – “student” (.69), “interview” – “theme” (.66), “educ (e.g., education)” – “network” (.61), and “educ (e.g., education)” – “colleg (e.g., college)” (.61)
Collective Leadership	“princip (e.g., principal)” – “teacher” (.91), “data” – “student” (.86), “school” – “student” (.86), “data” – “interview” (.85), “data” – “school” (.81), “interview” – “school” (.78), “princip (e.g., principal)” – “school” (.76), “leader” – “leadership” (.74), “interview” – “teacher” (.69), “communiti (e.g., community)” – “church” (.68), “educ (e.g., education)” – “student” (.68), “leader” – “teacher” (.67), “interview” – “princip (e.g., principal)” (.66), “intevie” – “student” (.65), “school” – “teacher” (.65), “data” – “educ (e.g., education)” (.64), “educ (e.g., education)” – “interview” (.64), “educ (e.g., education)” – “school” (.63), “interview” – “leader” (.63), “interview” – “leadership” (.61), “safe” – “church” (.60)
Relational Leadership	“student” – “staff” (.90), “program” – “youth” (.89), “trust” – “princip (e.g., principal)” (.70), and “behavior” – “team” (.64),

Categorization of Collectivistic Leadership Studies through CTM

Figure 2 shows the perplexity values of 39 topic models for the collectivistic leadership literature, which were obtained by changing the number of topics. The perplexity value tends to decrease as the number of topics increases since a greater number of topics can be used to fit the topic model. This may indicate the overfitting of the model in that a topic without any association with the considered documents was observed in every CTM when the number of topics was greater than seven. Thus, the CTM with seven topics was selected for the collectivistic leadership literature since the lowest perplexity value was observed at the CTM with seven topics among the topic models that have completed topic associations with the collective leadership articles.

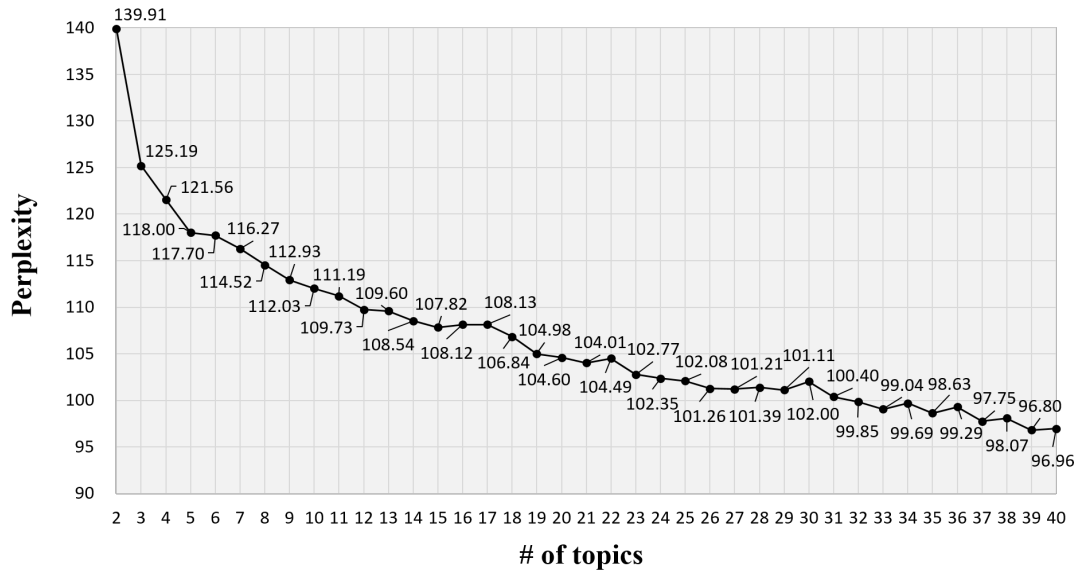


Figure 2. Perplexity value according to the number of topics

Table 3 summarizes the ten most frequent terms of the seven topics identified through topic modeling. The order of terms in Table 3, starting with the term located at the top, indicates more frequent occurrence in the articles that are most likely to be associated with each topic. In addition, the articles in which the stemmed terms exactly appear were traced back and the most frequently appearing original words are provided in Table 3.

Table 3. Results of correlated topic model with the 10 most frequent terms of each topic

Topics	Topic #1	Topic #2	Topic #3	Topic #4	Topic #5	Topic #6	Topic #7
	<i>Conceptualization of collectivistic leadership</i>	<i>Distributed leadership in school</i>	<i>Shared leadership in management</i>	<i>Collectivistic leadership in specific professions</i>	<i>Collectivistic leadership for advanced service</i>	<i>Innovation and complexity in the project</i>	<i>Organizational learning</i>
Frequent stemmed terms (Original words)	“social” (social)	“school” (school)	“team” (team)	“emerg” (emerge, emergence, emergent)	“collabor” (collaboration)	“manag” (manage, manager, management)	“organ” (organization)
	“network” (network)	“teacher” (teacher)	“perform” (performance)	“experi” (experience)	“educ” (education, educational)	“project” (project)	“organiz” (organize)
	“articl” (article)	“student” (student)	“behavior” (behavior)	“interact” (interact, interaction)	“chang” (change)	“innov” (innovation, innovative)	“learn” (learn)
	“relat”	“princip”	“task”	“transform”	“health”	“complex”	“framework”

(relational, relationship)	(principal)	(task)	(transform, transformation)	(health)	(complex, complexity)	(framework)
“paper” (paper)	“learn” (learn, learning)	“share” (share, shared)	“communic” (communicate, communication)	“care” (care)	“success” (success, successful)	“knowledg” (knowledge)
“power” (power)	“improv” (improve, improvement)	“divers” (diverse, diversity)	“time” (time)	“communiti” (communities)	“adapt” (adaptive, adaptability)	“improv” (improve, improvement)
“perspect” (perspective)	“instruct” (instruction, instructional)	“measur” (measure, measurement)	“train” (training)	“public” (public)	“environ” (environment, environmental)	“lead” (leading, leader)
“form” (form)	“profession” (professional)	“teamwork” (teamwork)	“skill” (skill)	“govern” (governance)	“factor” (factor)	“unit” (unit, units)
“conceptu” (conceptual, conceptualization)	“educ” (education, educational)	“employe” (employee, employees)	“action” (action)	“institut” (institutional, institute)	“trust” (trust)	“profession” (professional)
“distribut” (distributed, distribute)	“district” (district)	“moder” (moderate, moderator)	“challeng” (challenge, challenging)	“polic” (policies)	“system” (system)	“function” (function, functional)

Based on the CTM results and a literature review of the articles associated with each topic, the following seven topics of collective forms of the leadership literature are defined and suggested to represent extant collectivistic leadership approaches.

Topic #1 - *Conceptualization of collectivistic leadership* (16.1%: 209 out of 1,299 articles): The frequent key terms emerging from this topic are *social, network, relational, formal/informal, distributed, and shared*. The articles on this topic broadly define and conceptualize collectivistic leadership by emphasizing networks of dynamically shifting patterns of relationships among leaders and multiple actors. The literature in this group points out a shift from a leader-focused approach to a collective-focused approach as a more inclusive way of thinking about one another. In addition, the articles with the topic explain how shared and distributed leadership is related to a new approach to leadership that points out both *formal* and *informal* influence through social network in leadership process. For instance, Cullen et al. (2012), which is associated with the topic, emphasizes the need for a network approach to shifting a paradigm in leadership research and practice. This topic is also explored in the literature to investigate how leadership influence is shared and distributed among actors to form a leadership network (e.g., Gronn, 2002; Scott et al., 2018; White et al., 2016).

Topic #2 - *Distributed leadership in school* (22.2%: 289 articles): This topic includes keywords such as *school, teacher, student, principal, education, and distributed*. Obviously, the majority of articles in this group are from the educational discipline. The literature on this topic shows that distributed leadership approaches have flourished even though bureaucracy has long been the dominant paradigm in schools and other educational institutions. Indeed, the term distributed leadership is widely used nowadays in the field of school and educational leadership. For example, the research on the topic uncovers the school principal’s role as a facilitator of distributed leadership practices (e.g., Harris, 2011; Klar et al., 2016). Other related research investigates the impact of distributed leadership on school climates (e.g., Heck & Hallinger, 2010), teachers’ attitudes (e.g., Devos et al., 2014), and student’s performance (e.g., Phillips, 2013). In particular, academic dissertations on teacher leadership are commonly observed within the topic (i.e., 65.7%: 190 out of 289 articles).

Topic #3 - *Shared leadership in management* (22.9%: 297 articles): The articles associated with this topic include key terms such as *team, performance, task, shared, diverse, and teamwork*. Most articles in this group use “shared leadership” as a label to indicate a collectivist leadership approach. The literature shows how shared leadership impacts team performance and proposes a nomological network of shared leadership antecedents, boundary conditions, and outcomes. Most literature on this topic employs the concept of shared leadership, which is commonly defined as an emergent team phenomenon whereby leadership roles and functions are shared among multiple team members (Carson et al., 2007). In addition, the literature on this topic performs team-level empirical research. Two main approaches are observed in the articles associated with the identified topic: 1) an aggregation approach that measures the extent to which team members collectively engage in leadership functions (e.g., Ensley et al., 2006; Hoch, 2013; Hoch et al., 2010; Pearce & Sims., 2002) and 2) a social network that measures the connection pattern to analyze the extent of leadership density or decentralization (e.g., Carson et al., 2007; Mehra et al., 2006).

Topic #4 - *Collectivistic leadership in specific professions* (4.5%; 58 articles): The most frequent terms in articles on this topic are *emerge, experiment, transform, communication, qualitative, action, and theme*. The articles related to this topic investigate the impact of various leadership styles, including shared leadership for specific professionals and social groups such as nurse (e.g., Boudes et al., 2018; Fields et al., 2018; Steinert et al., 2006), radiologist (e.g., Rudy et al., 2015), community theater group (e.g., Kramer, 2006), and school district (e.g., McNiff, 2015). Interestingly, the literature in the article group related to the topic employs various non-quantitative methods such as qualitative survey (e.g., Boudes et al., 2018), qualitative interview (e.g., Canterino et al., 2018; Döös et al., 2017), discrete choice experiment (e.g., Fields et al., 2018), empirical case study (e.g., Keikotlhaile et al., 2015; Rosengren et al., 2010), and action research (e.g., Reitz, 2017).

Topic #5 - *Collectivistic leadership for advanced service* (20.7%; 269 articles): Key terms that form this topic are *collaboration, health, care, governance, policy, culture, and service*. The articles associated with this topic focus on enhancing service qualities and improves service outcomes in healthcare organizations (e.g., Fitzgerald et al., 2013; George et al., 2013), public sectors (e.g., Crosby & Bryson, 2018; Currie et al., 2009), higher education (e.g., Floyd & Preston, 2018; Jones & Harvey, 2017), and service industry (e.g., Manz et al., 2015). Moreover, the studies within this topic use various leadership labels such as collective leadership, decentralized leadership, and distributed leadership to represent a collectivistic form of leadership.

Topic #6 - *Innovation and complexity in the project* (12.2%: 159 articles): This topic has *project, innovation, complexity, success, environment, and trust* as frequently occurring terms in the literature associated with the topic; the related studies discuss situational and contextual boundaries such as organization/team environment and task characteristics when collectivistic leadership emerges and exists. Scholars have demonstrated that the collectivistic leadership approach can be applied not only in complex projects (Hoch et al., 2010; Pearce, 2004) but also in teams that require creative or innovative output (Hoch, 2013). Indeed, many articles on this topic demonstrate that collective leadership positively impacts organizational functioning especially when the organization pursues innovation (e.g., Hunter et al., 2012; Hunter et al., 2017) and adaptability (e.g., Uhl-Bien & Arena, 2018). The articles within this topic also discuss the importance of horizontal leadership to achieve project success (e.g., Yu et al., 2018) and the role of shared leadership for project managers to respond to a dynamic and complex environment (e.g., Clarke, 2012).

Topic #7 - *Organizational learning* (1.4%: 18 articles): Frequently appearing terms in this topic group of articles are *organization, learning, knowledge, improvement, and framework*. The studies on this topic discuss organizational learning as an outcome of collectivistic approaches to leadership. The studies handling this topic emphasize the fact that collective leadership phenomena can foster organizational learning to achieve desired organizational outcomes (e.g., Dickerson, 2011; Duffy Atkin, 2002). In addition, the topic is discussed based on the purposeful sharing of strategic decisions and the process of learning in an organization as a result of sharing decisions. For example, intra-organizational learning and effective knowledge management are driven by collaborative decision-making based on self-interest such as a personal opportunity to engage in a decision-making process in the workplace (e.g., Laiken, 2001).

CONCLUSIONS AND DISCUSSION

This study presented a text mining approach to comprehensively understand collectivistic leadership approaches in a large set of the extant literature. As a result of the term frequency analysis in Section 3.1, the existing studies grouped by the conventional collectivistic leadership labels were observed to have similar contexts across the article groups

for the existing labels. To newly categorize and characterize extant collectivistic leadership studies, this study employed a CTM approach to collectivistic leadership articles. Seven latent topics underlying in a comprehensive set of collectivistic leadership articles were derived as the most distinguished collectivistic leadership themes in the existing literature: 1) conceptualization of collectivistic leadership, 2) distributed leadership in school, 3) shared leadership in management, 4) collectivistic leadership in specific professions, 5) collectivistic leadership for advanced service, 6) innovation and complexity in the project, and 7) organizational learning. Unlike prevailing top-down approaches to review the literature, the CTM approach used in this study summarizes key characteristics in the literature using a bottom-up viewpoint to consider all possible conceptualizations.

This study initially assumed that various collectivistic approaches to leadership grouped by the major leadership labels have distinct underlying leadership characteristics and approaches across the label groups. For example, keywords and context in shared leadership literature are different from those in distributed leadership. However, the text mining results in Section 4.1 revealed that there is no direct and clear link between specific labeling and specific discipline, and multiple labels are co-existed across disciplines without precise categorization. The results claim that there may be too many collectivistic leadership labels in the field of collectivistic leadership research without articulated conceptualization. The findings imply that research for clear categorization and conceptualization of collectivistic leadership should be conducted to use terminologies and labels in appropriate contexts and situations (Denis et al., 2012; Ospina et al., 2020).

To contribute to an objective view of underlying topics in collectivistic leadership studies, the application of a topic modeling technique to collectivistic leadership articles in this study demonstrated new viewpoints for collectivistic leadership-related topics. Based on the correlated topic modeling results in Section 4.2, the literature was categorized and characterized into seven main topics. The identified topics provide a more structured and consolidated view on the overall research interests within the scholarship of collectivistic leadership.

This study addresses three important research trends in collectivistic leadership. First, leadership scholars have been trying to build a scholarship foundation for collectivistic leadership over the last decade. This is a revolutionary transition from the traditional notion of a single and heroic individual approach to leadership, which was considered as a dominant paradigm in the leadership field. The research transition is clearly observed in the *conceptualization of collectivistic leadership* topic derived by the CTM. The articles on this topic emphasize the need for a collectivistic approach to shifting a paradigm in leadership research and practice. In a decade ago, leadership scholars commented that shared leadership is still a nascent field of organizational behavior and management (Pearce et al., 2010), and the definition, structure, and content of shared leadership are not completely clear yet (Pearce et al., 2008). According to Zhu et al. (2019), the concept of shared leadership emerged from 2004 to 2010 and gained momentum between 2011 and 2017 as one of the major leadership themes. The consistent result is observed in this study; a total of 157 (75.1%) out of 209 articles in the *conceptualization of collectivistic leadership* topic published since 2011. This tendency implies that collectivistic leadership is now a core capability in modern organizations, future leadership studies will be continuously fostered to lay a foundation for the dynamic notion of collectivistic leadership in modern organizations.

Second, the *distributed leadership in school* and *shared leadership in management* topics are the most frequently investigated collectivistic leadership themes in the literature; a total of 586 articles ($\approx 45\%$) are associated with those derived topics. This is in line with the findings of Fairhurst et al. (2020) that distributed leadership and shared leadership are identified as the most popular terms. Modern schools and companies that have been significantly affected by industry changes and technology advances necessitates a new form of leadership through collective efforts from individuals. This indicates that collectivistic leadership becomes a new core competency in schools and companies, and therefore effective collectivistic leadership approaches have been widely discussed in these domains. Scholars may further benefit from current findings by perceiving how collective leadership phenomena are scattered amongst multiple academic disciplines such as education, management, healthcare, and public administration. It also suggests collaborations among disciplines and the necessity of a multidisciplinary approach to plural forms of leadership.

Lastly, the *collectivistic leadership in specific professions* topic is considered as an emerging agenda in recent collectivistic leadership studies although this topic has been relatively less discussed in the literature so far (4.5%; 58 articles). Researchers in various fields has studied the effect of collectivistic leadership in multiple professions. These efforts reinforce and expand the existing research arguing that collectivistic leadership has been emerged and proven

to be effective among workers particularly in the knowledge-based organization (e.g., Carson et al., 2007; Ensley et al., 2006; Hoch et al., 2010; Pearce & Sims., 2002). This topic also suggests the need for specific contextual factors when investigating collectivistic leadership phenomena. Collectivistic leadership is highly sensitive to contextual factors (Ziegert et al., 2021). Thus, researchers need to pay attention to “when” this type of leadership emerges and exists in a particular situation for discovering context-specific aspects of collectivistic leadership. This will also be beneficial to find specific situational boundaries and various outcomes such as the *innovation and complexity in the project* and *organizational learning* topics, which are found as key topics in this study.

This study applies text mining to objectively characterize collectivistic leadership that has been discussed from various approaches in the extant literature. Text mining thus helps researchers review academic literature without subjectively choosing certain building blocks. Nevertheless, text mining may not replace researchers' subjective decisions that must be made as part of a literature review. For example, the number of topics derived from perplexity does not necessarily indicate that the derived topics are interpretable. In addition, text variations for similar expressions and words in leadership studies that may be more observable than scientific and technical studies should be tackled to better fit a topic model. A novel text mining technique that can more precisely capture contextual and semantic similarities among text-based information would be helpful to properly derive underlying topics in collective leadership studies. For future work, the use of the whole text of the literature and other web sources (e.g., news articles) is recommended as it may reinforce the clarity of latent topics scattered in a massive number of collectivistic leadership articles. Since more noise information can be a barrier to capturing meaningful latent topics, a pre-process that can effectively capture meaningful information in the entire text through an advanced machine learning algorithm would be necessary to ensure the performance of topic modeling. Furthermore, future research should explore clear distinction among definitions of various label considering the aspect of each label's primary construct, level of analysis, and academic discipline, etc.

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Appendix A. Top 20 Frequent Terms in Each Leadership Label

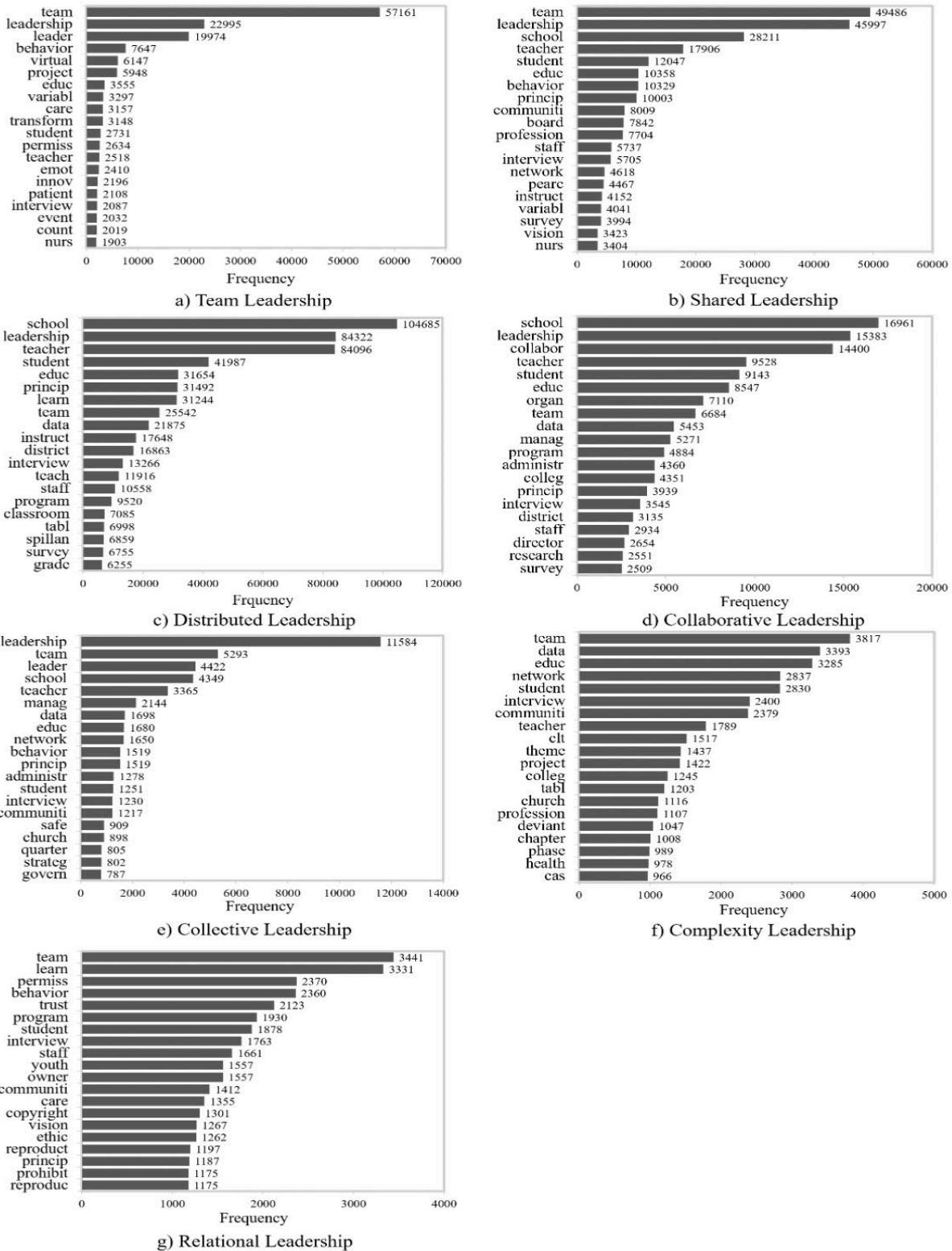


Figure A1. Top 20 frequent terms in each leadership label

CHRONIC HEALTH CHALLENGES: SYSTEMATIC REVIEW LESSONS OF LIFESTYLE THERAPIES

CJ Rhoads, Kutztown University

Roger Jahnke, Fielding Graduate University

Joseph Baumgarden, Physical Therapy, D'Youville University

David Rosenthal, Harvard Medical School

Wen Liu, University of Kansas Medical Center

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ABSTRACT

Evidence on the effectiveness of a variety of integrative medicine or integrative health interventions is growing. These different integrative health interventions (such as healthy lifestyle, healthy food, nutrition, physical activity, mind-body exercises like tai chi, qigong, yoga, and Pilates, meditation, as well as cognitive behavioral therapy) utilize similar underlying metabolic/physiological mechanisms to provide benefits for a variety of preventable chronic health challenges. We systematically searched MEDLINE Complete, Academic Search Ultimate, and Health Source: Nursing/Academic Edition following PRISMA 2020 guidelines and extracted the information found in the resulting studies. Out of the original 892 records, 869 were eliminated as not meeting the criteria, leaving 23 articles to be included in the systematic review.

The preventable chronic health challenges evaluated within the reviewed studies included cancer (5), cardiovascular disease (5), type II diabetes (4), chronic pain (3), obesity (1), stroke (1), depression (2), and multiple chronic illnesses (1). We noted that 18 of the studies (78%) indicated that many integrative health interventions studied were cost effective. The cost-effective interventions included healthy lifestyle, healthy food, nutrition, physical activity, physical therapy, mind-body exercises, acupuncture, naturopathic care, metformin, and cognitive behavioral therapy. Seven of the 18 studies determined that the integrative health methods were not only cost effective, but also resulted in cost savings. The cost saving interventions included healthy lifestyle, physical activity, physical therapy, mind-body exercises, acupuncture, naturopathic care, and cognitive behavioral therapy. Overall, our conclusion was that integrative medicine can be cost effective for chronic health challenges, but more research is needed in the future to definitively confirm this conclusion.

INTRODUCTION

The purpose of this systematic review is to identify the evidence in the literature that supports the economic impact of integrative health interventions in dealing with chronic health challenges. Study of cost effectiveness of various interventions is important for prioritizing healthcare decisions (Youngkong, 2015). The cost effectiveness is not a only a concern relevant to the individual, it also focuses on overall economic benefit to the public in keeping people healthy at an effective cost. When considering health decisions for one person, the resources of the individual can be assessed in conjunction with the proposed health status improvement for that individual. However, when considering health policies for an entire population, we must be mindful of both desired outcomes as well as resources available to address the needs of the population (Hoch & Smith, 2006).

The finding of this systematic review may impact government healthcare agencies, insurance companies, and local community public health systems. The data will enhance communication among health system researchers, policy and decision makers, legislators, practitioners, educators, administrators, students, and other types of allied health professionals.

A chronic health challenge is known by many other names including:

- chronic illness or disease,
- non-communicable disease,
- persistent injury,
- presenting problem,
- persistent condition or ailments

The term **health challenge** was chosen by the investigators of this systematic review. Although illness and disease are more often used in the literature, *health challenge* focuses on overcoming the functional impairment rather than simply diagnosing and labeling. It sets a tone for integrative health interventions to be a wellness-maximization intervention rather than sick-care intervention.

For this study, the health challenge must be chronic – i.e., last more than one year and require ongoing medical attention, or limit the activities of daily living, or both. Chronic health challenges include (but are not limited to) heart disease, stroke, cancer, diabetes, obesity, arthritis, Alzheimer's disease, epilepsy, and autoimmune disorders. These health challenges are not mutually exclusive. Obesity, for example, is often associated with an increased risk of death from all of these other challenges.(Strulik, 2014)

Chronic health challenges are often severe. They are the leading cause of death and disability and have reached epidemic proportions. The cost of treating chronic health challenges is staggering and becoming a larger percentage of the healthcare cost each year as populations grow older.(Raghupathi & Raghupathi, 2018) The four major health challenges (cardiovascular disease, cancer, chronic respiratory disease and diabetes) account for 80% of all premature deaths globally – over 32 million deaths each year. According to the World Economic Forum, we have a narrow window of opportunity to alter this upward trend of premature deaths and increasing health costs. Unless addressed, the world will spend \$30 trillion by 2030 in the treatment of preventable chronic health challenges, representing 48% of global GDP. This will further push millions of people below the poverty line.(Kamineni, 2019)

The National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) in 2022 pronounced "90% of the nation's \$4.1 trillion in annual health care expenditures are for people with chronic and mental health conditions." (NCCDPHP, 2022)

Management of multiple co-existing chronic conditions are especially costly. People with five or more chronic conditions make up 12% of the population but use up 41% of all healthcare spending. On average, they cost 14 times the amount spent on people without any chronic conditions.(Buttorff, Ruder, & Bauman, 2017)

The problem is growing because the number of people with preventable chronic conditions is growing. In 1998 only 62% of elder Americans had multiple chronic conditions, but just 7 years later the percentage jumped to 73%. Additionally, chronic health conditions affect more than just the elderly. In 2006 the percentage of all Americans living with multiple, preventable, chronic illnesses was 28% and has grown even more since then.(DuGoff, Canudas-Romo, Buttorff, Leff, & Anderson, 2014) The problem may become even more pronounced in light of cases of "Long COVID", a chronic illness that persists long after the COVID-19 infection has been mitigated. Additionally, decisions about *how* interventions get implemented does not always get included in studies. It is more complicated than that, as explained by Rycroft-Malone (2015).(Rycroft-Malone, 2015)

Being in a wealthier country (like the United States) appears to make cost of care for chronic health challenges even higher.(Magee, 2019) Some researchers feel that this is because of the disconnected, bureaucratic, and for-profit nature of the current U.S. healthcare system; it unnecessarily uses more than 30% of each dollar in administrative costs and procedures.(Nelson, 2010; Roth, 2010)

Whether in a wealthy or developing country, research about whether integrative health interventions can significantly save public healthcare funds is important knowledge to have and may impact the healthcare system positively. Health-maximization strategies may lead to greater savings than diagnosis-and-treatment strategies while improving care. While there are many proposals for lowering the costs of healthcare, there is little empirical data to suggest which of the many proposals would provide the most efficient and effective answer to the healthcare medical funding crisis and chronic disease dilemma while simultaneously improving both the quality and quantity of a healthy life.(Bauer, Briss, Goodman, & Bowman, 2014; Goldman, Seabury, & Brandon, 2019; Lafronza & Tobe, 2019)

We do know that the current medical system developed to handle broken arms and traumatic accidents is not optimized for the chronic health challenges which are so common and so expensive to treat within the current medical system. The resulting healthcare crisis is negatively impacting national budgets, lowering quality of life and increasing medical costs internationally in both developed and under developed countries.(Thorpe, 2019)

Integrative Health Interventions

One of the most overlooked interventions is behavior-based lifestyle-shifts and wellness practices. Proactive prevention through simple, accessible, low cost, group-based health promotion and wellness activities may be both cost effective and provide better outcomes. Many of those proactive prevention activities fall under the auspices of *integrative medicine*, also known as *integrative healthcare* or *integrative health practices* or *integrative therapies*.(Institute of, McGinnis, Samantha, & Andrea, 2009)

According to the University of Arizona's Center for Integrative Medicine, integrative medicine is healing-oriented medicine that takes account of the whole person, including all aspects of lifestyle.(Andrew Weil Center for Integrative Medicine, 2022) Integrative medicine emphasizes the therapeutic relationship between practitioner and health care user, is informed by evidence, and makes use of all appropriate interventions or strategies including aerobic exercise, strength training, tai chi, qigong, yoga, Pilates, meditation, massage therapy, nutrition, cognitive therapy, weight management and lifestyle coaching as components of a well-rounded multi-disciplinary approach toward a paradigm of chronic wellness rather than continuing to focus solely on acute disease or episodes of chronic illnesses. These interventions had previously been considered Complementary and Alternative Medicine (CAM) and not part of the conventional medical standard of care. Over the past few decades the use of CAM has become increasingly popular throughout the Western Societies as patients seek remedies to supplement conventional medical treatment.(Cassileth & Deng, 2004; Eisenberg et al., 1998; Shen et al., 2002; Tindle et al., 2005) The 2002 National Health Interview Survey (>31,000 US adults) found that 36% of respondents reported using some form of CAM in the previous 12 months.(Barnes, Powell-Griner, McFann, & Nahin, 2004) This has caused many physicians and medical schools to take a closer look and begin to integrate CAM into conventional standards, hence integrative medicine.

While use of integrative medicine is growing, it is still not the most common experience. Patients often ask medical professionals about CAM options, but usually receive relevant information on CAM through family members, friends, and mass media.(Shen et al., 2002) In current health policy doctors are neither expected nor encouraged to, for example, prescribe a series of massages or a Pilates class when faced with a health care user with a back problem. Tai chi or meditation are not prescribed prior to serotonin inhibiting medication when faced with a health care user with anxiety. Patients often seek integrative healthcare interventions after receiving western medicine diagnoses.(Tavares, 2015)

Many experts feel that separating western medicine from complementary/alternative medicine is a mistake, as they should be integrated into a single whole to better serve patients' needs.(Tavares, 2015) Indeed, physicians could even be sued if they vary from conventional standards of care by including integrative health interventions, and multi-disciplinary approaches to solving health problems are only taught in a few progressive medical schools in the United States (though more often part of the curriculum in other countries). The threat of lawsuits is not conducive to good healthcare. As Sloan and Shadle note: "the existence of the threat of a lawsuit does not lead to better outcomes." (Sloan & Shadle, 2009)

In addition, one of the current challenges that today's health services face is difficulty in recruiting a medical workforce, especially in rural areas.(Noya et al., 2022) If integrative health interventions were included more often in health maintenance plans, it might relieve some of the supply issues for health services, similar to the way that some states are encouraging use of nurse practitioners and physician assistants. This greater autonomy enables the healthcare system to be more responsive to health care users.(Stange, 2014)

In general, integrative health focusing on natural and behavioral methods could potentially optimize health and wellness, especially if integrated into the conventional medicine. Evidence for integrative health interventions is growing stronger. But does the growing body of evidence also show an economic benefit of those interventions? That is the question we hope to answer.

Research Questions

The long-term question is how would healthcare costs be impacted if all physicians practiced integrative medicine (including interventions such as qigong, tai chi, massage, nutrition, Pilates, yoga, cognitive behavioral therapy and healthy lifestyle coaching) instead of just a few physicians? If integrative health interventions were taught in all

medical schools as part of the multi-disciplinary approach required for high quality medical care, and included in the legal definition of *Medical Standards of Care*, would healthcare costs go up or down?

Medical Standard of Care is a legal standard, not defined by either custom or current medical practices. The closest to an actual definition is (as stated by Chief Justice C.J. Robertson in 1985 in a landmark malpractice case) "*an obligation, enforceable at law, to use minimally sound medical judgment and render minimally competent care in the course of services*".(Moffett & Moore, 2011) It is the level at which the average, prudent healthcare provider in a given community would practice, enforced legally by the courts and judicial law. Health practitioners who do not follow the medical standard of care are open to allegations of malpractice. It should be noted that medical standard of care, as described in guidelines in a variety of countries, has a large range of variability.(Porzsolt, Rhoads, Manzini, Lobmeyer, & Kaplan, 2019) Some countries already include some integrative health interventions as part of their standard of care, but not in the United States.

Although this long-term question has yet to be answered, and cannot be answered with just this systematic review, it is an extremely important question whether or not revising the Medical Standard of Care by including Integrative Medicine would save either hard costs or soft costs associated with healthcare spending. *Hard costs* are short-term actual dollar savings. For example, we can compare the cost of tai chi or yoga class with the cost of blood pressure medication to determine whether learning tai chi or yoga can reduce the cost by avoiding the immediate cost of blood pressure medication. *Soft costs* are long term dollar savings and short-term indirect savings. For example, a long-term dollar savings from losing weight may include the cost associated with the avoidance of diabetic medications or emergency room visits due to diabetic ketoacidosis in five years. Long term dollar savings would also include avoiding the extra cost of an airplane ticket if the overweight person cannot fit in a single seat. Indirect savings may include the reduced costs related to the loss of productive workdays due to illness, etc.

The first step on this road is to determine if there are any economic benefits to integrative medicine. The investigators ask the following questions regarding the economic impact of integrative health interventions on the cost of healthcare in preparation for the long-term question:

- What studies are available that demonstrate the economic benefits of integrative interventions for the health protection of children and adults from preventable chronic health illnesses?
- Do those studies show a positive economic benefit (i.e. savings) or not?
- If the studies show a positive economic benefit, how much would be saved?
 - How was the amount calculated?
 - Does it include both hard costs and soft costs?
 - Would it save governmental and community health costs as well as individuals?

METHODS

For this research study, investigators have conducted a full systematic review following PRISMA 2020 guidelines on the individual therapies that, as an aggregate, form the practice of integrative health, and extrapolated the information found in the resulting studies. The study is registered #42022288080 with PROSPERO.

Search Methodology

The search methodology was rigorous but flexible. In this section we will share the criteria, search strategy, selection process, data collection process, data extraction, details on some of the components, and synthesis methods.

General Description of Criteria

Investigators reviewed economic studies including those based on randomised or pragmatic controlled design involving any chronic health challenge. Investigators searched for articles on health economics that involved integrative health interventions such as qigong, tai chi, massage, nutrition, Pilates, yoga, and cognitive behavioral therapy. These are all integrative health interventions with a growing body of evidence for efficacy and efficiency for a wide variety of health challenges, many of which are chronic problems. Other integrative health interventions such as acupuncture, chiropractic and meditation were also included when they arose. While these additional integrative health interventions were not excluded, they were not explicitly included in the search term list. They often appeared due to the integrative health or integrative medicine terms.

Search Strategy

Databases available under EBSCOHOST that were full-text were chosen for the search. Originally, we planned to search the following databases: Academic Search Ultimate, AHFS Consumer Medication Information, Business Source Complete, Health source – Consumer Edition, Health Source: Nursing/Academic Edition, MEDLINE, MEDLINE Complete, and Psychology and Behavioral Sciences Collection. However, pre-screening indicated that there were very few (and often zero) results for the search terms in all but three of the databases. Therefore, for this systematic review, we searched just the three with multiple studies; MEDLINE Complete, Academic Search Ultimate, and Health Source: Nursing/Academic Edition. The selection process is described in the PRISMA flow diagram in Figure 1.

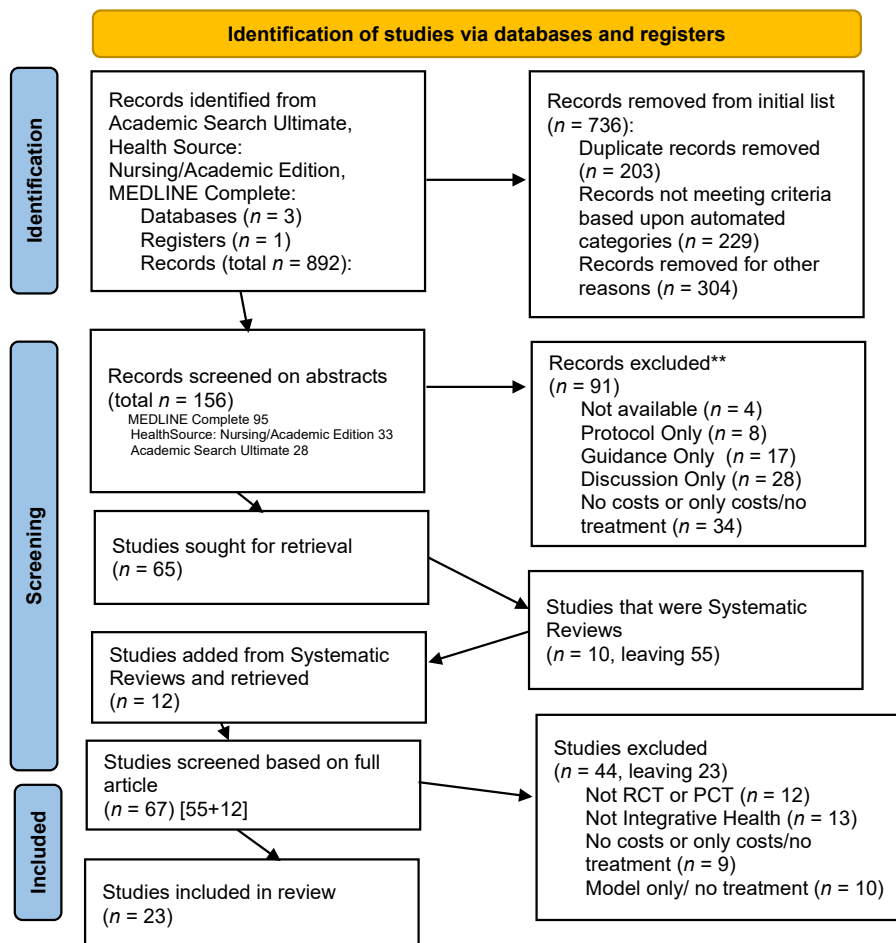


Figure 6. Flow Diagram for selection process

The search terms were:

- "chronic health conditions" or "chronic disease" or "chronic illness" in TEXT
- AND
- "economic" or "cost benefit" in SUBJECT
- AND

- "integrative medicine" or "integrative health" or "alternative medicine" or "complementary medicine" or "yoga" or "tai chi" or "taiji" or "taijiquan" or "qigong" or "massage therapy" or "Pilates" or "nutrition" or "lifestyle" or "exercise" or "cognitive behavioral therapy" or "CBT"
- AND
- NOT "protocol"

For the three databases that had responses (MEDLINE Complete, Academic Search Ultimate, and Health Source: Nursing/Academic Edition), we limited our search for each of the types of articles and the timeline:

For all Databases:

- Full Text
- Scholarly (peer reviewed) journals only
- Between January 2000 and December 2021

Special limiters for Academic Search Ultimate

- Publication type: Academic Journal
- All Languages
- Document Type: Article, Clinical Trial, Case Study, Research, Science Experiment

Special Limiters for Health Source - Nursing/Academic Edition

- Publication Type: Academic Journal, Periodical, Review

Special Limiters for MEDLINE Complete

- Human
- Review Articles
- Publication Type: Systematic Review, Research, Research Support, Randomized Controlled Trial, Pragmatic Clinical Trial, Practice Guideline, Periodical, Meta-Analysis, Journal Article, Controlled Clinical Trial, Clinical Trial, Clinical Study, Adaptive Clinical Trial
- All Languages
-

Selection process

The inclusion criteria for the Systematic Review are:

- Published between January 2000 and December 2021 in an academic or scholarly journal in any language.
- A Random Controlled Trial or Pragmatic Controlled Trial or Other study that describes the economic or cost benefit of using an intervention on a chronic health challenge of youth and/or adults that could be described as integrative medicine or integrative health intervention (alternative medicine, complementary medicine, yoga, tai chi, qigong, massage therapy, Pilates, nutrition, lifestyle changes, exercise, cognitive behavioral therapy among others).

The exclusion criteria for the Systematic Review included the following:

- A protocol, a guideline or discussion-only article
- A qualitative (rather than quantitative RCT or PCT) study,
- A study of only current standard of health care interventions,
- A study without economic or cost information,
- A study of preschool children or infants.
- Published before January 2000 or after December 2021

Out of the original 892 records, 736 were eliminated based upon the category criteria of the specific databases. That left 156 studies that were identified as potentially meeting the criteria. After downloading the 156 abstracts, three investigators independently reviewed the abstracts and decided whether the article might be included or excluded in the final review. The three investigators then compared their lists in a meeting with a fourth investigator, who acted as facilitator of the discussion in order to gain consensus among the three investigators.

After discussion, 91 articles were eliminated because they did not meet the criteria, leaving 65 that were eligible. The full text of the 65 were downloaded, and of those that were eligible, 10 were systematic reviews. The systematic reviews were then examined to determine if any of the underlying studies might fit the criteria, and if they did, they were included. This process revealed 12 studies, making the total number of studies to be reviewed 67. After reviewing the full text, 44 more studies were eliminated as not meeting the criteria, leaving 23 articles to be included in the

systematic review. Eleven of the studies were sourced from systematic reviews and the other ten were directly from the key word search.

Data Collection Process

Once the search was completed and the articles for inclusion were identified, the articles were downloaded in PDF format. Four investigators reviewed and agreed upon the data extraction categories. One investigator did the data extraction of the 23 articles and completed a spreadsheet with the data extracted. After all the information that could be extracted or found was listed for each article, three other investigators reviewed a portion of the list data items and either concurred or disagreed on those items. If there were disagreements, the investigators discussed the issue together as a group until a consensus was reached. After the article draft was written, all investigators reviewed it, revised it, and came to consensus on the written results.

Data Items

Each article was reviewed and categorized on the 23 data items grouped under eight categories: Article Elements, Population, Intervention, Comparison, Study Design, Health Outcomes, Cost Effectiveness and Conclusions.

Grouping	Aspect
Article Elements	Authors (all)
	Corresponding author email
	Year
	Article Category
Population	Number of subjects
	Type of subjects (adults, seniors, children, etc.)
	Mean Age
	Gender
	Country
Intervention	Health Challenge (Condition)
	Description of Intervention
	Duration
	Setting
	Category
Comparison	Subcategory
	Description of Comparison
Study Design	Design of Health Outcome Style (Random Control or Pragmatic Control or other)
	Quality of Economic Assessment Described
	Sensitivity Analysis
Health Outcomes	Description and Measurement of Health Outcomes
	Significant Health Outcome
	Results of Health Outcome
Cost Effectiveness	Cost Effectiveness or Cost Utility
	Other or Additional Design Method
	Source of costs
	Perspective of Economic costs
	Follow-up Time (Cost duration)
	Year for currency
	Monetary Unit
	Economic Results Reported
	Cost Effective?
	Cost Effectiveness Ratio and Details
	Reported Savings
Incremental Cost-Effectiveness Ratio	
Conclusions	Concluding Comments

Twenty-two of the articles were based upon an actual study in addition to an economics analysis, but one article reported only economical assessments without any specific clinical trial study involved. Whenever possible, the details of the study were reviewed. In some cases, the study itself was referenced in a different article that was not available to the investigators of this research, therefore not all the details of the underlying studies are included in this review.

Quality of Study Design and Economic Analysis

Our initial intent was to assess the risk of bias for each random control study utilizing the Cochrane Risk of Bias Assessment, defining *High, Low, or Unclear* for each of the categories:

- Random sequence generation
- Allocation concealment
- Selective reporting
- Other sources of bias
- Blinding (participants and personnel)
- Blinding (outcome assessment)
- Incomplete outcome data

The problem was that Cochrane Risk of Bias Assessment does not apply to economic studies, and not all of the studies provided the necessary information to assess the risk of bias on the underlying study. After discussion, we decided to drop the Cochrane Risk of Bias Assessment in favor of focusing solely on whether the economic assessment met the criteria for the Consolidated Health Economic Evaluation Reporting (CHEERS) assessment. Some studies included the CHEERS check list directly in the study, while others reported enough details as to be considered compliant with the check list.

Synthesis Methods

After all of the data elements were listed in a large chart for all articles, and the investigators had agreed that the data elements listed reflected the information within the article, investigators conducted counts on all data items, searching for patterns and discernible characteristics. Descriptive statistics were generated and discussed.

RESULTS

Study Characteristics

The years of the studies ranged from 1991 to 2020 with most years having only one study, with the top count being four studies in 2019. The number of subjects ranged from 53 to 226,056 (not counting the hypothetical one million subjects in one of the models). The range of the durations of the interventions was from 12 weeks to five years. The economic window duration for estimating follow-up costs ranged from 36 weeks to a lifetime duration.

The studies were from a variety of countries, as shown in Table 1.

Country	Number of studies
Australia	5
China	1
Netherlands	3
Spain	1
Sweden	2
United Kingdom	3
USA	8

Table 6. Country - Source of Study

It is important to know the country of the studies because, as Bordignon and Turati remind us, health services are provided at the *local level*.(Bordignon & Turati, 2009) In Canada and Australia health expenditures are the exclusive

responsibility of the state government (with some federal help). In some countries, such as Spain, Italy, or Sweden, health services are a joint responsibility of the two levels of government.(Bordignon & Turati, 2009)

There were a variety of categories of interventions. Eight articles focused on physical activity, and seven more on generic healthy lifestyle. Four focused on nutrition or healthy eating. Two focused on acupuncture, chiropractic, and massage; two on cognitive behavioral therapy. Only a few interventions included mind-body activities such as tai chi, qigong, yoga, or Pilates and were included in the Physical Activity category since the mind-body activities were usually one of a number of options for physical activity within the study (Table 2).

Category	Number of Articles
Healthy Food	4
Physical Activity	8
Healthy Lifestyle	7
Acupuncture/Chiropractic/Massage	2
Cognitive Behavioral Therapy	2

Table 7. Categories of Integrative Health Interventions

Other study characteristics can be found in Table 3. Two of the studies had children as the subjects. The other twenty-one studies were on adults. Of those, three focused on older adults. Of those who disclosed the number of real subjects (i.e. not counting the hypothetical subjects), there were 192,789 males and 47,541 females, for a total number of 240,330 subjects.

The health challenges that the subjects faced within the studies included cancer (5), cardiovascular disease (5), type II diabetes (4), chronic pain (3), obesity (1), stroke (1), depression (2), and multiple chronic illnesses (1), as can be seen in Table 6. To facilitate reading and comparing the tables of voluminous information, we established an Article Code combining the last name of the primary author with a short phrase connoting the intervention and the health challenge. This code is used in all the tables.

The setting for the studies included Community (14 studies), Hospital-Outpatient (5 studies), Hospital-Inpatient (1 study), School (2 studies), and Fitness Center (1 study). The individual descriptions of the interventions and their settings can be found in Table 7, found in the Appendix.

Of those that reported results from randomized control trials, five of the controls were alternative interventions (such as social support, talk therapy, relaxation program, or metformin), thirteen were usual care, and four were none or a placebo. Two of control group described as usual care were characterized simply as follow up office visits. One could argue that this might also be considered "no intervention" and is indicative of the difficulty of treating chronic health challenges. The categories of the interventions and the descriptions of the comparisons can be found in Table 8, found in the Appendix.

The study design for the 15 health outcomes studies that disclosed the study design were mostly (11 studies) randomized control trials. Of the four remaining, the study designs were considered pragmatic, though one was referred to as a "randomized pragmatic" and the other was a "pragmatic randomized." The distinction was not explained.

Of the 23 studies, 6 included the CHEERS checklist in the article, and 17 did not disclose whether they complied with the CHEERS standard or not. Of those, two reported enough details and appeared that they would have fulfilled all the requirements for CHEERS (noted as "Implied" in Table 3). Sensitivity Analysis was done in 16 of the studies.

A detailed description of the Health Outcomes is listed in Table 9 found in the Appendix. If the investigators described on one or more of the health outcomes as "significant", the intervention is listed on this table (often using the abbreviation found in the Interventions table). Sometimes the paper did not actually report on the underlying study, or the economic analysis was not based upon an underlying study.

The type of economic study design was Cost Effectiveness Analysis (CEA) for nine of the studies, and Cost Utility Analysis (CUA) for eleven. The three-remaining referred to just a Cost Analysis (2) or an Interrupted Time Series Analysis (1). Fourteen of the studies reported economic findings from a societal perspective, fourteen of the studies

reported economic finding from a health perspective, four from the health care user perspective, and two from the employer perspective. The type of cost analysis, the source of the costs, and the perspectives of the studies can be found in Table 10 found in the Appendix. This table also shows the range of the currency years from 1998 to 2018.

There were seven difference currencies (\$AUD, \$USA, £GPS, £UK, ¥RMB, €EUR, rkSEK) included. The economic results that were reported along with the cost effectiveness ratio, reported savings, and the incremental cost effectiveness ratio (if reported) can be found in Table 11 found in the Appendix.

In Table 4, a concluding comment for each study is listed.

Article Code	Design of Health Outcome Style (if concurrent)	Quality of Economic Assessment (CHEERS)	Sensitivity Analysis?
Chatterton_DietaryInterventionForDepression	Random	Implied	Yes
DiabetesPrevention_LifestyleOnDiabetes	Random	DND*	Yes
Fayet-Moore_FiberIntakeCostAnalysisDiabetes	NA*	Yes	NA
Fusco_RehabAfterHipReplacement	Random	Yes	Yes
Gao_LifestyleModificationStemCellTransplantSurvivors	NA	DND	Yes
Georgiou_ExerciseForHeartDisease	Random	DND	Yes
Gordon_ExerciseforBreastCancerPatients	Random	DND	Yes
Haines_MultimodalExerciseForBreastCancerPatients	Random	DND	Yes
Herman_IntegrativeHealthforPain	NA	Yes	Yes
Herman_NaturopathicForBackPain	Pragmatic Randomized	DND	Yes
Holman_CBTforDepressedOlderPeople	Random	DND	Yes
Jardim_HealthyEating_CardiometabolicDisease	NA	Yes	No
Levin_CardiacRehabilitationCostAnalysis	Pragmatic	DND	Yes
Lindgren_PhysicalActivityforCVD	NA	DND	Yes
Luciano_CostUtilityCBTforFibromyalgia	Random	Yes	Yes
May_ExerciseBreast&ColonCancerPatients	Randomized Pragmatic	Implied	Yes
McKnight_EffectivenessOfHealthyLifestyleProgram	Pragmatic	DND	No
Meng_CostEffectivenessNutritionPhysicalActivity	Random - Two Step Cluster Sampling	DND	No
Oosterhoff_LifetimeEconomicsHealthyLifestyleForChildren	NA	Yes	No
Sevick_LifestyleForObesity	Random	DND	Yes
Sonik_IncreasedFoodDecreasedHealthcareCosts	NA	DND	DND
Verhoef_CostEffectivenessGymMembership	NA	DND	Yes
Wart_CostUtilityAndCost-effectivene	Randomized - separate linear regressions adjusted for baseline values and chemotherapy duration	DND	Yes

Table 8. Quality of Design

* NA is Not Applicable and DND is Did Not Disclose

Concluding Comments	
Chatterton_DietaryInterventionForDepression	Fewer visits to non-mental health professionals suggests that a dietary improvement strategy may have multiple benefits that translate to wider health and wellbeing outcomes. The average utility values for this cohort, .47 at baseline, were lower than the population (.83), but average for individuals with depression. The analysis provides preliminary data to support the cost-effectiveness of a dietary support intervention as an adjunct to medication and psychological care for people with depression.
DiabetesPrevention_LifestyleOnDiabetes	This 3-year within-trial economic analysis of the DPP demonstrated that the lifestyle and metformin interventions are cost-effective. These analysis should assist health plans and policy makers in comparing the benefit of diabetes prevention to other prevention and palliative interventions. The adoption of diabetes prevention programs in health plans will likely result in important personal and member benefits at a reasonable cost and over a short period of time.
Fayet-Moore_FiberIntakeCostAnalysisDiabetes	Substantial economic savings could be realized with an increased intake of dietary fiber. The savings were greater for groups with low socioeconomic status and for those with low dietary fiber intake.
Fusco_RehabAfterHipReplacement	Accelerate physiotherapy significantly improves health-related quality of life and may reduce costs in resurfacing hip arthroplasty male patients. A tailored protocol for rehabilitation in resurfacing hip arthroplasty patients is very likely to offer a cost-effective use of resources (the probability of it being cost effective at a willingness to pay value of 5000 per QALY).
Gao_LifestyleModificationStemCellTransplantSurvivors	Cost effective for people who were overweight at baseline. Not cost effective in the base case. However, the cost effectiveness is probably understated given the lack of consideration of other potentially clinically significant benefits of the program other than weight loss.
Georgiou_ExerciseForHeartDisease	Present findings have no precedence in current literature so no direct comparison could be established. Using familiar categorization scheme (≤ 20000 as cost effective), at the cost of \$1773 per year of life saved is designated as "very attractive" intervention.
Gordon_ExerciseforBreastCancerPatients	Exercise intervention for women after diagnosis for breast cancer may be cost-effective if society is willing to pay approximately 300 per month. Exercise is fast becoming considered an evidence-based adjuvant treatment for cancer, and their findings highlight its potential affordability.
Haines_MultimodalExerciseForBreastCancerPatients	Considerable number of participants took up other forms of exercise, and the control group sham intervention may have had beneficial effects. It is also possible that the MME group participants had extracted all the physiological gains to be had from the program by the 3 month assessment, and more intensive or individualized exercises would be required for further gains.
Herman_IntegrativeHealthforPain	In a cohort of younger Veterans with chronic pain during 2010 - 2013, any use of Complementary Integrative Health intervention was not only cost-effective, it was cost saving. Any use of CIH was associated with an average reduction in healthcare costs of \$637, a .34-point reduction in pain intensity on a 1-10 pain scale, and a less than 1 percentage point increase in opioid use during the year after CIH started.

Concluding Comments	
Herman_Naturopathic ForBackPain	The economic evaluation alongside a pragmatic randomized control trial shows naturopathic care to be more cost-effective than a standardized physiotherapy education regimen in the treatment of chronic low back pain from the societal, employer, and participant perspectives.
Holman_CBTforDepressed OlderPeople	CBT is more likely to be cost effective compared with treatment as usual for older people presenting with depression in primary care, assuming a willingness to pay threshold of more than 115 per point reduction in BD1-II score.
Jardim_HealthyEating_CardiometabolicDisease	The 1-year estimated CMD costs per capita associated with an unhealthy diet in the US among those aged 35-85 years is \$301, translating to a population total cost of \$50.4 billion. Considering the high annual costs associated with CMD in the US that we estimate to be attributable to suboptimal diet, the participation of the government as the majority payer of such costs, these findings should motivate the healthcare and policymaking communities to implement strategies to reduce this financial and health burden.
Levin_CardiacRehabilitation CostAnalysis	Owing to the higher rate of return to work in the rehabilitation group, the NHIS was the clear winner with regard to the program, and saved almost 50000 per patient. Even if the healthcare system also saved resources (7630 during the 5 yr. period), there could be a shortage of financial resources in the system. In that case, it provides a strong incentive the the NHIS to finance the particular costs of the rehabilitation program. There is also incentive for the NHIS to compensate patients for the increased costs related to the rehabilitation program which would increase the rate of compliance.
Lindgren_PhysicalActivity forCVD	Based upon the predictions of the model, dietary advice appears to be a cost-effective strategy among 60-year-old men. This is regardless of whether the study perspective is societal or health care payers.
Luciano_CostUtility CBTforFibromyalgia	The results of the present work support that group DBT as a stand-alone intervention is cost-effective compared to FDA-recommended drugs and usual care. Therefore, a wider implementation of CBT programs in group format for FM patients within the public provision of healthcare in Spain in recommended.
May_ExerciseBreast& ColonCancerPatients	Our results indicated that physical exercise could be cost-effective for colon cancer. For breast cancer the higher costs of the intervention added costs. It might be worthwhile to loo for possibilities to lower program costs, for example, by offering the exercise program to larger groups and community centers instead of hospitals.
McKnight_EffectivenessOf HealthyLifestyleProgram	The FFL program showed consistent statistically and clinically significant weight loss results between 2009 and 2017. Participants lost between 2.7 kg and 4.8 kg (between 3.2% BMI and 4.8% BMI). Cost effectiveness ranged between \$73 and \$101 per kg lost contingent on class size. FFL was lower cost than some other commercial weight loss interventions, but more expensive that some other interventions such as multi-sensory armbands. From a policy perspective, funding these types of weight management and lifestyle interventions, especially in rural jurisdictions, could prove extremely productive and cost-effective.

Concluding Comments	
Meng_CostEffectiveness NutritionPhysicalActivity	The school based integrated intervention was cost-effective to improve BMI in school children and had the potential to be effective for childhood obesity prevention in urban China.
Oosterhoff_LifetimeEconomics HealthyLifestyleForChildren	Given the societal benefits and the Dutch threshold for prevention, HPSF is a marginally cost-effective strategy for combatting the lifetime burden associated with unhealthy lifestyles when assuming constant relative effects. In addition, HPSF has the potential to reduce health inequalities over the lifespan. Implementation is, however, associated with uncertainty. HPSF will not result in a win-win situation if the effects fade out during adolescence and/or effects are only maintained among children with a high socioeconomic background.
Sevick_LifestyleForObesity	A behaviorally-based <i>lifestyle</i> intervention approach in which participants are taught behavioral skills to increase their physical activity by integrating moderate intensity physical activity into their daily lives is generally more cost-effective than a <i>structured</i> exercise program in improving physical activity and cardiorespiratory health.
Sonik_IncreasedFood DecreasedHealthcareCosts	The costs of SNAP increases were partially offset by Medicaid savings, especially for beneficiaries with chronic illnesses who typically have elevated costs of care. Because of the link between additional SNAP benefits and reduced hospital admissions, it appears the allotment amounts before the SNAP increase may not have been sufficient to fully alleviate food insecurity and its associated health effects.
Verhoef_CostEffectiveness GymMembership	Provision of free leisure center membership to physically inactive members of the public receiving state benefit or those identified as being inactive could represent good value for the money, but is highly dependent on the long-term effects of leisure center membership on physical activity, uptake compliance and the impact of physical activity on mental wellbeing.
Waart_CostUtilityAnd Cost-effectivene	OnTrack could be considered cost effective in comparison with usual care for QALYs and for general and physical fatigue depending on decision-makers willingness to pay. Onco-Move is not likely to be cost-effective. Compliance with the training protocol was found to be associated positively with the probability of intervention cost-effectiveness.

Table 9. Concluding Comments for each study

Answers to Research Questions

The research questions asked in this study are:

- What studies are available that demonstrate the economic benefits of integrative health interventions for the health protection of youth and adults for preventable chronic health illnesses?
- Do those studies show a positive economic benefit (i.e. savings) or not?
- If the studies show a positive economic benefit, how much would be saved?
 - o How was the amount calculated?
 - o Does it include both hard costs and soft costs?
 - o Would it save governmental and community health costs as well as individuals?

The first question is answered by the 23 studies that met the criteria and evaluated the economic costs of integrative health interventions of preventable chronic health illnesses.

The second question does not have a simple yes/no answer. There are many phases and issues to the answer regarding economic benefit. Nonetheless, in each of the studies the investigators made a determination based upon the economic results of the study as to whether or not the investigators believe that *overall* the intervention studied *is* or *is not* cost effective. Recognizing the complexity of evaluating health costs and designing studies with integrative health interventions, our overall determination was that we found that 18 of the studies (78%) indicated that at least one of the integrative health interventions studied *is* cost effective. The cost-effective interventions included healthy food, metformin, physical therapy, healthy lifestyle, physical activity, mind-body, acupuncture, naturopathic care, cognitive behavioral therapy, and nutrition. Three studies indicated that one of the integrative health interventions studied *is not* cost effective (general nutrition, aerobic/strength/ resistance exercises, and fitness center participation), and two did not clarify or could not make a determination (increased fiber and optimal diet). Seven of the 18 studies determined that the integrative health methods were not only cost effective, but also cost saving. The cost saving interventions included physical therapy, healthy lifestyle, physical activity, mind-body & acupuncture, naturopathic care, and cognitive behavioral therapy. The list of studies and their determinations can be found in Table 5.

Study Code (Author-Topic)	Cost Effective?
Chatterton DietaryInterventionForDepression	Yes for Mediterranean Diet
DiabetesPrevention LifestyleOnDiabetes	Yes
Fayet-Moore FiberIntakeCostAnalysisDiabetes	NA
Fusco RehabAfterHipReplacement	Yes
Gao LifestyleModificationStemCellTransplantSurvivors	Yes
Georgiou ExerciseForHeartDisease	Yes
Gordon ExerciseforBreastCancerPatients	No
Haines MultimodalExerciseForBreastCancerPatients	No
Herman IntegrativeHealthforPain	Yes
Herman NaturopathicForBackPain	Yes
Holman CBTforDepressedOlderPeople	Yes
Jardim HealthyEating CardiometabolicDisease	Yes
Levin CardiacRehabilitationCostAnalysis	Yes
Lindgren PhysicalActivityforCVD	Yes
Luciano CostUtilityCBTforFibromyalgia	Yes
May ExerciseBreast&ColonCancerPatients	Yes
McKnight EffectivenessOfHealthyLifestyleProgram	Yes
Meng CostEffectivenessNutritionPhysicalActivity	Yes
Oosterhoff_LifetimeEconomicsHealthyLifestyleForChildren	Health Perspective - No. Society Perspective – Yes
Sevick LifestyleForObesity	Yes
Sonik IncreasedFoodDecreasedHealthcareCosts	DND
Verhoef CostEffectivenessGymMembership	No
Wart CostUtilityAndCost-effectivene	Yes

Table 10. Overall Cost Beneficial?

For the third and last question, unfortunately, each individual study must be reviewed. There were too many variations in currency, year, and cost collection methods to group and identify insights regarding how much savings might accrue based on aggregate finding. Especially difficult is dealing with the concept of a *statistical life*, on which many quality of life economic valuations are based. (Bellavance, Dionne, & Lebeau, 2009) Note that in the narrative description of costs we paid special attention to how those costs were gathered and exactly which costs were included. We felt this was necessary because cost information for health expenditures and integrative health interventions is so complex. The estimated savings reported for each study can be found in Table 9 found in the Appendix.

Given the complexity in estimating the cost, it is important to clarify the levels of accuracy and reliability for the sources of the cost data. We judged that economic costs studies would be more likely to be accurate and reliable if they utilized a *variety* of sources. The best source is actual costs based on private records or data, but that is only available for a subset of costs. Self-assessment on costs could also be used but are subject to issues of memory and bias. Finally, estimates based on public records could be used but again are best used in combination with other sources. Only two studies utilized costs from all three types of sources [(van Waart et al., 2018) and (Chatterton et al., 2018)]. Most studies (n=13) relied upon only one type of source for cost data, and eight studies combined cost data from two types of sources.

The results generally support the notion that integrative health interventions are both beneficial and economical. Some research evidence in the literature was strongly supportive.

CHALLENGES AND INSIGHTS

This systematic review presented many challenges but revealed many insights. In the following, we will highlight integrative health interventions that were found to be cost effective, delve more deeply into those that were also cost saving, and discuss possible reasons for those integrative health interventions that were not found cost effective. We will also share some insights into the impact of the study design on some study results, including the economic study results.

Cost Effective, but not Cost Savings

While cost effective means that the intervention does not cost any more than the control intervention, cost savings means that the intervention actually cost less for the same or better outcome. Seven of the studies calculated a cost effectiveness level using willingness to pay or a cost effectiveness ratio per unit of health measure but did not actually calculate cost savings.

The Diabetes Prevention program clearly shows that the adoption of diabetes prevention programs in health plans is cost effective and most likely will result in important personal and member benefits at a reasonable cost over a short period of time, but did not estimate actual savings. This study was done almost twenty years ago, and most health plans today have already taken the advice and adopted prevention programs. An update might reveal cost savings now. (Diabetes Prevention Program Research, 2003)

Holman, et al, found that cognitive-behavioral therapy is more likely to be cost effective compared with care as usual for older people presenting with depression in primary care. However, the study used a model rather than an intervention group and did not calculate the amount of savings. (Holman et al., 2011) Similarly, Lindgren, et al, found that dietary advice appears to be a cost-effective strategy among 60-year-old men regardless of whether the study perspective is societal or health care payers. They did not estimate the savings since their study was based upon the predictions of a model. (Lindgren et al., 2003)

McKnight, et al, noted that funding weight management and lifestyle interventions, especially in rural jurisdictions, could prove extremely productive and cost-effective, but they were speaking only from a policy perspective and did not calculate actual savings. (McKnight et al., 2018) Meng, et al, noted that school based integrated intervention was cost-effective to improve weight in obese school children but there were no actual savings reported. (Meng et al., 2013) Sevick, et al, determined that all behaviorally-based lifestyle interventions was generally more cost-effective than a structured exercise program but again, no cost savings was discussed. (Sevick et al., 2000)

Wart, et al, reported that the likelihood of cost effectiveness for one of the two physical activity interventions in breast cancer patients was low, primarily due to low compliance of the participants to the intervention. The higher the compliance, the higher the likelihood that the integrative health intervention would be cost effective.(van Waart et al., 2018)

Cost Savings

Nine of the studies indicated that savings could happen with the right intervention. Fusco, et al, found that accelerated physiotherapy is not only likely to improve the clinical quality of life outcome of health care users following resurfacing hip arthroplasty, but represents good value for the investment.(Fusco et al., 2019) Gao, et al, found savings for stem-cell transplant survivors who were overweight.(Gao et al., 2017) Georgiou, et al, concluded that exercise is a "very attractive intervention" cost-wise.(Georgiou et al., 2001)

Herman, et al, (2019) made a clear case that integrative health interventions were not only cost effective to help veterans with muscular-skeletal pain, but also cost saving.(Herman et al., 2019) In a different study on naturopathic care of low back pain, Herman, et al, (2008) reported cost effective results from societal, employer, and participant perspectives.(Herman et al., 2008)

Jardim, et al, estimated the savings of eating a healthy diet and noted that the cost associated with an unhealthy diet was over \$50 billion in U.S. each year. They felt that since the government was the major payer of the costs, this information should motivate healthcare and policy making communities to implement policies and strategies to reduce this high cost.(Jardim et al., 2019)

Levin, et al, found that government healthcare costs was the "clear winner" in a study that increased physical activity in cardiac patients because they returned to work earlier and also had fewer repeated heart attacks. They felt that the results were strong enough that government should sponsor the costs of extended rehabilitation for cardiac patients.(Levin et al., 1991) May, et al, found similar results for health care users with colon cancer. They felt that using larger groups in the community instead of smaller groups within the hospitals might also reveal savings for health care users with breast cancer as well.(May et al., 2017)

Luciano, et al, felt the cost savings were strong enough that cognitive-behavioral therapy in a group format should be recommended for patients with fibromyalgia.(Luciano et al., 2014)

Potential Reasons for Lack of Cost Effectiveness

Of the three studies that found their interventions not cost effective, the investigators had suggestions for what might have changed the outcome. Gordon, et al noted that exercise intervention for women after diagnosis of breast cancer may be cost-effective if society is willing to pay for a longer term of the intervention even though the intervention appeared not to save money in the short term. They did note that the findings highlight its **potential** affordability if the program could be provided less expensively.(Gordon et al., 2017) Haines, et al, did not find cost effectiveness in part because of the considerable number of participants who took up other forms of exercise outside of the study. They also noted that the control, a sham intervention, may have had beneficial effects. They also thought it possible that the participants in the intervention group might have extracted all the potential physiological gains from the program by the 3-month assessment (where it was found to be cost effective), and that a more intensive or individualized exercises might have enabled further gains.(Haines et al., 2010) Verhoef, et al, found that free gym membership for physically inactive members of the public receiving state benefit *could* represent good value for the money, but that it was highly dependent on the long-term effects and whether or not the people took advantage of the membership in order to gain the benefit of health and well-being.(Verhoef et al., 2016)

Disappointed in Variety

Overall, we were disappointed in the limited variety of integrative health interventions studies that included a cost effectiveness component. The most common integrative health intervention studied was just plain exercise. Very few studied mind-body interventions for cost effectiveness despite the fact that mind-body interventions appear to be developing a strong body of evidence for health benefits. We believe that if more economic studies were done on mind-body therapies, they may reveal more promise as a cost effective intervention than simple exercise. We highly recommend researchers to focus on these areas.

Design of the Companion Studies

One issue became clear as we reviewed the integrative health studies upon which the economics studies were based: study design issues. The current guidelines for assessing quality of study design and level of bias are advantageous for pharmaceutical and medical device studies, but not for behavioral therapy such as physical exercise, yoga, Pilates, tai chi or qigong. (Aldridge & Kelley, 2015) In order to assess the true level of quality and bias fairly and adequately in behavioral therapy studies, which often require a pragmatic control rather than a random control, new guidelines need to be developed. Investigators may also consider using the following methods (recommended by the ASKLEPIOS research group (ASKLEPIOS, 2015)) to conduct a double-blind, randomized controlled trial study so that the results might be less likely to be dismissed due to the study design:

- Identify each intervention and the control with a highly-documented set of movements in a certain sequence accompanied by certain thought patterns.
- Include documentation of *exactly* what was done, including dosage and duration, in the study design and publication.
- Eliminate the esoteric terminology of the interventions. Do not use the traditional names of the movements or utilize non-medical terms and concepts in their explanation.
- Utilize controls that don't mimic the movement/breath/intention being studied.
- Utilize biomarkers as measurements whenever possible in addition to quality of life and other self-assessments.
- Make sure neither the person measuring the outcome, nor the person receiving the health intervention, should know which health intervention they are receiving.
- Be sure to describe the protocols used to ensure that the health intervention remains double-blinded.

For example, instead of using the terms and descriptions of the traditional tai chi or qigong interventions, researcher can establish that Health Intervention 1 follows a certain sequence of movements accompanied by certain breathing interventions and thought patterns and Health Intervention 2 follows a different set of movements in a certain sequence accompanied by certain thought patterns. Under the covers, Health Intervention 1 might actually be the Evidence-Based Taijiquan form developed specifically for research, and Health Intervention 2 might be a set of Hatha Yoga postures. As long as the terminology is only Health Intervention number, movement, breath, and intention, (i.e. the subjects are not told whether they are following Health Intervention 1 or Health Intervention 2, and what each Health Intervention is based upon), the subjects would be blinded to which group they are in. Of course, researchers may require an additional passive control group, Health Intervention 3, in which the participants might be under usual care, nothing at all, or receiving health education. This would enable the double-blinding of the Health Intervention and randomized control in order to increase the credibility of the results.

As one can imagine, it is much more difficult and expensive to establish double-blind protocols for a behavioral-based integrative health therapy than a simple pill. Given that integrative medical research studies often receive limited funding, it is understandable that many studies rely on study protocols that are not double-blinded. In comparison, the pharmaceutical industry is very well-funded, and pills are extremely easy to double-blind. It would be advantageous for both the economics researchers and the medical community to establish strong control protocols that work as well for non-pharmaceutical and non-surgery therapies so that valid comparisons can be made.

In the meantime, researchers would do well to pay heed to qualitative and observational studies. The relationship among research and medical standard of care and public policy are not the idealized straight-forward linear connections, but rather more conceptual in nature. There is no reason to wait to begin to integrate some of the less-costly, safe integrative healthcare interventions into a patient's care. Often, interpretive qualitative methods are more important than quantitative research when establishing standard of care and public policy.(Verboom & Baumann, 2022) Indeed, some researchers have revealed that there is a dynamic network of interactions between the social values of the community and various components of the health system that should be taken into account when evaluating study design and results.(Whyle & Olivier, 2021)

Another issue raised during our review is the reproducibility of the therapy. With a pill, the dosage and frequency are easy to replicate by any physician. With behavioral therapy, the same is not true. There is a checklist, the Consensus on Exercise Reporting Template, that could (and should) be used by researchers reporting on activity and behavioral-based therapies.(Slade, Dionne, Underwood, & Buchbinder, 2016; Slade, Dionne, Underwood, Buchbinder, et al., 2016) Unfortunately, few reviewed studies used this guideline. Zhang, et al, reviewed 27 studies focused solely on

whether or not there were enough details in the study to replicate the interventions. They found that not a single study reported sufficient details on the Consensus Exercise Reporting Template checklist.(Zhang, Roster, Hays, & Wang, 2021)

Overall, both economic and health researchers have been accused of not meeting the needs of the patients and aggravating the current inequities and shortcomings of the existing health financing methods.(Redman, 2019) It may be that this problem may continue given the influence of what has been called the *Medical-Industrial Complex*, which is controlled by the business needs of the pharmaceutical and device companies. Business needs do not necessarily benefit by a healthier population since healthy people spend less on healthcare rather than more. (Magee, 2019)

Limitations

One limitation of this systematic review was the availability of a wide variety of integrative health economic studies for chronic health challenges. Initially we thought that perhaps the limitation was related to the databases that we surveyed, but further reflection showed that there simply weren't that many studies on integrative medicine or integrative health on chronic health issues that included economic cost effectiveness results. Another thought was the insistence of the term "chronic" in the search, as perhaps researchers might not necessarily use that term when conducting research on cancer, or heart attacks or other problems that we now know are often chronic health issues. For example, one seminal article that we would have expected to appear in the list was Herman, et al, (Herman, Poindexter, Witt, & Eisenberg, 2012), but apparently because the term "chronic illness" was not utilized in the article, it did not appear in our search to be reviewed.

In any case, we would hope that more researchers who work on integrative health interventions and/or chronic health challenges would consider adding a side project on the cost effectiveness of the therapy so that in the future there will be more studies on the cost effectiveness of a wider variety of integrative health therapies on various chronic health problems.

Another limitation of this study was the wide variety of timeframes, currency, and descriptions of cost sources which made it unfeasible for any attempt at standardizing the actual costs so that they could be directly compared. We tried to convert all the currencies, for example, but soon found the resulting numbers were less-than-helpful and possibly misleading.

Finally, and perhaps most importantly, is that we were unable to fully evaluate the quality and bias of either the underlying studies or the economic studies beyond reporting whether they followed CHEERS checklist. The information simply wasn't reported clearly enough for us to feel comfortable making those judgements. We felt that the information we did gather, in an organized and formatted account, was valuable enough that other researchers, should they so choose, could build upon it. Much more work such as this must be done.

Next Steps

First, we hope that integrative health researchers will take up the call to add economic components to their research so that the next systematic review will reveal the economics of a wider variety of behaviorally-based integrative health interventions. As researchers, we would think that future integrative therapies randomized protocols should include an evaluation of the economic value; saved costs minus the cost of the intervention.

Second, more studies should be developed, perhaps by the numerous small and large health organizations (both for-profit and non-profit) that are already in the integrative healthcare field. The therapies, platforms and products utilized by these organizations should be evaluated using **rigorous** research methods so that these therapies can be leveraged, if appropriate, toward a more health-oriented health care system. More work needs to be done to help these organizations take advantage of rigorous research tools.

Third, based on the foundational concept that total population health enhancement is desirable for both economic and society wide benefit, the investigators intend to develop a financial model to demonstrate these benefits comprehensively. Clarifying the costs (both hard and soft costs) of integrative health interventions within the usual standard of care guidelines will impact important policies that will be beneficial for everyone. Our plan is to focus on public health costs where changes may provide the most value for the least outlay of funds. These results would be of extreme interest to both government agencies in the interest of public health and private sectors in the interest of health insurance payers. The outcome, of course, would be increased well-being and productivity for the entire community.

CONCLUSIONS

Overall, our conclusions were that integrative health interventions such as healthy lifestyle, healthy food, nutrition, physical activity, mind-body exercises (tai chi, qigong, yoga, and Pilates, meditation), as well as cognitive behavioral therapy is most likely cost effective for a wide variety of preventable chronic health challenges, but more definitive research is needed to confirm these conclusions. Despite some of the difficulties in doing economic health research of this type, reviewing the actual studies, and comparing the data presented in this systematic review, we conclude that in most cases, it would make sense to include integrative medicine in health policy guidelines and patient care.

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APPENDIX

Populations and Study Characteristics							
Article Code	Reference	Number of subjects	Type of subjects	Mean Age	Gender	Country	Health Challenge (Health Condition)
Chatterton_DietaryInterventionFor Depression	(Chatterton et al., 2018)	67	Adults	40.3	M-19, F-48	Australia	Depression
DiabetesPrevention_LifestyleOnDiabetes	(Diabetes Prevention Program Research, 2003)	3234	Overweight Adults 25 yrs. or older with impaired glucose tolerance (IGT, pre-diabetes)	51	M-1035, F-2199	USA	Diabetes
Fayet-Moore_FiberIntakeCostAnalysisDiabetes	(Fayet-Moore et al., 2018)	9341	Adults ≥ 19 years old	NA	NA	Australia	Cardiovascular Disease and Type 2 Diabetes
Fusco_RehabAfterHipReplacement	(Fusco, Campbell, & Barker, 2019)	80	Males with resurfaced hip arthroplasty	55.8	M-80, F-0	United Kingdom	Hip Disfunction
Gao_LifestyleModificationStemCellTransplantSurvivors	(Gao, Moodie, Brown, & Avery, 2017)	53	Overweight Adults treated with hemopoietic stem cells for blood cancer	49.2	M-24, F-28	Australia	Blood Cancer
Georgiou_ExerciseForHeartDisease	(Georgiou et al., 2001)	DND	Adults age 55-64 with class II & II heart failure	DND	DND	USA	Chronic heart failure
Gordon_ExerciseforBreastCancerPatients	(Gordon et al., 2017)	194	Adult Females with Breast Cancer	52	M-0, F-194	Australia	Breast Cancer
Haines_MultimodalExerciseForBreastCancerPatients	(Haines et al., 2010)	89	Adult Females with Breast Cancer	55.05	M-0, F-89	Australia	Breast Cancer
Herman_IntegrativeHealthforPain	(Herman et al., 2019)	226056	Veterans in chronic pain	NA	M-186762, F-39294	USA	Chronic Pain
Herman_NaturopathicForBackPain	(Herman, Szczurko, Cooley, & Mills, 2008)	70	Adults with low back pain	46.5	M-52, F-18	Canada	Chronic Pain
Holman_CBTforDepressedOlderPeople	(Holman, Serfaty, Leurent, & King, 2011)	198	Older adults (> 65 years old)	74.1	M-36, F-162	UK	Depression
Jardim_HealthyEating_CardiometabolicDisease	(Jardim et al., 2019)	1,000,000	Adults between 35 - 85 years old stratified on sex, race/ethnicity, education, health insurance, & BMI	54.9	M - 473000, F-527000	USA	Cardiovascular Disease and Type 2 Diabetes (CVD)

Populations and Study Characteristics							
Article Code	Reference	Number of subjects	Type of subjects	Mean Age	Gender	Country	Health Challenge (Health Condition)
Levin_CardiacRehabilitationCost Analysis	(Levin, Perk, & Hedbäck, 1991)	305	Adults below 65 yrs. who had suffered a heart attack	57.25	M-258, F-47	Sweden	Myocardial infarction
Lindgren_PhysicalActivityforCVD	(Lindgren, Fahlstadius, Hellenius, Jönsson, & de Faire, 2003)	160 Males for Health Intervention study, 813 for economic study	Adults who have not had a heart attack	NA	M-160, F-0	Sweden	Cardiovascular events, High Blood Pressure, High Cholesterol, Smoking, Left ventricular hypertrophy, Glucose Intolerance
Luciano_CostUtilityCBTforFibromyalgia	(Luciano et al., 2014)	168	Adults with Fibromyalgia	46.8	M-9, F-159	Spain	Fibromyalgia
May_ExerciseBreast&ColonCancerPatients	(May et al., 2017)	237	Adults with either breast cancer or colon cancer	54.0	M-0, F-237	Netherlands	Cancer (breast or colon)
McKnight_EffectivenessOfHealthyLifestyleProgram	(McKnight, Demuth, Wilson, Leider, & Knudson, 2018)	1231	Adults	DND	M-320, F-911	USA	Obesity, Diabetes Type II
Meng_CostEffectivenessNutritionPhysicalActivity	(Meng et al., 2013)	8301	Children (ages 6-13)	DND	M-4207 F-4094	China	Obesity
Oosterhoff_LifetimeEconomicsHealthyLifestyleForChildren	(Oosterhoff et al., 2020)	1676	Children (ages 4-12)	DND	DND	Netherlands	Obesity
Sevick_LifestyleForObesity	(Sevick et al., 2000)	235	Sedentary but healthy adults	DND	DND	USA	Cardiovascular fitness and high blood pressure
Sonik_IncreasedFoodDecreasedHealthcareCosts	(Sonik, 2016)	19122	Adults with chronic health conditions	DND	DND	USA	Chronic Illnesses (sickle cell disease, diabetes, malnutrition, cystic fibrosis, asthma, and inflammatory bowel disease)
Verhoef_CostEffectivenessGymMembership	(Verhoef et al., 2016)	1025	Adults who were physically inactive	NA	NA	UK	Diabetes, Coronary Heart Disease, Stroke
Waart_CostUtilityAndCost-effectiveness	(van Waart et al., 2018)	230	Adults with cancer	50.666	M-2, F-228	Netherlands	Breast Cancer

Table 11. Study Characteristics

* NA is Not Applicable and DND is Did Not Disclose

Intervention Details			
Article Code	Description of Intervention	Duration	Setting
Chatterton_DietaryInterventionForDepression	Dietary: Nutrition Counseling from Dietitian, Modified Mediterranean Diet	12 weeks, 7 hours (7 sessions of 60 minutes each)	Community
DiabetesPrevention_LifestyleOnDiabetes	Diabetes Prevention Program (DPP) Diet and Physical Activity [brisk walking] 150 minutes per wk. and 16 lesson curriculum in monthly sessions Medication (MT) Metformin 850 mg initial dose, increased to 850 2X a day after 1 month	3 years	Community
Fayet-Moore_FiberIntake CostAnalysisDiabetes	Increased Cereal Fiber	NA	Community
Fusco_RehabAfterHipReplacement	Accelerated physiotherapy (AP) - full weight training immediately, no precautions	8 weeks	Hospital
Gao_LifestyleModificationStemCell TransplantSurvivors	Positive Change For Life (PCFL): Dietary modification based on telephone-delivered Coaching Patients on Achieving Cardiovascular Health model; individually tailored physical activity at gym, fitness center or personal training including aqua exercise, walking, yoga or Pilates; group physical activities, and educational materials including monthly newsletters.	1 year	Community
Georgiou_ExerciseForHeartDisease	Exercise (EX) 1hr 3X a wk for 8 wks, then 2X a wk for 1 year	14 months	Hospital - outpatient
Gordon_ExerciseforBreastCancerPatients	Adjuvant Exercise For Health (EfH) either face to face (EfH-F2F) or via telephone (EfH-TH). Type of exercise was patient driven, including both aerobic and resistance-based under supervision of qualified physiologist. 16 sessions with the overall goal of exercising at least 4 days/week for 45 minutes including aerobic and resistance-based.	16 sessions over 8 month period	Community
Haines_MultimodalExerciseForBreastCancerPatients	Adjuvant Multimedia, 36 minute multimodal exercise (MME) of home-based strength, balance, shoulder mobility and cardiovascular endurance program (increasing number of reps every 2 weeks)	3, 6, and 12 months	Community
Herman_IntegrativeHealthforPain	Complementary Integrative Health Interventions (CIH) including Acupuncture, biofeedback, guided imagery, hypnosis, massage, meditation, tai chi, yoga, chiropractic.	1 year	Community
Herman_NaturopathicForBackPain	Integrative Health Interventions (IHP)	3 months of 30 minute semi-weekly sessions- onsite naturopathic care visits (acupuncture, exercise and dietary advice, relaxation training, and a back care educational booklet)	Community
Holman_CBTforDepressedOlderPeople	Cognitive Behavioral Therapy (CBT)	10 months of 12 sessions	Community
Jardim_HealthyEating_CardiometabolicDisease	Nutrition	5 years	Community
Levin_CardiacRehabilitationCostAnalysis	Health education and Exercise (EX) 45 minutes 2X per wk. for 3 months - adjunctive	5 years	Hospital - outpatient
Lindgren_PhysicalActivityforCVD	Dietary Advice, Exercise, Dietary Advice + Exercise	18 months for health intervention, Lifetime for economic study	Community
Luciano_CostUtilityCBTforFibromyalgia	Cognitive Behavioral Therapy (CBT)	6 months	Community

Intervention Details			
Article Code	Description of Intervention	Duration	Setting
May_ExerciseBreast&ColonCancerPatients	Exercise For Health (EFH)	18 weeks of twice weekly 1 hour sessions	Outpatient clinics
McKnight_EffectivenessOfHealthyLifestyleProgram	Fit For Life Diabetes Prevention Program (FFL-DP)	12 weeks of 90 minute weekly sessions plus 3 monthly counseling sessions	Hospital Outpatient in rural area
Meng_CostEffectivenessNutritionPhysicalActivity	Nutrition (NT) or Physical Activity (PA) or Integrated Nutrition and Physical Activity (NPA)	9 months (6 classes, 20 minutes of activity per day)	School
Oosterhoff_LifetimeEconomicsHealthyLifestyleForChildren	Healthy Primary School of the Future (HPSF) and Physical Activity School (PAS)	2 years	School
Sevick_LifestyleForObesity	Lifestyle (LS) including CBT in weekly meetings for first 16 weeks, and biweekly for remaining time for next nine weeks, monthly for next 5 months, bimonthly for next five, and quarterly for remaining time. Also received a newsletter and schedule of events.	24 months	Community
Sonik_IncreasedFoodDecreasedHealthcareCosts	Increased Supplemental Nutrition Assistance Program (SNAP)	70 months	Community
Verhoef_CostEffectivenessGymMembership	Give it a Go (GiaG). Free membership in a fitness center for 4 months	4 months	Leisure Centre
Wart_CostUtilityAndCost-effectivene	Onco-Move or OnTrack, Onco-Move is home-based, low-intensity, individualized and self-managed activity with behavioral reinforcement. Encourage to do 30 minutes a day, 5 days a week of low-intensity activity. OnTrack is a high intensity, resistance & aerobic exercise program, supervised by physiotherapists. Twice a week strength training plus aerobic exercises.	6 months after chemotherapy ended	Hospital Outpatient

Table 12. Details of Health Interventions

Intervention Category and Comparison			Comparison
Article Code	Category	Sub category	Description of Comparison
Chatterton_DietaryInterventionForDepression	Healthy Food (HF)	Mediterranean Diet (MD)	Social Support ("befriending"; SS)
DiabetesPrevention_LifestyleOnDiabetes	Healthy Lifestyle (HL) Pharmaceutical (MT)	Healthy Lifestyle (HL) Diet and physical activity Pharmaceutical (MT)	Placebo
Fayet-Moore_FiberIntakeCostAnalysisDiabetes	Healthy Food (HF)	Increased Cereal Fiber (IF)	NA
Fusco_RehabAfterHipReplacement	Physical Therapy (PT)	Accelerated physiotherapy (AP)	Usual Care (UC)
Gao_LifestyleModificationStemCellTransplantSurvivors	Healthy Lifestyle (HL)	Nutrition, Walking, Yoga, Pilates, Swimming, Counseling	Usual Care (UC) [which translated to no intervention]
Georgiou_ExerciseForHeartDisease	Physical Activity (PA)	Exercise at 60% of peak oxygen level for 1 hour	Usual Care (UC)
Gordon_ExerciseforBreastCancerPatients	Physical Activity (PA)	Aerobic and resistance exercises	Usual Care (UC) [which translated to no intervention]
Haines_MultimodalExerciseForBreastCancerPatients	Physical Activity (PA)	Aerobic, strength, and resistance exercises	Flexibility and Relaxation program (FRP)

Intervention Category and Comparison			Comparison
Article Code	Category	Sub category	Description of Comparison
Herman_IntegrativeHealthforPain	Mind-Body, Acupuncture, Chiropractic (CHI)	Acupuncture, biofeedback, guided imagery, hypnosis, massage, meditation, tai chi, yoga, chiropractic	Usual Care (UC)
Herman_NaturopathicForBackPain	Naturopathic Care (NC), Acupuncture	acupuncture, exercise, dietary advice, relaxation training, and back care educational booklet)	Usual Care (UC) [standardized physiotherapy advice and the back care educational booklet]
Holman_CBTforDepressedOlderPeople	Cognitive Behavioral Therapy (CBT)	Cognitive Behavioral Therapy (CBT)	Talking Therapy and UC
Jardim_HealthyEating_CardiometabolicDisease	Nutrition (Optimal Diet - OD)	10 dietary factors (fruits, vegetables, nuts/seeds, whole grains, unprocessed red meat, processed meat, sugar-sweetened beverages, polyunsaturated fats, seafood omega-3 fats, sodium)	Usual Care (UC)
Levin_CardiacRehabilitationCostAnalysis	Health Education and Physical Activity (PA)	Health Education sessions and Medically supervised cycling, jogging, and calisthenics	Usual Care (UC)
Lindgren_PhysicalActivityforCVD	Nutrition (Optimal Diet - OD) Physical Activity (PA)	Exercise regime and dietary advice or the combination of the two.	Usual Care (UC)
Luciano_CostUtilityCBTforFibromyalgia	Cognitive Behavioral Therapy (CBT)	Cognitive Behavioral Therapy (CBT)	Recommended Pharmacological Treatment (RPT) & Usual Care (UC)
May_ExerciseBreast&ColonCancerPatients	Physical Activity (PA)	Exercise (aerobic and strength training)	Usual Care (UC)
McKnight_EffectivenessOfHealthyLifestyleProgram	Healthy Lifestyle (HL)	Exercise, Nutrition, Counseling	Fit for Life (FFL)
Meng_CostEffectivenessNutritionPhysicalActivity	Healthy Lifestyle (HL)	Exercise and Nutrition	No intervention
Oosterhoff_LifetimeEconomicsHealthyLifestyleForChildren	Healthy Lifestyle (HL)	Exercise and Nutrition	Regular Curriculum
Sevick_LifestyleForObesity	Healthy Lifestyle (HL)	Physical activities	Structured Supervised (SS) intervention at - supervised exercise at center.
Sonik_IncreasedFoodDecreasedHealthcareCosts	Nutrition (Optimal Diet - OD)	Increased food budget by 13.6%	Decreased SNAP
Verhoef_CostEffectivenessGymMembership	Physical Activity (PA)	Fitness center participation (at least 5 visits)	NA
Wart_CostUtilityAndCost-effectivene	Physical Activity (PA)	Exercise - both low intensity and high intensity	Usual Care (UC)

Table 13. Details of Category and Comparison (Control)

Health Outcomes			
Article Code	Description & Measurement of Health Outcomes	Significant Health Outcome	Results of Health Outcomes
Chatterton_DietaryInterventionForDepression	QALY: AQoL-8D	Dietary	No significant difference between MD & SS
DiabetesPrevention_LifestyleOnDiabetes	Quality of Well-Being Index (QWB-SA), Cases of diabetes prevented	EX & MT	DPP reduced diabetes by 58% MT reduced diabetes by 31%
Fayet-Moore_FiberIntakeCostAnalysisDiabetes	Dietary fiber Intake impact on: Cardiovascular Disease (CVD) and Type II Diabetes (T2D): Disease Prevalence from Australian Health Survey	NA	NA
Fusco_RehabAfterHipReplacement	Quality Adjusted Life Years (QALY): EuroQoL EA-5D	AP	DND
Gao_LifestyleModificationStemCellTransplantSurvivors	Weight Change (WC): pounds. Health-adjusted Life Years (HALY): Australian Institute of Health and Welfare Survey	PCFL	PCFL group lost an average of 2.2 kg, .8 BMI and 2.8 weight circumference.
Georgiou_ExerciseForHeartDisease	Life Expectancy (Mortality Rate)	EX	Exercise group had 18% mortality rate, while control group has 41% mortality rate
Gordon_ExerciseforBreastCancerPatients	Number of Improvers: FACT-B+4. QALY: EQ-5D-3L	UC	69 (57%) improvers in EfH group, 21 (39%) in UC group. 48 additional women improved quality of life. Significant difference.
Haines_MultimodalExerciseForBreastCancerPatients	HRQALY:EQ-5D & VAS, EORTC C30, BR23. Direct health costs (Medicare Australia Medical Benefit Scheme and Pharmaceutical Benefits Scheme & logs) & productivity gains/losses (Health and Labor Questionnaire)	MME at 3 and 6 month assessment	Quality of Life Improvement was significantly greater at the 3 mo. And 6 mo. Assessments, but not at the 12 mo. follow-up.
Herman_IntegrativeHealthforPain	Before/After Costs, Pain Scores, Opioid Use	CIH	Pain scores decreased significantly for the CIH group.
Herman_NaturopathicForBackPain	Back pain: Roland-Morris Disability Questionnaire, Oswestry Disability Index, Analog pain scale. HRQoL SF-6D	NC	The NC group gained a statistically significant increase in QALYs over the 6 month period.
Holman_CBTforDepressedOlderPeople	Change in Depression (Beck Depression Inventory II), Direct Costs (General Practitioner records)	CBT	Effectiveness was assess using the Beck Depression Inventory-II, and found an improvement in scores in favor of CBT against TAU and TC. The CBT showed a benefit of .40 of a point per visit.
Jardim_HealthyEating_CardiometabolicDisease	24 hour food intake (based on National Health and Nutrition Examination Survey) and the dietary factor causal relationship to disease (using Bradford-Hill criteria) Costs - hospitalization, chronic costs, and drugs.	NA	NA
Levin_CardiacRehabilitationCostAnalysis	Number of fatal heart attacks, Number of non-fatal heart attacks, Number of other cardiac events, blood pressure, number of smokers, and number fully employed after 5 years.	EX	Control group had higher number of repeated heart attacks, higher number of other cardiac events, and higher blood pressure. Only 27.4% of control group patients were fully employed after 5 years. Exercise group had lower number of heart attacks and cardiac events, lower blood pressure, and 51.8% were fully employed after 5 years.
Lindgren_PhysicalActivityforCVD	DND	DND	DND
Luciano_CostUtilityCBTforFibromyalgia	QALY: EuroQoL-5D, HRQoL: EQ-VAS Costs: Client Service Receipt Inventory + Direct costs	CBT	QALYs at follow-up calculated for the 6 month intervention period were found to be similar for all groups, with no significant differences.

Health Outcomes			
Article Code	Description & Measurement of Health Outcomes	Significant Health Outcome	Results of Health Outcomes
May_ExerciseBreast&ColonCancerPatients	Breast cancer patients cost €2912 more for PA and received an incremental effect of .01 (€403.394/QALY). Colon cancer patients cost €4321 less and received a .03 effect.	PA for colon cancer, UC for breast cancer	For patients with breast cancer, average EQ5D scores did not differ at baseline or 36 week, but did differ at 18 week assessment. For patients with colon cancer, average EQ5D scores differed at 18 and 36 weeks.
McKnight_EffectivenessOfHealthyLifestyleProgram	Change in weight. Also change in BMI, cholesterol, triglycerides, blood pressure, HbA1c, exercise, sugar-sweetened beverages, use of nutrition labels.	HbA1c values	Participants lost an average of 2.7 kg (3% of total weight). 68% participants exercises more after intervention than before.
Meng_CostEffectivenessNutritionPhysicalActivity	BMI and BAZ (BMI Z-scores).	BAZ (BMI Z-scores)	The increment of the overweight and obesity prevalence in the Combined Intervention (NAP) group was 87% less than the control group (p=.06, borderline significance). The incremental difference in BAZ scores was .15 (as compared to .25 for the control) which was a significant difference (p=.05). Neither the Nutrition (NT) nor the Physical Activity (PA) groups were significantly different from their controls.
Oosterhoff_LifetimeEconomicsHealthyLifestyleForChildren	Dietary Behavior, Physical Activity Behavior, and BMI-Zscores, QALY (based on model)	NA	HPSF and PAS resulted in a reduction of chronic diseases. The avoided cases reached a max at 70 years of age.
Sevick_LifestyleForObesity	Average change from baseline on: Physical Activity Recall (PAR); self-report of: sitting time, number of flights stairs, and number of weeks walked; peak VO2, total treadmill time, heart rate, blood pressure, weight.	LS and SS	Both Lifestyle and Structure Supervised programs significantly improved health variables.
Sonik_IncreasedFoodDecreasedHealthcareCosts	NA	NA	NA
Verhoef_CostEffectivenessGymMembership	General Practice Physical Activity Questionnaire (GPPAQ)	None	NA
Wart_CostUtilityAndCost-effectivene	Health State (EQ-5D-3L) converted to Dutch utility values, General and physical fatigue (Multidimensional Fatigue Inventory), cardiorespiratory fitness, muscle strength	DND	DND

Table 14. Detailed results of Health Outcomes *DND is Did Not Disclose. NA is Not Applicable. Other Intervention abbreviations can be found in Table 4 or Table 5, both found in the Appendix.*

Cost Effectiveness Analysis & Source of Costs						
Article Code	Cost Effectiveness or Cost Utility Analysis (CEA, CUA)	Other or Additional Design Method of Economic Study	Source of Costs	Perspective of Economic Costs	Follow-up Time (Cost duration)	Year for currency
Chatterton_DietaryIntervention ForDepression	CEA	Area Under the Curve method	Direct Costs: cost to deliver intervention [hrly wage of personnel for MD, Victorian Hospitals Industrial Association salary for SS], cost of healthcare resources used [participant's report of medication (both patient cost and Pharmaceutical Benefits schedule costs), number of doctor visits (both patient costs and payer costs based on Medicare Benefits Schedule). Indirect Costs: Patient transportation [tax reimbursement for travel for 30km/session], food [estimated as 112/wk. for MD and 138/wk. for SS], and effect of productivity [participants report of days off and working while ill (assumes loss of 1.2 hrs. per day) based on average hrly wage of Australian Bureau of Statistics + 25% overhead].	Health, Societal	12 months	2013-2014
DiabetesPrevention_LifestyleOnDiabetes	CEA, CUA	CEA	Direct Costs: Costs of identifying subjects, implementing DPP, sed effects of interventions, and medical care (costs of hospital, ER, Urgent Care, outpatient services, telephone calls, prescription medications) Indirect Costs: Travel time, exercise, shopping and cooking time, cost of exercise classes and equipment, food, and cost of transportation. Also productivity costs (absent from work due to DPP visits, illness, injury, and premature mortality)	Society, Health	3 years	2000
Fayet-Moore_FiberIntake CostAnalysisDiabetes	NA	Cost of Illness	Direct Costs: Average expenditures per prevalent case of CVD and T2D using total costs of population (CVD 7.6 billion and T2D .9 billion) time the health price index growth (2.6%). Expenditures included hospital admitted patient services, out-of-hospital medical expenses and prescription pharmaceuticals. Indirect Costs: absenteeism, presenteeism, premature death and reduced labor force participation [estimated at .9 reduced risk of CVD mortality per 1 gram increase in cereal fiber intake - based upon previous study, and estimated at 255.13 per person for T2D]. Employment activity came from National Health Survey and the Disability, Ageing, and Carers Survey. These costs were calculate by dividing the total estimated productivity costs of CVD & T2D by the prevalence of each disease. Savings calculated by applying the cost per case to the estimated reduction in the prevalence of CVD and T2D.	Health, Societal, Employer	DND	2015-2016
Fusco_RehabAfter HipReplacement	CUA		Direct Costs: Insurance-covered visits of clinician [Personal Social Service Research Units] and Private visits of clinician [British United Provident Association]. Hospitalization days [National schedule for reference] and equipment [Personal Social Service Research Units].	Patient, Societal	12 months	2014-2015
Gao_LifestyleModification StemCell TransplantSurvivors	CUA	Multistate life table Markov model	Direct Costs of PCFL: Alfred Hospital records. UC treatment costs from Australian Institute of Health and Welfare.	Societal (no productivity)	2 years for WC, Lifetime for HALY	Did Not Specify (assumed to be 2016)

Cost Effectiveness Analysis & Source of Costs						
Article Code	Cost Effectiveness or Cost Utility Analysis (CEA, CUA)	Other or Additional Design Method of Economic Study	Source of Costs	Perspective of Economic Costs	Follow-up Time (Cost duration)	Year for currency
Georgiou_ExerciseForHeartDisease	CEA, CUA	Piece-wise exponential survival model with constant hazard rate	Direct costs of training: equipment, rented space, salary for training facility. Indirect costs: Wages lost using median earnings from US Census Bureau Hospitalization costs: Using data from Health Care Cost and Utilization Project (HCUP-3) Did not include travel or loss of income)	DND	14 months	1999
Gordon_ExerciseforBreastCancerPatients	CUA		Service Provider model: direct costs of provider and patient from project records including physiologist, administrative salaries, educational booklets and support materials, exercises devices and hand weights, telephone, office consumables, rental and marketing expenses. Private Provider model: costs based on Medicare Benefits Schedule and patient out-of-pocket expenses except travel.	Health (service provider OR private professional)	12 months	2014
Haines_MultimodalExerciseForBreastCancerPatients	CUA	Area Under the Curve method	Direct costs: Medicare subsidized hospitalization, pharmaceuticals, employment gained or lost (paid using individual wage rates and unpaid using local market price for home help [36 per hour]), and program provisions (market prices) and hospitalizations (using Australian Diagnosis Related Grouping costs).	Societal	6 months	2006
Herman_IntegrativeHealthforPain	Cost Analysis	Matched Cohort using hierarchical linear modeling with propensity score weighting.	Direct costs: from the VA's Medical SAS Inpatient and Outpatient Datasets which included costs and pharmaceuticals. Estimates of the cost of each type of care came from the VA's Health Economics Resource Center database.	Health	1 year	2013
Herman_NaturopathicForBackPain	CEA		Published sources were used for chiropractic care, over-the-counter and prescription drugs as well as productivity losses. Naturopathic, massage, and physiotherapy costs were obtained from the national associations for each intervention. Visits to conventional physicians was not tracked.	Societal, Employer, Patient	6 months	2005
Holman_CBTforDepressedOlderPeople	CEA		Costs were collected using a modified version of the Client Service Receipt Inventory from physician records. Direct treatment costs and health service costs included contacts with general physicians, practice and district nurses, health visitors, psychiatrists, psychologists, occupational therapists, physiotherapists, psychiatric nurses and general counsellors. (Did not include prescription costs, production gain or losses, patient time, caregiver time, or burden. Also did not include hospitalization costs)	Health	10 months	2008
Jardim_HealthyEating_CardiometabolicDisease	Cost Analysis	Microsimulation model	Costs were based on National Health and Nutrition Examination Survey. Costs included acute costs (hospitalizations) annual chronic costs of CVD and diabetes [not related to the hospitalization or drugs].	Societal	1 year	2018
Levin_CardiacRehabilitationCostAnalysis	DND		Costs were post-discharge from hospital after heart attack. Direct costs: training program, rehospitalizations, drugs, by-pass surgery, out-patient visits and travel costs. Indirect costs: loss of resources or production due to illness, time-costs of training and out-patient visits. Estimates from Swedish National Health Insurance System (NHIS)	Societal, Health, Patient	5 years	1988

Cost Effectiveness Analysis & Source of Costs						
Article Code	Cost Effectiveness or Cost Utility Analysis (CEA, CUA)	Other or Additional Design Method of Economic Study	Source of Costs	Perspective of Economic Costs	Follow-up Time (Cost duration)	Year for currency
Lindgren_PhysicalActivity forCVD	CUA	Stochastic Markov Model	Direct costs of disease, indirect costs (loss of production), production gain due to added survival years. Direct costs taken from previous study (from hospital records, travel and time not included). Indirect costs based on human capital theory.	Health, Societal	Lifetime (to cohort age of 109)	
Luciano_CostUtility CBTforFibromyalgia	CUA		Direct costs included medication consumption [based on Vademecum International Red Book, 2011 edition], medical tests [SOIKOS database], health-related services, and cost of staff [Official College of Psychologists of Spain]. Indirect costs included productivity [minimum daily wage in Spain for 2011 by number of days sick as reported by patient]	Health, Societal	6 months	2011
May_ExerciseBreast& ColonCancerPatients	CEA		Costs were assessed using the consumer price index from Statistics Netherlands. Direct costs include medication, cancer therapy, radiotherapy, hospital days, day care, medical specialists, other caregivers, phone consults, professional home care. Direct non-health expenses included were paid domestic help, patient travel, and patient own costs. Indirect costs included unpaid domestica help and sick leave in hours. Also calculated were the Physical Activity during Cancer Treatment costs.	Societal	36 weeks	2011
McKnight_EffectivenessOf HealthyLifestyleProgram	CEA	CEA	Estimated Program Costs only. No travel, conferences, or administration costs, nor the 1-time cost of the curriculum.	Health	7 months	2017
Meng_CostEffectiveness NutritionPhysicalActivity	CEA		Identified by project coordinator: materials, training, communication, transportation, accommodations, monitoring, and labor costs. Costs collected at population level and then divided by the number of participants in each group.	Societal	9 months	2010
Oosterhoff_LifetimeEconomics HealthyLifestyleForChildren	CUA		Material costs [transportation, accommodations, food, curriculum materials, monitoring equipment, advertising and promotion, accreditation, training materials for personnel, communication and administration], and time invested [school personnel, program coordinator, school project leader, teacher, teaching assistant, volunteers, career, external parties, personnel from government, pedagogical staff from childcare, and health staff].	Health Societal Employer [Education] Patient [Household & Leisure]	Lifetime (to cohort age of 100)	2018
Sevick_LifestyleForObesity	CEA		Actual project costs on profession personnel (but not researchers time or costs), curriculum development, computer tracking system, health club membership, facilities, printing and postage of reminders.	Health	2 years	1994
Sonik_IncreasedFood DecreasedHealthcareCosts	Interrupted Time Series Analysis	Single and Multigroup Interrupted Time Series Analysis comparing trends over time (before and after intervention)	Monthly State Medicaid records	Health	70 months	2006-2012

Cost Effectiveness Analysis & Source of Costs						
Article Code	Cost Effectiveness or Cost Utility Analysis (CEA, CUA)	Other or Additional Design Method of Economic Study	Source of Costs	Perspective of Economic Costs	Follow-up Time (Cost duration)	Year for currency
Verhoef_CostEffectivenessGymMembership	CUE	Decision Analytic Markov Model	NHS and Personal Social Services: Evaluation, communication, mailing, training, coordination, incentives. Program costs (induction, membership, appointment, and communication)	Health	12 months	2013/14
Waart_CostUtilityAndCost-effectivene	CUA		Participant complete questionnaire on both health care costs and informal care (valued at 14.12 per hour), absenteeism and unpaid productivity losses (valued at Dutch age & gender price weights using Friction Cost Approach). Intervention costs were estimated using invoices, salary including holiday allowance and benefits, or costs for group physiotherapy sessions from hospital. Dutch standard costs for health care utilization, or prices indicated by professional organizations if standard costs were not available. Medication obtain from pharmacy records but valued based on unit prices of the Dutch Society of Pharmacy.	Societal	Average of 9.4 months	2017

Table 15. Detailed results of Source of Costs

Economic Results					
Article Code	Monetary Unit	Economic Results Reported	Cost Effectiveness Ratio and Details	Reported savings	Incremental Cost-Effectiveness Ratio
Chatterton_DietaryInterventionForDepression	\$AUD	MT was cost effective. Costs from each perspective were <i>Mean(SD)</i> : Health- MT cost 217 (65); SS cost 133 (89); Societal- MT cost 1692 (96); SS cost - 1886 (147)	NA	HP \$856, SP \$2591	NA
DiabetesPrevention_LifestyleOnDiabetes	\$USA	DPP accrued .072 more QALYs over 3 years than placebo. MT accrued .022 more QALYs over 3 years than placebo. DPP accrued .050 more QALYs over 3 years than MT. DPP was more cost effective than MT, and MT was more cost effective than placebo. From HP, DPP cost 15700 per case of diabetes prevented, and MT cost 31300 per case of diabetes prevented.	SP: Cost for DPP was 51600 per QALY gained, MT was 99200 per QALY gained HP: Cost for DPP was 31500 per QALY gained, MT was 99600 per QALY gained		
Fayet-Moore_FiberIntakeCostAnalysisDiabetes	\$AUD	Healthcare Expenditure Savings by perspective: Health: 1.03 Billion savings for CVD at target IF intake, 285.9 Million savings for T2D at target IF intake. Societal: Per 10g/day increase in grain fiber, risk reduction was .75, 1.6 Billion savings for CVD at target IF intake, 1.7 Billion savings for T2D at target IF intake.	NA	HP 1.3159 Billion (CVD 1.03B & T2D 285.9M at target intake) PC 1.53 Billion (CVD 609.5M & T2D 1.4B at target intake) SP 3.3 Billion (CVD 1.6B & T2D 1.7B at target intake)	NA

Economic Results					
Article Code	Monetary Unit	Economic Results Reported	Cost Effectiveness Ratio and Details	Reported savings	Incremental Cost-Effectiveness Ratio
Fusco_RehabAfterHipReplacement	€GPS	QALY improved significantly for AP, but costs were not significantly different (only 200 savings)	AP 504.36, .13 per QALY UC 704.58, .71 per QALY	200	AP .13 per QALY UC .71 per QALY
Gao_LifestyleModificationStemCellTransplantSurvivors	\$AUD	Intervention cost 1233 per participant. Increased life years of .007 to .101 and increased HALY from .010 to .141 per person.		Per person savings of between 109 and 1474 over lifetime for scenario ii (weight loss achieved & intervention maintained) 77 980 for obese	\$3237 per HALY for scenario ii (weight loss achieved & intervention maintained) \$118,418 per HALY for scenario iv (weight regained gradually)
Georgiou_ExerciseForHeartDisease	\$USA	Incremental life expectancy was 1.82 years per patient (discounted 3%, 2.28 years per patient before discounting). Reduction in hospitalization rate of 19%. "Very attractive" and cost effective intervention.	\$1773 per Life Year (LY)	\$1336 per patient	
Gordon_ExerciseforBreastCancerPatients	\$AUD	Incremental cost of \$947 to \$818 to produce 48 additional improvers. Results of QALY were not clear, and it was determined that QALY was not appropriate for this research.	Would be cost effective at 2400 per improver (300 per month). Likelihood of cost effective was between 44 and 46%.	NA	NA
Haines_MultimodalExerciseForBreastCancerPatients	\$AUD	Value-based QALYs gained were .03. Utility-based QALYs showed a loss of .01. (When outliers were excluded, Value-based QALYs gained were .02 and Utility-based QALYs showed zero change). Low probability that the intervention was more cost effective than control. Control showed Value-based QALYs gained were .80% and the Utility-based QALYs were .05%. (When outliers were excluded, Value-based QALYs gained were 50.02% and Utility-based QALYs were 25.55%)	Willingness to pay would need to be over 300,000 per QALY gained	NA	NA
Herman_IntegrativeHealthforPain	\$USA	CIH use was associated with a significant decrease in healthcare costs and pain, and a less than a percentage point increase in opioid use compared to control. Lower healthcare costs (\$637 average) and .34 lower pain intensity.	Not only cost effective, but cost saving.	\$637	NA
Herman_NaturopathicForBackPain	\$USA	Naturopathic care participants tended to reduce adjunctive care use and have reduced absenteeism. Control group participants tended to increase absenteeism and adjunctive care. QALY increase was .0256 (equivalent to 9.4 perfect health days) with a net savings of \$1212 per person.	Cost Saving	SC -\$1212 PC -\$1096 EC 0 7.9% ROI	0.0256
Holman_CBTforDepressedOlderPeople	£UK	Mean costs per patient ranged from 1464 at 10 months for CBT, 884 for TC, 1037 for TAU. There is very little difference between groups in community health service costs.	120 per additional point reduction in BDI score	NA	120 per additional point reduction in BDI score

Economic Results					
Article Code	Monetary Unit	Economic Results Reported	Cost Effectiveness Ratio and Details	Reported savings	Incremental Cost-Effectiveness Ratio
Jardim_HealthyEating_CardiometabolicDisease	\$USA	Suboptimal intake contributes to \$50.4 billion in CVD costs (\$301 per person). Most influential were low consumption of nuts/seeds (\$81) and seafood omega-3 fats (\$76) as well as high consumption of red meat (\$3) and polyunsaturated fats (\$20). 18.2% of costs for CVD are attributable to sub-optimal diet.		OD	\$301 per person per year
Levin_CardiacRehabilitation CostAnalysis	rkSEK	Intervention total costs were 484260, and control group was 557770, for a difference of 73510. Patient spent 1240 more on intervention, but the NHIS saved 49010 and the total societal savings was 73510. For Employers, there was a significantly higher rate of return for the intervention group. Exercise program did not place economic burden on budget - lower rate of recurrence of non-fatal and cardiac events led to cost savings.		49010 per patient	
Lindgren_PhysicalActivity forCVD	rkSEK	Dietary advice group has the longest predicted survival and is most cost effective from both health and societal perspective	If effect remains, Diet advice costs 1294784 and adds 13.329 years of life. Exercise alone cost is 1292513 for 13.308 years, and Diet and Exercise 1290378 for 13.292 years	NA	If effect remains: SP: 141555 per QALY; HP: 11642 per QALY If effect declines: SP: 127965 per QALY; HP: 98725 per QALY
Luciano_CostUtility CBTforFibromyalgia	€EUR	Primary Care Services: Use of healthcare related to individuals in CBT group diminished to 80, while use by members of the other two groups increased to 110. The difference was significant. Specialized Care Services: Cost of specialized health care diminished to 940 for the CBT group, while increased to 1850 for RPT and 1660 for TAU. The difference was significant. Medication Costs: Cost of prescribed medications decreased to 33, while the RPT increased to 828 and TAU was 530.	CBT was more cost effective than either UC or RPT and saved between 2100€ (UC) and 2400€ (RPT)	SC - 2250€	From 63 to 107
May_ExerciseBreast& ColonCancerPatients	€EUR	Costs of Breast Cancer Intervention was 25105 from societal perspective, 18195 from healthcare perspective compared to usual care costs of societal 22216 and healthcare 16335. Costs of Colon Cancer Intervention was 21086 for societal, 13713 for healthcare, as compared to usual care costs of 25391 for societal, 18474 for healthcare.	Exercise program was cost effective for colon cancer patients, but not cost effective for breast cancer patients	SC - €4321	Only reported for breast cancer as €403.394/QALY
McKnight_EffectivenessOf HealthyLifestyleProgram	\$USA	Program Costs were \$5750 for FFL and \$7188 for FFL-DP. (\$279 per participant with 30 in each class for FFL assuming 80% completion rate.)	FFL was more cost effective than FFL-DP. For students who lost more than 5% of their weight, the cost was \$1056 for FFL and \$1587 for FFL-DP.	DND	FFL - \$178 per kg lost FFL-DP \$184 per kg lost.

Economic Results					
Article Code	Monetary Unit	Economic Results Reported	Cost Effectiveness Ratio and Details	Reported savings	Incremental Cost-Effectiveness Ratio
Meng_CostEffectiveness NutritionPhysicalActivity	¥RMB	707711 was total cost of program, with a per student cost of 1824. (Converted in article to \$26.80 per student, with total being \$104075.10, assumed to be 2013 dollars)	\$1308.90 US was cost to avoid 1 overweight and obesity case. Cost Effectiveness Ratio ranged from \$30.7 to 346.5 depending upon location.		The cost for achieving 1 kg BMI reduction was 113, 62.1, 346.5 and 30.7 in respectively Jinan, Guangzhou, Shanghai, and Harbin.
Oosterhoff_LifetimeEconomics HealthyLifestyleForChildren	€EUR	HP - Lifetime costs were 249175 for control, 251419 for PAS and 253175 for HPSF. SP Control costs were 259380, HPSF was 260152, and PAS was 261,025. The lifetime cost per QALY gained was 19734 for HPSF versus control. HPSF was dominant over PAS.	Under healthcare perspective, the control (no intervention) was cost effective. Under societal perspective, HPSF had a 50% probability of being cost-effective (using 20000 threshold)		QALY gain of .039 for HPSF versus control, and a QALY gain of .032 for PA versus control. Future health costs are greatly influenced by the inclusion of productivity costs and the assumptions of the intervention maintenance effects.
Sevick_LifestyleForObesity	\$USA	Lifestyle program cost 49805 (17.15 per participant per month). Structured supervision cost 134910 (49.31 per participant per month).	Average incremental cost per average unit of improvement: LS 6 mo.: \$30 per kcal of energy expended, LS 24 mo.: \$20 per kcal of energy expended. SS 6 mo.: \$142 per kcal of energy expended, SS 24 mo.: \$71 per kcal of energy expended.	DND	DND
Sonik_IncreasedFood DecreasedHealthcareCosts	\$USA	Cost growth (total costs, admissions, and length of stay) declined significantly after SNAP benefits were increased for all Medicaid recipients, but the cost growth declined even more sharply for people with chronic illnesses after the SNAP increase. Increases in SNAP costs were partially offset by Medicaid savings.	DND	DND	DND
Verhoef_CostEffectiveness GymMembership	£UK	GiaG - 2354, Control - 2287. Incremental diff = 67.25. Incremental gain in QALY = .0001	WTP threshold was 25,000	None	20347 per QALY gained
Waart_CostUtilityAnd Cost-effectivene	€EUR	UC: .58 QALY at 28714 cost. OM: .63 QALY at 31133 cost. OT : .65 QALY at 29589 cost.	The probability of OT being cost-effective compared with UC was 31% at WTP of 0/QALY and 79% at WTP of 80000/QALY	NA	26916 per QALY of OT versus UC

Table 16. Currency type and Economic Results

DND is Did Not Disclose. NA is Not Applicable.

EFFECTIVE STRATEGIES FOR ACADEMIC SUCCESS IN THE FIRST YEAR AND BEYOND: EXPLORING THE 7 HABITS OF HIGHLY EFFECTIVE COLLEGE STUDENTS

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ABSTRACT

The goal of business faculty in institutions of higher learning is to produce students who will be prepared for success in professional positions at the time of graduation and grow into leadership roles over time. Immense resources of time and money are devoted to this mission. However, there is much indication that this goal is becoming increasingly difficult to attain for a variety of reasons that combine to present challenges to college educators.

Feedback from business partners to colleges and numerous surveys of employers in the United States have demonstrated that, despite the great amount of money expended on education at the college level, recruiters find recent college graduates are often still lacking in the necessary skills needed to be productive members of the workforce (Bridgeland & Bruce, 2011; Giffi et al. 2018). Most notably, the skills many recent college graduates are deficient in, according to recruiters, are not necessarily the “hard skills” of technical or subject matter proficiency, but are often the “soft skills”, such as communication, organization, punctuality, social skills, and teamwork. This paper explores these and related issues.

A SUGGESTED PATH FORWARD

Our NABET presentation and this accompanying article address experiences of college students and their readiness for the global workforce by examining existing literature that focuses on issues related to effective soft skillsets for college success and beyond. Research indicates that organizations are experiencing deficiencies in these skillsets among recent college graduates they seek to hire. The authors also, in their presentation, draw on their anecdotal experiences in the first-year seminar courses they have taught for first-semester college freshmen. The questions addressed include: “What roles do foundational life skills play in preparing students for college and beyond?” “Are today’s college students adequately prepared for the workforce?” “How can college educators assist in better preparing college students for successful, contributory futures?” “What strategies are effective in college and career success?”

Many institutions of higher education endorse the position that students need to possess soft skills to be ready for success in college. Western Governor’s University lists Time Management, Critical Thinking, Communication, Goal Setting, and Collaboration, among others, as skills students need to be “college ready” (Western Governor’s University, 2021). The National Society of High School Scholars identifies Self-Motivation and Perseverance, among others, as soft skills that students need to be “college ready” (National Society of High School Scholars, 2019).

Several factors are converging to make the topic of soft skills development in college students increasingly important to institutions of higher learning, college-graduate job seekers, and employers. One factor, which can have an impact on the sustainability of institutions of higher education, is the overall trend of declining college enrollment. According to the Brookings Institution (Meyer, 2023), between 2010 and 2021 undergraduate enrollments fell by 15% and undergraduate completion rates have declined as well (Meyer, 2023). The Education Data Initiative reports that 24.1% of college freshmen drop out of college (Hanson, 2022). The National Center for Education Statistics reports that the 6-year graduation rate for students seeking a bachelor’s degree was 64% as of 2020 (National Center for Education Statistics, 2022). With fewer students enrolling in colleges and fewer students persevering to degree completion, the retention of students becomes even more crucial to the sustainability of colleges and universities, meaning the importance of students possessing the soft skills to be successful academically intensifies.

Not only does evidence indicate there is an increasing percentage of college students lacking the soft skills to complete their degree programs, the career readiness of those students who do graduate is also cause for concern. Employers are frequently and consistently reporting that recent college graduates have not learned in college, and are deficient in, the soft skills that guide behaviors expected and necessary to thrive in professional office environments. A 2018 survey of 650 employers by Cengage found that nearly 75% of the survey respondents indicated they have a hard time finding college graduates with the soft skills (such as communication, interpersonal, and critical-thinking skills) their companies need (Cengage, 2019). Other studies have produced similar results, for example, a 2016 report by LinkedIn

detailing a survey of 291 hiring managers found 59% of respondents reporting difficulty finding recruits who possess soft skills such as communication, punctuality, teamwork, and adaptability (Berger & Link, 2016).

There are likely many factors contributing to the deficiencies in soft skills of college students and recent college graduates. Changes in K – 12 education practices and standards, changes in demographics, including family structures, the explosive use of social media platforms, and other societal trends may be significant influences in the decline in soft skills proficiency but are beyond the scope of the authors' current presentation. A proximate cause of recent concerns with soft skills, which has been the focus of much research, is the Covid-19 pandemic which led to the closing of schools and the isolation of young people in their crucial formative years. Research into the effects of the Covid-19 pandemic and school closures is still maturing, but a review of prominent studies by *Education Week* (Schwartz, 2022) indicates the consensus of findings is that students suffered negative effects on learning from remote instruction during school shutdowns. One area the authors believe deserves additional study is the impact to students on social skills learning by being removed from in-person interactions with teachers and the cessation of peer interaction through participating in group social activities such as team sports, school club activities, and the simple, but formative, experiences of mingling with fellow students in hallways and classrooms. The social skills learning loss dimension of the Covid-19 school closures possibly have significantly impaired the development of soft skills (as described earlier) in young people.

Many colleges have heightened awareness of the soft skills gap of students and are taking proactive measures to address this concern. For example, *The Wall Street Journal* (Ellis, 2023) reported that Michigan State University began in 2022 requiring business students to take classes focused on developing soft skills needed in the workplace after noticing students were not as strong in these skills as students in the past were.

The authors believe that college freshmen can benefit greatly from courses that have a central focus on increasing the awareness of soft skills conducive to academic achievement as well as success in careers and life in general. Many colleges have implemented courses aligned with this belief, frequently titled "First Year Seminar". There have been many books written that formulate frameworks for soft skills development that, when mastered and practiced, lead to more successful and fulfilling lives, for example, *How to Win Friends and Influence People*, by Dale Carnegie. The authors suggest *The 7 Habits of Highly Effective College Students*, by Sean Covey, is a particularly well-rounded approach to soft skills development. This book is adapted specifically for college students from the very successful and widely-respected *The 7 Habits of Highly Effective People*, by Franklin Covey, which (as described by the publisher) "...focuses on timeless principles of fairness, integrity, honesty, and human dignity." The objective of the 7 Habits framework (as described by the publisher) is to help people "... effectively lead themselves, influence, engage and collaborate with others and continuously improve and renew their capabilities. These elements are at the heart of personal, team, and organizational effectiveness." (Why Franklin Covey. <https://www.franklincovey.com/why-franklincovey/>)

The 7 Habits of Highly Effective College Students textbook for students includes a rich supplement of instructional materials for professors to facilitate engagement with students and the comprehension and practical application of the concepts introduced in the course content.

The 7 Habits are these:

- Habit 1: Be Proactive
- Habit 2: Begin with the End in Mind
- Habit 3: Put First Things First
- Habit 4: Think Win-Win
- Habit 5: Seek First to Understand, Then to Be Understood
- Habit 6: Synergize
- Habit 7: Sharpen the Saw

The first three habits are called "The Private Victory", meaning they lead to mastery over oneself. The second three habits are called "The Public Victory", meaning they lead to being successful in relationships and collaborations with other people. The final habit, "Sharpen the Saw", is the habit of continuous renewal to remain sharp and focused in all aspects of life.

CONCLUSION

The authors of this paper suggest that professors and administrators at institutions of higher education consider adopting *The 7 Habits of Highly Effective College Students* as the textbook for courses developed to be taken early in college students' academic careers as a means to address the widespread assessment that today's college students and graduates are deficient in the very important soft skills. The authors believe this course of action will promote improved student success in college and ultimately produce graduates that are better prepared for success in their careers and lives and equipped to make meaningful contributions to society.

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**YOU HEARD MY MUSIC, WHERE'S MY MONEY? HOW RECENT DEVELOPMENTS IN
INFORMATION TECHNOLOGY MAY BE USED TO FIX THE ECONOMY OF THE ROYALTY
DISTRIBUTION BUSINESS FOR THE PUBLIC PERFORMANCE OF MUSIC**

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ABSTRACT

The collection and distribution of royalties (earned payments) belonging to the authors and publishers of musical compositions publicly performed in the United States is accomplished through a highly criticized and antiquated system that unfairly favors popular music to the exclusion of other publicly performed compositions. This study provides a historical perspective of the deficient operations of royalty collection agencies followed by an exploration of how newly emerging technology can be employed to affect a much needed change in the business of royalty distribution, including recommendations on how to mitigate the current disparities

INTRODUCTION

Since the 1940s, the collection and distribution of royalties (earned payments) belonging to the authors of musical compositions in the United States has operated under the same, highly criticized system. This paper will explore a new technology that, if properly employed, may affect a major and much needed change in the royalty system.

To appreciate where royalty collection and distribution could be going, you first need to know where it has been. A brief understanding of the current system and how it came about is required to understand the potential framework for the future:

A Brief History

To start with, the Copyright Law, which governs musical works in the United States, not only gives authors the right to control the making of copies of their works, but also provides for the exclusive right of authors to control the public performance of their works (see 17 U.S. Code Section 106(4) Exclusive Rights In Copyrighted Works) This means that any time a musical work is broadcast over the radio, or played by a band in a nightclub, or played over the public address system in a grocery store, or performed anywhere else, the author is entitled to be compensated.

Of course, it would be impossible for any one author to monitor the public performances of their music around the entire country on a daily basis. If you're located in New York, you can't constantly monitor whether a band, nightclub DJ, or grocery store is playing your music in Texas. Therefore, historically, a system was needed to enable the enforcement of the authors' rights to compensation. Enter the PROs.

In 1914, the American Society of Composers Authors and Publishers (ASCAP) was formed as a central agency to collect the monies owed to songwriters. (Britannica, 2023) Twenty-seven years later, the rival group Broadcast Music Incorporated (BMI) was established with basically the same purpose. (id) Before these PROs (Performance Rights Organizations) were established, each songwriter would have had to individually license the use of their music and collect the pennies associated with a particular use. With the formation of the PROs, it became possible for songwriters and publishers to turn the task of collecting the compensation for public performance of music over to these organizations. It then became the job of the PROs to monitor the use of their member's music and collect the required funds.

The system was legitimized in 1941, when, as part of a Federal antitrust investigation the United States Department of Justice entered into consent decrees with the PROs, permitting them to continue to operate in what it thought would be the best interests of the songwriters by issuing blanket licenses to users of music. (Thomas, 2023) in other words, radio and television stations, bars, restaurants, fitness clubs, etc. could buy a license to permit the public performance of any of the music governed by a particular PRO. (id)

The Consent Decrees entered into by the PROs have been reviewed and modified over time, but the system put in place for the Performance Rights Organizations to represent authors and publishers has consistently operated in the United States since the 1940s (Gardner, 2017)

THE CURRENT SYSTEM

Under the current system, the PROs sell licenses to the various music users and accumulate the funds they collect in the form of license fees which are then distributed annually to the songwriters. Theoretically, all of the funds (except for a small percentage dedicated to operating expenses) go into a giant pot to be distributed to the owners of the music who have registered with a particular PRO.

The PROs enforce the collection of licensing fees by several means- including employing spies who visit clubs, stores, and other venues to make sure they buy licenses if they are using copyrighted music. They also issue fines and start lawsuits for unlicensed use – the proceeds of which also find their way into the same royalty accumulation pot for eventual distribution.

Unfortunately, there is no specific attention paid to what music is publicly performed by a particular user who buys a license. For example, if a venue (e.g. a nightclub) buys an ASCAP license, it is entitled to publicly perform any and every song in the ASCAP catalog. ASCAP sells the blanket license but does not require the venue to report which songs are used. So, once the PROs sell all the licenses and accumulate the licensing fees, they have to figure out a way to distribute the pot of money to their member songwriters. The first common criticism of the current PRO system for royalty distribution is that songwriters don't really understand how it works. For example, ASCAP explains it's formula for distribution as follows (ascap 2023):

Generally, royalties for a single musical work, in any surveyed medium, are the product of this calculation:

$$\begin{aligned}
 &\text{Use Weight} \quad \times \quad \text{Licensee Weight} \quad \times \quad \text{"Follow the Dollar" Factor} \quad \times \quad \text{Time of Day Weight} \\
 &+ \\
 &\text{Premium Credits} \\
 &= \text{Total Credits}
 \end{aligned}$$

USE WEIGHT is described as “the factor, or value, attached to each type of performance (theme, background, promotional, etc.) LICENSE WEIGHT is termed as any factor that reflects the license fee paid by a station (or group of stations) and the number of hours included in the appropriate survey. The licensee weight is also referred to as the "hook-up" weight with respect to network television, reflecting the number of stations carrying a broadcast. Other surveyed media - such as background music services, airlines, circuses and ice shows - are also assigned "weights" based on license fees paid to ASCAP. The FOLLOW THE DOLLAR FACTOR supposedly ensures that the license fees that ASCAP receives from any medium are paid to writers and publishers for performances on that specific medium. For example, the money received from radio stations is paid out for radio performances, while the money received from TV networks is paid out for TV performances, etc. Under the TIME OF DAY WEIGHT factor, ASCAP can vary the value of a performance depending on the time of day; for example, whether it takes place in primetime or in the middle of the night. PREMIUM CREDITS are adjustments that ASCAP makes for songs that earn certain threshold numbers in a particular revenue quarter, songs that hit a certain unspecified performance benchmark in a single quarter, and featured performances in highly rated network, cable, satellite, and local TV series.

According to ASCAP, CREDITS x SHARE x CREDIT VALUE = \$ ROYALTY and, after establishing the number of credits generated by a performance, they then allocate these credits among all of their registered writers and publishers of the works to determine the SHARE each should receive.(id)

BMI uses a similar system to divvy up its collected royalties. Not only are these systems hard for a songwriter to understand (or anyone outside of the PRO for that matter), they are subject to a second kind of criticism because they favor what the PRO deems to be popular songs over other songs, with no real attribution. In other words, the system for dividing up royalties is based upon presumed popularity of a particular piece of music, and may, to the detriment of some copyright owners, actually ignore that fact that less high-profile music is also being performed.

Criticism of the Current System

The PROs have long been criticized for not making an effort to account better for who is actually entitled to the royalty payments. When PROs have to figure out which songwriters and music publishers will be paid, and they try to apportion royalties based on what are supposed to be statistical estimates of whose music gets played more than someone else's, it inevitably results in smaller "long tail" songwriters being left out or paid inaccurately. (Rosenblatt, 2020)

For example, if a nightclub in Buffalo, New York, decides to continuously play a certain song, or decides to have an event featuring the works of a particular songwriter, it is likely that the PRO representing that music won't find out about it. The venue is entitled to use any music within the PRO's catalog, and does not have to report to the PRO on what was actually used. Therefore, the particular songwriter has no idea who is actually using their music, and may not be fairly compensated for the performance unless the formulaic system gives them credit. Conversely, a songwriter with a popular song may be over-compensated at the expense of songwriters whose material is less popular, but is still being performed.

BMI's own Royalty Policy Manual actually recognizes that adequate data is not being collected to the potential detriment of some copyrights owners, and states in pertinent part (BMI 2019):

"BMI collects license fees from tens of thousands of music users including, but not limited to, radio stations, broadcast television, cable and satellite providers, hotels, restaurants, nightclubs, sports arenas, theme parks, airlines, jukeboxes, retail stores, and digital media music users such as internet websites and ring-back tone providers.... BMI strives to distribute license fees derived from specific users of music to the songwriters, composers and publishers whose music is performed by those users...However, in cases where performance data is not available or is incomplete for any of the sources from which BMI collects fees, BMI may distribute those fees against performances from a source or sources where sufficient data is available."

Wouldn't it be better and more equitable if the distribution of royalties was based on actual secure and accurate data? Couldn't there be a better way of establishing which songs were performed thereby being entitled to a performance royalty? Is there potentially a better way to pay the songwriters and publishers than putting all of the license fees into a big pot and then estimating whose songs are entitled to a bigger share? Enter the new technology.

MUSIC RECOGNITION THROUGH THE USE OF ALGORITHMS

Starting in 2003, song recognition technology became available through the use of algorithms to identify wave patterns in digitally sampled music. This technology was originally utilized to identify plagiarism in music, and has now expanded to all kinds of research, including being used to find out who inspired some of the pioneers of blues, jazz, rock, pop or any other genre. (Jovanovic, 2015)

The technology works by sampling the soundwaves of a song, and then comparing the sample to a data base. It requires that the song first be "fingerprinted" and then added to a data base for the purpose of being recognized. (id)

There are now several types of song recognition software available, including Shazam, which is owned by Apple, and SoundHound, which was started in 2005 by a group of Stanford graduates (Stassen, 2021). There is also a newer system, called Musicxmatch which identifies songs by analyzing lyrics (Audiomelody, 2020)

All of these recognition systems operate in basically the same way:

The app "listens" to the song, creating an audio fingerprint based on a few seconds of the track. The database then stores song data which includes the song's unique sounds and patterns. In this way, a spectrogram is developed, which is essentially a graph that has time on the x-axis, frequencies on the y-axis, and amplitude represented by color. Any

sequence of sound can be converted into a spectrogram. Notes are turned into numbers. For efficiency, the apps get rid of a song's lower energy parts, thereby decreasing the spectrogram and making the app less susceptible to identifying dull sounds and background noise. The result is a string of numbers which are easily storable and searchable. A computer reads this and recognizes the song based on time and distance. When all of the song's data has been identified and hashed, the song now has a unique 32-bit number that becomes its identification in the database. (id)

Fingerprinting the entire song would be computationally impractical because there is too much information in a single song to compile a simple signature. Therefore the fingerprinting focuses on a few relatively "intense" moments to create a spectrogram based on frequency vs. amplitude vs. time. The algorithm then picks out just those points that represent peaks of the graph, working out to about three data points per second per song. (Manjoo, 2009).

Since the sound clips being analyzed may not be clean copies of a song, "This is where algorithms come in handy. The algorithm's job is to compare the fingerprints and determine if the incoming sound clip matches a song (or portion of a song) in the database within a certain range of probability." (Strickland,2020). In this way, songs can be matched in noisy environments, over bad connections, and different versions of the same song can be recognized. (Manjoo, 2009)

"The identification process is similar to the way forensics experts once matched a suspect's fingerprints to those found at a crime scene. Before sophisticated computer software and advanced methods for examining fingerprints became available, experts would look for points of similarity between different fingerprints. In most cases, the specialist would need to demonstrate at least 16 points of similarity for a print to be considered a match." (id).

The song recognition systems are so sensitive, that they can even recognize a song based on a sing/hum recognition technology, as well as lyrics, voice, and complicated queries and context. (Stassen, 2018) With "radio quality" audio to review (which is less than live performance quality) a data base of about 20 thousand song tracks can find a match in about 5-500 milliseconds, and even if the audio sample is somewhat corrupted, it can do so within less than 10 milliseconds.(Wang, 2003).

The way that this technology currently operates, when one of the recognition programs determines a match for a song, there are additional applications that come into play. For example, an application might send information to flag a song on a website and notify the legal department of a record company of a potential copyright infringement. The entire process of analysis and matching takes only a few seconds. (id)

APPLYING THE NEW TECHNOLOGY

Currently, song recognition technology is used by individuals to recognize and share music. For example, Shazam is described as a mobile app that "recognizes music around you" (shazam, 2023) and is used to discover the title and artist. The app is installed on Apple and Android devices, and if a consumer hears a song and wants to know more about it, they merely hold up their device so the app can "recognize" the music.(id). According to the company, they now deliver 1 billion song results every month.

It is easy to see how readily available song recognition technology could be transformed from a tool used by consumers to tell them more about a song, to a system to instantly monitor public performance, which would result in the collection of accurate information on the specific song and the number of times it is played (i.e. publicly performed).

The idea of pay-per-play as opposed to pro rata distribution of funds is already being developed in other areas of music use. For example, when music is being streamed by a streaming service, they can easily keep track of the particular song being streamed and pay the author an accumulated amount for each stream.

Services such as Spotify currently operate a "pro rata" (or "one big pot") royalty model, whereby the majority of all money paid by subscribers is pooled, then paid out based on the market share each artist/label claims of all streams. This means money paid by individual subscribers regularly gets paid to artists they've never listened to. A "user-

centric” model would instead see the subscription fee from an individual paid instead to copyright owners based only on what that individual subscriber has listened to (Didier, 2021). A system based on perceived popularity is therefore no longer tenable, especially when 42% of the 158 million tracks available on Spotify that are rarely played will see no revenue when they are in fact played (Houghton, 2023).

While the streaming music services are currently under scrutiny because songwriters believe that the per stream amount paid is too little (Hypebot, 2021), it would be different when dividing up accumulated public performance monies if, instead of paying pro-rata, payments were to be made user-centric (based on the actual use of the music). Likewise, song recognition technology could be employed by the PROs to accurately keep track of the public performances of music. The PROs could instantly use the data to fairly distribute the accumulated PRO funds to their members based on the actual number of times a song was publicly performed instead of trying to divide the money formulaically as they have done up to now.

All it would take to make this work would be the installation of an inexpensive song recognition device, or the required implementation of song recognition technology to go along with each license issued by a PRO. So, for example, if a store were to buy a license to broadcast music over its public address system, a song recognition device would be installed to keep track of what songs are actually being used. The information would then be collected and the PRO would actually know which songs in its catalog were utilized by that particular venue. Additionally, in a way similar to how the song recognition technology is currently used to investigate copyright infringements, applications could be developed to send public performance information to the PRO in real time. By collecting the information from all of its licensees, the PRO could not only fairly compensate the songwriters and publishers on an actual, user-centric, per-use basis, but could more fairly structure its license fees. Licensees could be charged a small fee per song performed, instead of paying a blanket yearly fee. In other words, those licensees who perform music more frequently would pay more than licensees who use music less frequently, and no payment would be required when music isn’t actually being used. This would certainly be a better system on both ends.

There would also be no reason to trick the system, as the licensee would not care what information is being collected. The licensee is still entitled to play any music in the PRO’s catalog. The device merely keeps track of the information for the PRO for the purpose of more fairly compensating the PRO members.

CONCLUSION

For many years, the Performance Rights Organizations have been unfairly collecting and distributing monies for the public performance of music. There is no reason to continue the current system when the technology has become available to permit the accurate collection of the data necessary to pay copyright owners their fair share of collected royalties.

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EFFECTIVENESS OF ECONOMIC SANCTIONS, THE IMPACT OF WAR, AND OIL PRICE SHOCKS ON THE IRANIAN ECONOMY

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ABSTRACT

Many researchers (Rarick & Han, 2010; Hufbauer & Elliott, 1990; Elliott, 1997; Elliott & Hafbauer, 1999; Pape, 1997,1998; Bergeijk & A.G, 1989; Eaton & Engers, 1999; Hufbauer, 2007; Shojai & Root, 2013) have studied the effectiveness of economic sanctions and concluded that in more than two-thirds of cases sanctions have not been effective. There is no conclusive evidence that sanctions by themselves contribute to the achievement of the goals of sanctioning countries (Smeets, 2018). However, the global economy has witnessed the proliferation of sanctions during the past 23 years. Between 2000 and 2021, the U.S. Treasury's Office of Foreign Assets Control (OFAC) sanction designations against individuals and entities increased by 933 percent, going from 912 cases in 2000 to 9,421 in 2021 (The Treasury 2021 Sanctions Review, the Department of Treasury, p.2). Collins-Chase and Nelson (2023), in an overview of the U.S. sanctions presented to the 118th Congress of the U.S., list major areas of sanctions, including support of international terrorism; nuclear arms proliferation; egregious violation of human rights, democratic governance, or corruption standards, and threatening regional and global stability. This paper focuses on the impact of those sanctions on the Iranian economy and related issues.

INTRODUCTION

Iran has been subject to many sanctions since the revolution of 1979, including mild unilateral sanctions imposed by the U.S. administration or Congress and robust multilateral sanctions administered by the U.S. and the EU. Congressional Research Service report prepared for the U.S. Congress, Humud and Thomas (2022) assess the effectiveness of the U.S. sanctions imposed on Iran based on four criteria: effect on Iran's Nuclear Program and Strategic Capabilities, effects on Iran's Regional Influence, Iranian domestic political effects, and economic effects. The report indicates that Iran has advanced its nuclear and missile programs despite the international sanction regime of 2011-2015. The authors assert that the sanctions have substantially imposed costs on Iran's economy during 2011-2015, including Iran's Gross Domestic Product (GDP) contracted by 20%, its oil exports dropped from 2.5 million barrels per day (mbd) to 1.1 mba by 2014, its foreign reserves abroad declined from \$115 billion to \$85. Its currency depreciated by 757% from 2015 to December 2021 (as of June 2023, the depreciation was 1,357%); trade between the U.S. and Iran declined from \$291 million in 2015 to \$40 million in 2020, and the inflation rate increased to 60% during 2011-2013, and the international banks left Iran (Humud & Thomas, 2022, pp. 50-54).

This paper uses an ordinary least square method (OLS) to estimate the short and long-term impact of economic sanctions, the 1980-88 war between Iran and Iraq, and the oil price shocks on the economic activity and growth of the Iranian economy measured by the change in real GDP, percentage change in the real GDP, and percentage change in the real per capita GDP of Iran using annual data during 1960-2021 period.

ECONOMIC SANCTION MODELS

Many researchers (Pape, 1997, 1998; Parker, 2000; Oskarsson, 2012; Shojai & Root, 2013). Hufbauer et al. (1990) have studied the effectiveness of economic sanctions. However, the empirical research is inconclusive because of the various definitions of effectiveness, methodology employed, and data constraints. Hufbauer et al. (1990) used an ordinary least squares regression to regress an index of success/failure of sanctions on explanatory variables such as the size of sanction-imposing and target countries, the nature of the relationship of sending and receiving countries before the imposition of sanctions, and the cost of sanctions to the sending entity. The study included 115 cases of sanctions between WWI and 1990. The success/failure index was constructed by the product of experts' opinions on "policy success" (whether sanctions were successful or not) and "sanctions contributions to the policy results," each on a scale of 1-4. The product of these scores produced all possible values of the dependent variable (success/failure index) comprised of 1, 2, 3, 4, 6, 8, 9, 12, and 16. Shojai and Root (2013) scrutinized the methodology adopted by Hufbauer et al. (1990). They concluded that the success/failure of sanctions is a random outcome. They used randomly generated values for the dependent variable selected from the population of numbers used by Hufbauer and concluded that the success or failure of sanctions is a random outcome; thus, the empirical research results could be flawed because of this randomness.

THE MODEL AND THE EMPIRICAL RESULTS

Cerra and Saxena (2008) regressed the output behavior following a financial crisis in 190 countries on the lagged dependent variable and a series of dummy independent variables to capture the association between GDP and financial crisis. They document that the significant output loss is associated with financial and political crises. This paper uses an ordinary least square model to regress the change in gross domestic product (GDP), the percentage change in GDP, and the percentage change in per capita GDP in Iran on three dummy variables identifying the periods of sanction episodes, the oil price shocks, and the war between Iran and Iraq during 1980-1988 period. This paper estimates various versions of the model presented below:

$$g_t = a + b \log g_{t-1} + cD_s + dD_o + wD_w + k COP + e$$

Various measures of GDP are presented by g . D_s , D_o , and D_w are dummy variables and represent sanction episodes, oil price shock, and war times, respectively. The dummies are equal to one during sanction episodes, crude oil price shock (a decline of crude oil prices by three or more than three percent from the previous year), and war years but zero otherwise, and annual crude oil price (COP) averaged over 12 months of monthly prices.

The coefficient of dummy variables is expected to be negative, but the coefficient of the lagged dependent variable and COP are expected to be positive. The ADF test indicates that the level of GDP, real per capita GDP, and COP have unit roots and become stationary at the first difference level. All data are obtained from Federal Reserve Economic Data- St. Louis FED (FRED).

The empirical results in the table below of various model versions (not reported here) indicate that lagged dummies are insignificant at any significance level except for those reported here. The conclusion is that sanctions significantly and negatively impact the percentage change in real per capita GDP by an estimated -4.42 percent. Regressing the percentage change in real GDP on the explanatory variables enables the estimate of the percentage change in real GDP caused by one unit change in the explanatory variables. Sanctions negatively and significantly affect GDP after seven years of imposition, causing a drop of 16.15 percent in the GDP. The war's negative and significant impact was experienced two years into it by a reduction of \$58.6 billion in the second year of the war. However, during the first year of the war, GDP improved. Crude oil price consistency has a significantly direct effect on the GDP of Iran.

The sanctions impacted GDP negatively and significantly in the seventh year, causing an estimated \$48.9 billion reduction. However, two years after the sanction episode, GDP is positively impacted by an estimated \$67.3 billion. War significantly negatively impacts the GDP in its second year by an estimated \$58.6 billion; however, its first-year effect is positive. Higher crude oil prices significantly and positively affect GDP, but the lagged dependent variable is not impactful. Forty-three percent of the variation in GDP is explained by the explanatory variables, as indicated by an R-squared of 0.43.

See the table, below:

**THE OLS ESTIMATION RESULTS- 1960-2021
DATA**

EXPLANATORY VARIABLE	REAL PER CAPITA GDP (% CHANGE)	REAL GDP (% CHANGE)	REAL GDP (THE FIRST DIFFERENCE)
CONSTANT	4.56 (2.79)***p	19.71 (4.40)***p	-8.2e+9 (-0.83)
DS (ECONOMIC SANCTIONS)	-4.42 (-2.19)**p	-	-
DO (CRUDE OIL PRICE DUMMY)	-	-	-
SW (WAR YEARS)	-	-	-
CRUDE OIL PRICE (COP, \$)	-	0.55 (2.51)**p	1.83e+9 (4.00)***p
DS-2	-	-	6.73+10 (3.21)***p
DS-7	-	-16.15 (-2.88)***p	-4.89e+10 (-2.80)***p
DW-1	-	-	5.04e+10 (2.84)***p
DW-2	-	-	-5.86e+10 (-3.21)***p
R-SQUARED	0.08	0.21	0.43
ADJUSTED R-SQUARED	0.06	0.18	0.38
NUMBER OF OBSERVATIONS	61	55	55

T-values are reported in parentheses. **, *** indicates significance level of 5%, and 1%, respectively. P indicates a p-value less than 5%. Some coefficients are presented in scientific notation.

CONCLUSION

The overall conclusions based on estimation results are: First, economic sanctions significantly and negatively affect the GDP by \$48.9 billion and the percentage annual change in the GDP of Iran seven years after their imposition by -16.15 percent. However, sanctions immediately and significantly reduce annual percentage change in real per capita GDP by 4.42 percent. Second, crude oil prices significantly and positively affect real GDP and percentage change in real GDP. Crude oil price shows no impact on percentage change in per capita GDP. Similarly, oil price shocks do not significantly impact the Iranian economy at a five percent or better significance level. Third, the Iran-Iraq war has had a negative significant effect on the real GDP by \$ 58.6 billion and the percentage change in the real GDP of Iran two years after the start of the war. The Iran-Iraq war positively impacted the real GDP and the percentage change in real GDP during its first year. This is against the conventional wisdom about the impact of the war. However, immediately after the war, many resources were mobilized to meet the war requirements. Fourth, the lagged dependent variable positively affects the percentage change in real per capita GDP and has no impact on real GDP or its percentage change. The model drops the lagged dependent variable to avoid potential bias in estimating the coefficients.

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LEVERAGING CONTINUOUS DIAGNOSTICS AND MITIGATION FOR CYBERSECURITY ENHANCEMENT OF FEDERAL AGENCIES AND BEYOND

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ABSTRACT

Continuous Diagnostics and Mitigation (CDM) is a cybersecurity program developed by the Department of Homeland Security (DHS) to strengthen the security stance of federal government agencies. This article explores how CDM can help organizations improve their cybersecurity and outlines its applications. The CDM program focuses on delivering federal agencies with increased visibility into their network infrastructure, improved threat detection capabilities, and effective response mechanisms. Through continuous monitoring and automated incident response, CDM assists agencies in identifying and mitigating security risks rapidly. The program also prioritizes risk mitigation based on potential impact, ensuring optimal resource allocation, and enabling agencies to address critical threats proactively.

CDM's collaborative tactic helps with information sharing and knowledge transfer among federal agencies. This collaborative environment promotes the discussion of best practices, emerging threat intelligence, and lessons learned. By leveraging this shared knowledge, agencies can stay informed of evolving cyber threats and implement effective security measures. Furthermore, CDM offers a phased implementation approach, allowing agencies to steadily improve their cybersecurity competencies. This phased approach ensures that current cybersecurity needs are met while providing a foundation for long-term enhancement. Standardized security capabilities and tools provided by CDM develop consistency and interoperability across different agencies, enabling continuous integration of cybersecurity systems.

The benefits of utilizing CDM extend beyond the federal government. Private sector organizations can also leverage CDM principles and practices to strengthen their cybersecurity position. By adopting continuous monitoring, automated event response, and risk-based prioritization, organizations can improve their ability to detect, mitigate, and respond to cyber threats effectively.

HISTORY OF CDM

The Continuous Diagnostics and Mitigation (CDM) program was established by the Department of Homeland Security (DHS) to address the evolving cybersecurity challenges faced by federal government agencies. The program has evolved to enhance the cybersecurity posture of these agencies. Here is a brief history of CDM, from 2009:

The Comprehensive National Cybersecurity Initiative (CNCI) was launched by the federal government, emphasizing the need for improved cybersecurity practices. One of the initiatives under CNCI was focused on the continuous monitoring of federal networks.

2010: The Office of Management and Budget (OMB) released a memorandum (M-10-28) titled "Clarifying Cybersecurity Responsibilities and Activities of the Executive Office of the President and the Department of Homeland Security." This memorandum emphasized the importance of continuous monitoring for federal agencies.

2012: The Department of Homeland Security (DHS) initiated the CDM program as part of its efforts to enhance federal network security. The program aimed to provide federal agencies with tools and capabilities for continuous monitoring, risk assessment, and incident response.

2013: DHS partnered with the General Services Administration (GSA) to establish a contract vehicle called Continuous Monitoring as a Service (CMaaS). This allowed federal agencies to procure commercial off-the-shelf (COTS) tools and services to support their continuous monitoring efforts.

2014: The first task order for the CDM program was awarded, focusing on the acquisition and deployment of tools for continuous monitoring. This marked the initial phase of implementation for CDM.

2015: DHS expanded the CDM program to include phases beyond continuous monitoring. These additional phases encompassed capabilities such as identity and access management, boundary protection, and incident response.

2017: The CDM program underwent further enhancements to address cloud computing and mobile security challenges. These enhancements aimed to ensure that federal agencies could effectively monitor and secure their cloud-based and mobile devices.

2018: DHS released the CDM Program Phase 3 Task Order Request for Proposals (TORFP), which expanded the program's scope to include federal, state, local, tribal, and territorial governments. This expansion aimed to improve cybersecurity across all levels of government.

2019: The CDM Program Phase 4 was launched, focusing on incident response and risk management capabilities. This phase aimed to enhance agencies' ability to detect, respond to, and recover from cybersecurity incidents effectively.

2020 and Beyond: The CDM program continues to evolve, adapting to emerging threats and technological advancements. It remains a cornerstone of the federal government's cybersecurity efforts, supporting agencies in their mission to protect sensitive information, critical infrastructure, and national security.

Throughout its history, the CDM program has played a vital role in improving the cybersecurity posture of federal government agencies, promoting continuous monitoring, risk management, and incident response capabilities. It has served as a framework for agencies to enhance their cybersecurity practices and adapt to the ever-changing cyber threat landscape (DHS, 2021).

In 2013, the Department of Homeland Security (DHS) developed CDM to enhance the cybersecurity position of large and small federal government agencies (DHS, 2021). CDM's main goal is to provide federal agencies with increased visibility into their network assets, improved threat detection capabilities, and effective response mechanisms (CISA, n.d.).

Here are ways in which CDM helps protect federal government agencies:

Enhanced Situational Awareness: CDM enables federal agencies to utilize real-time visibility into their network infrastructure, including hardware, software, and users. This improved awareness allows agencies to identify potential vulnerabilities and threats effectively.

Continuous Monitoring: The program emphasizes continuous monitoring of networks and systems to promptly detect and respond to security incidents. By deploying monitoring tools and establishing strong security controls, CDM helps agencies identify unauthorized activities, anomalous behavior, or indicators of compromise.

Rapid Incident Response: CDM provides federal agencies with the necessary tools and capabilities to respond quickly to security incidents. By implementing automated incident response mechanisms, agencies can mitigate the impact of cyber threats and minimize the time it takes to detect and remediate security breaches.

Risk Prioritization and Mitigation: CDM assists agencies in prioritizing risks based on their potential impact on critical assets and systems. By categorizing risks and vulnerabilities, agencies can allocate resources efficiently and concentrate on addressing the most critical threats.

Phased Approach: CDM follows a phased approach, empowering agencies to implement cybersecurity solutions gradually. This approach allows agencies to address immediate cybersecurity needs while building a foundation for long-term improvement.

Collaboration and Information Sharing: CDM encourages collaboration and information sharing between federal agencies, enabling them to benefit from collective knowledge and experiences. This collaborative approach helps agencies stay updated on emerging threats, vulnerabilities, and best practices for cybersecurity.

Standardized Security Capabilities: CDM establishes a set of standardized security capabilities and tools that agencies can adopt. This ensures consistency in security practices across different agencies and promotes interoperability between various cybersecurity systems.

Explaining the Phases of CDM

The Continuous Diagnostics and Mitigation (CDM) program follows a phased method to implementing cybersecurity measures within federal government agencies. These implementation phases were designed to gradually improve the cybersecurity posture of agencies and address immediate needs while building a foundation for long-term improvement (O’Keeffe, 2018). The CDM program consists of the following four phases:

Phase 1: What is on your network or "Asset Management" The first phase focuses on asset management and identifying hardware (HWAM) and software (SWAM) assets within the network. It involves establishing an inventory of assets, including devices, applications, and users. This phase aims to enhance visibility into the network and establishes a baseline for monitoring and securing assets effectively.

Key activities in Phase 1 include:

- Developing an inventory of hardware and software assets
- Deploying tools for automated asset discovery and tracking
- Establishing a configuration management system to track changes to assets
- Defining policies and procedures for managing assets effectively

Phase 2: "Identity and Access Management" Phase 2 centers around network management and improving the visibility and security of network systems. It involves deploying monitoring tools and capabilities to gain real-time visibility into network traffic, identify vulnerabilities, and detect potential threats. This phase aims to enhance situational awareness and threat detection capabilities.

Key activities in Phase 2 include:

- Implementing continuous monitoring tools for network traffic analysis
- Deploying intrusion detection and prevention systems
- Establishing security information and event management (SIEM) capabilities
- Conducting vulnerability scanning and patch management

Phase 3: "Manage Who Is on the Network" Phase 3 focuses on identity and access management, emphasizing user activity monitoring and controlling access privileges. This phase aims to enhance security by ensuring that only authorized users have access to network resources and identifying any anomalous user behavior.

Key activities in Phase 3 include:

- Implementing multi-factor authentication mechanisms
- Deploying privileged access management (PAM) solutions
- Establishing user activity monitoring and log analysis capabilities
- Conducting user access reviews and periodic account recertification

Phase 4: "Manage What's Happening on the Network" The final phase concentrates on incident response and risk management. It aims to improve agencies' ability to effectively detect, respond to, and recover from cybersecurity incidents. This phase involves implementing automated incident response capabilities and establishing risk management processes.

Key activities in Phase 4 include:

- Deploying security incident event management (SIEM) and security orchestration, automation, and response (SOAR) systems
- Developing incident response plans and playbooks
- Conducting security awareness training for employees
- Establishing risk assessment and mitigation processes

These four phases of CDM create a comprehensive and continuous approach to cybersecurity. By progressing through each phase, federal government agencies can enhance their cybersecurity posture, improve threat detection and response capabilities, and achieve a more resilient security environment.

Who Can Benefit from CDM?

The CDM program is primarily used by federal government agencies in the United States. However, other entities can also benefit from CDM principles and practices. Here are the key beneficiaries of the CDM program:

Federal Government Agencies: The primary beneficiaries of CDM are federal government agencies at the national, state, and local levels. These agencies include departments, agencies, and organizations responsible for national security, law enforcement, public services, healthcare, finance, and more. CDM helps these agencies enhance their cybersecurity posture, protect sensitive information, and safeguard critical infrastructure.

State and Local Governments: State and local government entities can also benefit from CDM. By implementing CDM practices, these organizations can improve their cybersecurity capabilities, detect, and respond to threats more effectively, and protect citizen data and critical government systems.

Critical Infrastructure Sectors: The CDM program can serve critical infrastructure sectors, such as energy, transportation, water, communications, and healthcare. These sectors rely on robust cybersecurity measures to ensure the secure operation of essential services. By adopting CDM principles, these organizations can enhance their threat detection, incident response, and risk mitigation capabilities.

Private Sector Organizations: While the CDM program was originally designed for government entities, private sector organizations can also derive benefits from its principles. Private organizations face similar cybersecurity challenges and adopting CDM practices can help them improve their cybersecurity defenses. Continuous monitoring, automated incident response, risk-based prioritization, and information sharing can significantly enhance the security posture of private sector entities.

Information Sharing and Analysis Centers (ISACs): ISACs play a critical role in facilitating information sharing and collaboration within specific industries. CDM can aid ISACs in strengthening their cybersecurity capabilities, promoting standardized security practices, and helping with the exchange of threat intelligence and best practices among participating organizations.

Cybersecurity Service Providers: CDM can also be beneficial for cybersecurity service providers and managed security service providers (MSSPs). These entities can utilize CDM principles and technologies to offer enhanced monitoring, incident response, and risk management services to their clients, thereby improving the overall cybersecurity ecosystem.

Academia and Research Institutions: Academic institutions and research organizations involved in cybersecurity studies can leverage CDM as a framework to develop and evaluate innovative cybersecurity solutions. By aligning their research and education efforts with CDM principles, these institutions can contribute to advancing the field of cybersecurity.

DRAWBACKS TO CDM

While the Continuous Diagnostics and Mitigation (CDM) program offers significant benefits, there are some potential drawbacks and challenges to the implementation and adaptation. Implementing the CDM program can be complex and resource intensive. It requires significant coordination and effort to deploy the necessary tools, integrate them into existing infrastructure, and establish the required processes and procedures. This complexity may pose challenges, especially for smaller agencies or organizations with limited resources and technical capabilities. The costs associated with implementing and maintaining the CDM program can be substantial. This includes the procurement of necessary tools, licensing fees, infrastructure upgrades, training, and ongoing maintenance costs. For smaller agencies or organizations with limited budgets, the financial burden of implementing CDM may be a constraint. CDM relies on skilled cybersecurity professionals to operate and maintain the program effectively.

There may be a shortage of skilled personnel with expertise in continuous monitoring, incident response, and risk management, particularly in the public sector. The recruitment and retention of qualified cybersecurity professionals can be challenging, potentially impacting the program's effectiveness. The evolving nature of cyber threats necessitates the continuous adaptation of CDM practices and tools. It is essential to ensure that the program remains up-to-date and responsive to emerging threats, technologies, and attack vectors. However, keeping pace with the rapidly changing threat landscape and implementing timely updates to the CDM program can be a challenge. Continuous monitoring within the CDM program involves the collection and analysis of a vast amount of data, including sensitive information.

It is crucial to address data privacy concerns and ensure that appropriate measures are in place to protect the privacy and confidentiality of the collected data. Compliance with relevant privacy regulations and the secure handling of data are critical considerations. Integrating CDM tools and capabilities into existing IT infrastructure can be complex, particularly in environments with diverse systems and platforms. Ensuring seamless interoperability and integration with different technologies and vendors may require additional effort and customization, potentially leading to interoperability challenges and integration complexities. The CDM program often relies on commercial off-the-shelf (COTS) tools and solutions provided by vendors. This dependency on vendors can create challenges such as limited flexibility, vendor lock-in, and reliance on external support for updates, patches, and maintenance. It is essential to establish effective vendor management and maintain a balance between vendor solutions and agency-specific requirements.

While these drawbacks and challenges exist, they can be addressed through careful planning, effective resource allocation, appropriate training, collaboration with industry partners, and ongoing evaluation and improvement of the CDM program. The benefits of enhancing cybersecurity capabilities and the potential for improved threat detection and response often outweigh these challenges, making CDM a valuable initiative for government agencies.

SUMMARY

CDM plays a crucial role in improving the security posture of federal government agencies by providing continuous monitoring, incident response capabilities, risk prioritization, and a collaborative environment. By implementing these measures, CDM helps agencies detect, mitigate, and respond to cyber threats effectively, thereby protecting sensitive government information and critical infrastructure.

In summary, while the primary focus of the CDM program is federal government agencies, its principles, and practices can apply to state and local governments, critical infrastructure sectors, private sector organizations, ISACs, cybersecurity service providers, academia, and research institutions. By adopting CDM, these entities can enhance their cybersecurity capabilities, improve threat detection and response, and fortify their overall resilience against cyber threats. CDM serves as a valuable framework for improving cybersecurity in federal government agencies and beyond. The program's emphasis on continuous monitoring, rapid incident response, risk prioritization, collaboration, and phased implementation offers significant advantages in strengthening cybersecurity defenses. By embracing CDM principles, organizations can strengthen their security infrastructure and mitigate the ever-evolving cyber risks of the current digital age.

THE FUTURE OF CDM

The future of CDM is expected to involve ongoing evolution and expansion to address emerging cybersecurity challenges. The CDM program will continue to incorporate advanced threat intelligence capabilities. This involves leveraging artificial intelligence (AI), machine learning (ML), and big data analytics to improve threat detection and response. By staying ahead of evolving threats, CDM can better protect federal government agencies from sophisticated cyber-attacks. With the increasing adoption of cloud computing in government agencies, CDM will focus on strengthening cloud security measures. This includes developing guidelines, tools, and best practices for continuous monitoring and risk management of cloud-based systems (O'Keeffe, 2021).

The program will address challenges related to cloud security, such as data protection, access control, and visibility across hybrid environments. As the Internet of Things becomes more prevalent within government networks, CDM is likely to expand its coverage to include IoT security. This involves monitoring and managing the security of connected devices, ensuring their integration into the overall cybersecurity framework. CDM may provide guidelines and tools for continuous monitoring, vulnerability management, and incident response for IoT devices. The future of CDM may involve increased collaboration and information sharing among federal agencies, industry partners, and other stakeholders.

This collaborative approach allows for the sharing of threat intelligence, best practices, and lessons learned. It fosters a collective defense approach, enabling a more comprehensive understanding of the threat landscape and promoting timely responses to cyber incidents. Automation and orchestration capabilities will play a significant role in the future of CDM. This includes automating routine cybersecurity tasks, incident response workflows, and security policy enforcement. By reducing manual effort and response time, CDM can enhance the efficiency and effectiveness of

cybersecurity operations within government agencies. CDM will eventually integrate with established risk management frameworks, such as the National Institute of Standards and Technology (NIST) Risk Management Framework (RMF). This integration ensures that CDM aligns with broader cybersecurity practices and compliance requirements, enabling agencies to streamline their security efforts and effectively manage risks. The CDM program may expand its reach to include state, local, tribal, and territorial (SLTT) governments. This expansion aims to enhance cybersecurity across all levels of government, promoting consistent monitoring, incident response, and risk management practices throughout the country.

In summary, the future of CDM in the United States will involve the integration of advanced technologies, addressing cloud security and IoT challenges, fostering collaboration and information sharing, leveraging automation and orchestration, integrating with risk management frameworks, and expanding its coverage to SLTT governments. These developments will enable CDM to adapt to evolving cyber threats and continue strengthening the cybersecurity posture of federal government agencies and the broader government ecosystem.

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PRELIMINARY STUDY TO DESIGN MINDFUL LEADERSHIP CLASS FOR GRADUATE STUDENTS IN IT AND MANAGEMENT SPECIALIZATIONS

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ABSTRACT

Mindful employees tend to be more productive as they can focus on tasks. Also, mindful leaders tend to lead people with stronger mutual trust and task focus. There is no wonder why companies have started developing employees' mindfulness. Many of them also have asked universities, especially graduate programs in IT and management specializations, to ensure their graduates are mindful when employed. Several universities, such as Southern Utah University, Vanderbilt University, and Purdue Global, have introduced mindfulness classes for their students. Our program has also decided to introduce a mindful leadership class as one of its capstone courses. However, developing the class will be challenging because our program has hybrid and online modalities. As a first step, we conducted a preliminary study on employee mindfulness and mindfulness training to design the class. This study will show the benefits of mindful employees and effective ways of developing employee mindfulness.

INTRODUCTION

Mindful employees tend to be more productive when focusing on tasks; therefore, companies have started developing their employees' mindfulness for better focus and productivity in the IT era. According to the Employer-sponsored health and well-being survey in 2018, 52% of the participating companies offered mindfulness training, including yoga and meditation, to their employees (Marturano, 2014; Hougaard et al., 2016; Geroge, 2022; Mindful, 2022).

Also, being mindful is crucial for higher productivity, as multitasking is a fantasy. The human brain is monotasked. Information technology (IT) will not make us multitask. Instead, IT can destroy our focus and productivity. Our mind wanders 47% of the time because of interruptions of our attention with IT, such as cell phones, e-mails, texts, and web browsing (Marturano, 2014; Hougaard et al., 2016; Mindful, 2022).

For our graduate program, it will be our responsibility to ensure our students are mindful and able to maintain mindfulness for better employability and potential career success. In this paper, we will show the benefits of mindful employees in the current working environment. This preliminary study shows the benefits of mindful employees and effective ways of developing employee mindfulness.

MINDFULNESS

Mindfulness is a part of the natural law; therefore, individual mindfulness has many definitions. However, we define it as "paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally" in this paper. The definition indicates three key characteristics of our mindful awareness: purpose, presence, and acceptance. Therefore, a mindful person can intentionally and purposefully pay attention at this very moment to accept whatever arises now (Naik et al., 2013).

Many researchers have pointed out similar features of mindfulness to explain why a mindful person can do the right thing to get the correct result. According to their studies, a mindful person can do these becomes the person is fair and objective by being non-attached, benevolent, understanding, and appreciative. The person also can figure out the reality by focusing on the current movement and acting from multiple perspectives with considered behaviors (Uryu, 1994; Dickmann & Stanford-Blair, 2009; Beekum, 2016).

According to studies focusing on the influence of mindful employees on organizations, a group of mindful employees tend to create new categories, welcome new information, keep multiple viewpoints, and develop process-oriented organizations (Langer, 1989; Uryu, 1994; Fingold & Iarussi, 2019). Groups of mindful employees create a mindful organization, which has five characteristics. It pays attention to potential sources of errors, does not overlook information that may be important for decision-making, has a sensitivity to operations to take immediate corrective actions as necessary, commits resilience, and respects to most knowledgeable persons and experts (Bucher et al., 2016; Sutcliffe et al., 2016).

An increasing number of scientific studies have tried to prove employee mindfulness's psychological, physiological, and spiritual benefits (Naik et al., 2013; Goilean et al., 2020). In 2000, there were less than 100 studies. However, in 2018, there were more than 1200 studies (Goilean et al., 2020). These studies focus on employees' cognitive and academic performance, health and well-being, and improved relationships (Mindful, 2022).

In addition to these studies, companies have recognized the tangible benefits of mindful employees. According to the employer-sponsored health and well-being survey with 163 companies, 52% have introduced mindfulness training to their employees. The training includes yoga and meditation. The employees are also encouraged to use apps to maintain their mindfulness (Marturano, 2014; Hougaard et al., 2016; Geroge, 2022).

The tangible benefits are higher productivity, a better working environment, creativity, forward-thinking, and healthier employees. Especially healthier employees have contributed to reducing the cost of health-related burdens of an organization (Gelles, 2015; Sutcliffe et al., 2016; Ehrlich, 2017; Steinhouse, 2018). This is remarkably important as health-related costs have increased after the IT revolution as the working environment has been overloaded with information and is more complex and ever-changing. Employees need to be always on, work more, and work faster. Employees are overwhelmed, overworked, stressed, and less focused (Hougaard et al., 2016; Geroge, 2022).

Organizations can adjust and make a vision more robust by anticipating potential problems as mindful employees have a vision from different timeframes and multiple viewpoints (Braibant, 2013; Gelles, 2015; Steinhouse, 2018). Mindful employees improve productivity and motivation through powerful mindful leadership with positive force and sensitivity, as they will be generalists with specialized areas by having both people and technical skills. Also, they are clean-headed, engaged, and focused. Therefore, their organizations can also focus and be creative to learn and make the best possible decisions (Coleman, 2019; Pater, 2020; EMA, 2022).

MHCC (2020) categorized the benefits of mindful employees into twelve types of contribution. We summarized the twelve types here. First, they can manage the balance between work and personal demands. Second, they can respect the perspective of others and maintain good two-way communication. Third, they can strive to clarify any issues, engage, be proactive, and seek opportunities to improve their skills and competence. Fourth, they can share their opinions and offer alternatives and solutions in a way that respects the ideas and opinions of others. Finally, they can ask for help, speak up when they witness or experience inappropriate behaviors or actions, and recognize and appreciate others for their efforts and contributions. Many studies have recognized very similar contributions (Schaufenbuel, 2014; Sutcliffe et al., 2016; Johnson et al., 2019).

Table 1: Summary of types of the contribution of mindful employees

<ol style="list-style-type: none">1. They can manage the balance between work and personal demands.2. They can respect the perspective of others and maintain good two-way communication.3. They can strive to clarify any issues that arise, engage, be proactive, and seek out opportunities to improve their skills and competence.4. They can share their opinions and offer alternatives and solutions in a way that respects the ideas and opinions of others.5. They can ask for help, speak up when they witness or experience inappropriate behaviors or actions, and recognize and appreciate others for their efforts and contributions.

If organizations can make their employees mindful, they can expect great “mindful” leaders who can collect and utilize information, correctly prioritize issues and actions, and continuously improve colleagues' livelihoods. Especially mindful leaders can make employees' livelihoods better by improving employees' job satisfaction, engagement, stress management, and interactions with all stakeholders. Also, improving livelihoods means increasing customer and investor satisfaction (Schaufenbuel, 2014; Davies, 2016; Hougaard, 2016; Sutcliffe et al., 2016; Geroge, 2022).

Also, mindful leaders can recognize how and why we make mistakes, what we can and cannot change, and how to respond to them. They can detect critical threats and let employees correctly and promptly react to the threats. This is possible as they encourage employees to have regular and healthy discussions on potential threats and the best ways to deal with them. Employees can develop reliable solutions and alternatives through such discussions by questioning and challenging existing assumptions. Also, they can carefully analyze the threats, solutions, and alternatives to make decisions and integrate these into an up-to-date operational plan (Vogus & Sutcliffe, 2012; Davies, 2016; Hougaard, 2016; Geroge, 2022).

At Facebook, mindful employees developed mindful technology or "the technology with the human mind." The technology will prevent confrontation among users and increase mutual understanding. Patagonia implemented mindful decision-making to protect and be kind to each other, positively impact all stakeholders, and improve transparency and communication. They introduced mindful merchandise using fair-traded recyclable, reusable, and green materials with less packaging. Especially they encourage customers to be mindful of mindful consumption, meaning no materialism and, therefore, no overbuying Patagonia's products. They believe mindful decisions will make mindful buyers, consumers, suppliers, and stakeholders (Gelles, 2015).

DEVELOPMENT OF MINDFUL EMPLOYEES

We can develop employees' mindfulness through appropriate training, which has two steps: being mindful and acting mindfully. First, employees must learn to be mindful. Learning to be mindful requires them to focus quietly and pay attention to anything without attachment. Training employees to find ways of focusing without attachment is a key training goal. Second, they must experience their own mindfulness by practicing mindful behaviors in time management, prioritization, and situational awareness. Introducing mindfulness apps, such as Calm, Headspace, and Insight Timer, has been very popular to support mindful behaviors (Bunting, 2016; Levey & Levey, 2019; Trisoglio, 2022). The apps will help them maintain mindful behaviors such as active listening, brief meditation, and solution-seeking. While apps are very effective, companies ensure apps that are easy to implement at a reasonable cost for employers before the introduction (Levey & Levey, 2019; Barrett, 2022).

Probably, one of the most famous mindfulness training programs is Google's mindfulness employee training started in 2007. Many companies have widely adopted similar training. Mindfulness training is categorized into one of four types of training: selective mindful leadership development, non-selective mindful leadership development, employee-led mindful development, and individual mindful training through mindful apps (Barrett, 2022). By 2016, 22% of US businesses offered various types of mindfulness training. Some of them adopted the training on a large scale. For example, Aetna has offered mindfulness training to more than 13,000 employees by 2016 (Barrett, 2022).

Even if there are four types of training, the elements of mindfulness training are very similar. There are three elements which are (1) understanding and experiencing mindfulness, (2) reinforcement of mindfulness in practice, and (3) utilizing apps to support them to be mindful employees. Many companies have focused on the first element by offering mindfulness classes to let employees understand and experience mindfulness in the workplace.

For example, Prana, Intel, AOL, Salesforce.com, and Google offer mindfulness classes to let employees understand and experience the benefits of being mindful. First, employees will learn the concepts and benefits of being mindful and the myths and realities of mindfulness. Then, they will learn how to be mindful in their workplaces to experience the benefits of being mindful. Typically, mindful classes' ultimate goal is to increase employees' curiosity and motivation toward being mindful (Bunting, 2016; Levey & Levey, 2019; Rupprecht et al., 2019; Trisoglio, 2022). Once employees finish mindfulness classes, companies offer them yoga sessions and meditations at their workplaces to make them continuously mindful (Bunting, 2016; Levey & Levey, 2019; Trisoglio, 2022).

Most companies set up a daily meditation program as the easiest and most effective training to make employees mindful and healthier. Meditation can be done at any time in almost everywhere in companies. Employees will do seated breath meditation called mindful breathing to be grounded, be calm, and notice any existence around them (Naik et al., 2013). Seated breath meditation is not the only meditation to be mindful. There are different types of meditation. These are mindful walking, self-kindness meditation, connectedness meditation, breathing practice, reflection, intention setting, body scan, eating meditation, and guided meditation (Levey & Levey, 2019; Rupprecht et al., 2019; Trisoglio, 2022).

For example, Google has offered their employees daily meditations (Marturano, 2014; Levey & Levey, 2019; Rupprecht et al., 2019). General Mills, Goldman Sachs, Nike, and Fidelity Investments have offered employees routine meditations. Intel offered employees daily mindfulness meditations (Gelles, 2015). Prana has offered employees a daily meditation program, which they will meditate at 3 pm daily. Adobe developed a meditation program every Wednesday afternoon. AOL introduced company-wide employee meditation programs (Levey & Levey, 2019; Rupprecht et al., 2019; Trisoglio, 2022).

Table 2: Job ranks that meditation will work in the USA (Lee, 2022)

1. Professionals
2. Managers
3. Administrative support
4. Service workers
5. Sales workers
6. Technicians

Table 3: List of companies doing mindful meditation in 2016 (Mentalworkout, 2016)

SAP	Hearst Publications	DONG Energy	Green Mountain Coffee Roasters
McKinsey & Company	eBay	Ford	Plantronics
UnitedHealth Group	General Mills	Cargill	Intel
Target	Twitter	Genentech	P&G
Google	Apple	Facebook	Astra Zeneca
Sun Life Financial	Nike	Kaiser Permanente	Royal Bank of Canada
Aetna	Deutsche Bank	Compusense	

Table 4: Job ranks that yoga will work in the USA (Lee, 2022)

1. Professionals
2. Managers
3. Technicians
4. Sales workers
5. Administrative support
6. Service workers

Another reason for the popularity of mindful meditation is its scientifically proven effectiveness. Scientific studies have proven that meditation can reduce workplace stress and absenteeism, improve focus, boost creativity and problem-solving skills, improve job satisfaction, improve communication and relationship, and strengthen empathy (Schaufenbuel, 2014; Rupprecht et al., 2019; Trisoglio, 2022). For example, The UK Department of Health conducted a follow-up survey of their 123 employees who underwent mindfulness training, including mindful meditation, mindful eating, and a short body scan. According to the survey, 80% of the employees felt less stress at work, 77% experienced less anxiety before stressful events, 70% could focus and concentrate more, and 65% could think more clearly. Also, 75% said they would continue mindfulness practices (Bristow, 2016). After all, the daily meditation program is a low-cost solution to employee burnout, workplace stress, and absenteeism (Rupprecht et al., 2019; Trisoglio, 2022).

While meditation is very popular, many companies have introduced routine yoga sessions to let employees improve brain function, lower stress levels, increase flexibility, relieve anxiety, improve a sense of balance, increase self-awareness, calm the mind, and foster resiliency. Prana, Intel, General Mills, Goldman Sachs, Nike, Fidelity Investments, and Suzuki have offered their employees free yoga classes (Marturano, 2014; Levey & Levey, 2019; Rupprecht et al., 2019; Trisoglio, 2022).

MINDFULNESS DEVELOPMENT PLANNING

The cost of the training, training management, and implementation are three major concerns for companies when they introduce mindfulness development training. In addition to the concerns, they need to know the training plan and logistics, including rooms, time, equipment, and trainer. Also, they must determine who will manage and lead the training. If they want their employees to use mindfulness apps, they need to find appropriate apps and let trainers be familiar with the apps (Naik et al., 2013; Bristow, 2016).

Companies must know that being mindful is not easy for many employees without experiencing the benefits of mindfulness through practicing mindful behaviors. Therefore, ensuring a correct understanding of mindful behaviors at a very early stage of mindfulness training is key for successful training. For success, training programs must be able to deal with employees who cannot focus and pay attention as they cannot stop thinking. Also, the programs must ensure they do not feel too restless to be mindful. Companies should pay attention to employees' tiredness and stress levels because they cannot be mindful when they are too tired or stressed out (Naik et al., 2013).

Trainer selection is very difficult as they must be examples of mindful employees. They must show mindful behaviors in front of employees as mindful practice guidelines (Naik et al., 2013). Also, they are expected to offer trainees various practical tips to be mindful during training sessions. Such practical tips include 15 minutes of breathing meditation before work, taking a stop between tasks, being monotask, taking time outs for a quick meditation or walking meditation, lunchtime without PCs and smartphones, mindful listening, and recording own accomplishments. All these tips are practical and effective for all employees (Schaufenbuel, 2014).

Table 5: Ten Mindful Behaviors (Naik et al., 2013).

1. I am able to observe my thoughts and feelings without getting lost in them.
2. I am aware of my body and physical sensations throughout the day.
3. I can easily find words to describe my feelings.
4. I can easily describe different sensations that I am feeling.
5. I notice when my mind is wandering and return it to the present.
6. I am aware of the thoughts and emotions influencing my actions and behaviors.
7. I can accept unpleasant experiences without judging them.
8. I can be aware of my thought and emotions without judging them to be good or bad.
9. I can notice my thoughts and emotions without having to react to them.
10. I can pause before reacting in difficult or stressful situations.

Teaching employees how to use mindful apps is a great idea to ensure the continuity of employees' mindfulness. However, companies must be careful in selecting the apps. They must check if apps align with operational or training goals. They need to know if apps are developed based on a theory of change, psychological model, or established good mindful practice. They should confirm the practical effectiveness of the apps they want to implement. They ensure apps will work on different mobile platforms. Finally, they need to check if apps will be constantly updated, manage data appropriately, and have the appropriate level of security (Barrett, 2022).

SUMMARY

We discussed the benefits of mindful employees in the current working environment. Also, we argued appropriate ways of developing mindful employees. Mindful employees are required for business success in the digitization era. Mindful employees are more focused and productive because they will not be disrupted by IT, such as cell phones, e-mails, texts, and web browsing. If companies need more mindful employees, offering employees to be mindful is one of the most critical corporate responsibilities.

This study gives us some critical points we must consider in a mindful leadership class. While mindful training seems simple and easy to implement, we must carefully design our mindful leadership course, as making students mindful will take time. Instead of focusing on making them fully mindful, it may be better to focus on increasing their interest in being mindful by showing the benefits of mindfulness and cases of success of mindful employees and leaders first. Then, we should introduce them to effective mindfulness practices. As a final project, we will ask them to design their own mindfulness practice to continue to be mindful.

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A REVIEW OF LARGE LANGUAGE MODELS

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ABSTRACT

This paper is a review of large language models, with a focus on the evolution, architecture, capabilities, applications, challenges, ethical issues, and prospects of these models. Starting with the introduction of Chat Generative Pre-Trained Transformer 4 (ChatGPT-4), a chatbot by OpenAI, and its rapid user adoption, the study delves into its foundational basis in the Generative Pretrained Transformer (GPT) series. The paper traces the progression from Bag of Words (BOW) work (Harris, 1954) to GPT-4, emphasizing their immense scale and training data. ChatGPT-4's role as a fine-tuned conversational AI model is detailed, showcasing its extensive training and capacity for capturing language patterns and reasoning. Key concepts in AI, machine learning, deep learning, and natural language processing are also outlined to facilitate comprehension. This review discusses the significance of large language models and their inclusion of billions of parameters, training data, and the contextual complexity. It highlights ChatGPT-4 as an exemplar of these large models and underlines their application versatility, including few-shot learning and creative text generation. The historical progression of NLP techniques is traced emphasizing the transformative role of large language models. These applications span generating human-like text, answering questions, creative writing, and beyond, while their potential ethical, environmental, and robustness concerns are acknowledged. The paper concludes by offering a comprehensive overview of the advancements, challenges, and potential impacts of large language models in the domain of Natural Language Processing (NLP).

INTRODUCTION

Recently the OpenAI released the Chat Generative PreTrained Transformer 4 (ChatGPT-4), the fourth version in the GPT series. ChatGPT-4, a chatbot which can interact with human beings through written language and images. What is more surprising about ChatGPT is the fact that it has a growing number of user base. According to OpenAI, ChatGPT acquired 1 million users just within 5 days of its launching in November 2022. By comparison, it took Instagram approximately 2.5 months to reach 1 million downloads, Whereas Netflix had to wait around 3.5 years to reach 1 million users (Duarte, 2023).

But what kind of chatbot is ChatGPT to achieve this kind of amazing popularity? ChatGPT is based on the Generative Pretrained Transformer (GPT) series of models, developed by OpenAI. The original GPT was introduced in 2018 and was trained to predict the next word in a sentence, thus learning to a rich understanding of the syntax, semantics, and even some world facts (Radford et al., 2018). GPT-2, released in 2019, was a larger model with 1.5 billion parameters. It achieved state-of-the-art results on various language benchmarks, demonstrating the power of scaling up language models (Radford et al., 2019). In 2020, OpenAI introduced GPT-3, an even larger model with 175 billion parameters, which further pushed the capabilities of language models (Brown et al., 2020). In brief, ChatGPT is a specific application of the GPT series that is finetuned for human-like conversation. It utilizes the unsupervised learning capabilities of GPT-2 or GPT-3, and then undergoes additional fine-tuning on datasets that include conversational data (OpenAI, 2022). This progression from GPT to ChatGPT represents a significant milestone in the development of conversational AI, enabling more natural, coherent, and contextually aware dialogue generation.

What does ChatGPT have to do with large language models? ChatGPT stands as a prominent example of large language models due to its sheer size, complexity, and capabilities. Understanding why it is classified as a large language model requires a deeper dive into its underlying structure and training process. The notion of 'large' language models began to take shape with the introduction of models such as GPT-2 and GPT-3, which contain billions of parameters and are trained on extensive corpora of text data. These models are large both in terms of their parameter count and the data they are trained on (Radford et al., 2019; Brown et al., 2020). ChatGPT is a fine-tuned version of the GPT series, incorporating the large scale and complexity of these models. With the number of parameters ranging from 117 million (GPT-2 small) to 175 billion (GPT-3), the model has a vast potential to capture complex patterns in language (Radford et al., 2018; Brown et al., 2020). Large language models like ChatGPT are trained on vast amounts of text data. This extensive training allowed the model to learn language patterns, idioms, facts about the world, and

even some level of reasoning (Radford et al., 2019; Brown et al., 2020). Before we get deeper, few terms are presented here to facilitate the readers of this paper:

Artificial Intelligence (AI): AI refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. It is an interdisciplinary field that includes machine learning, natural language processing, computer vision, and robotics (Russell & Norvig, 2016).

Machine Learning (ML): A subset of AI; ML involves developing algorithms that improve automatically through experience and use of data (Bishop, 2006).

Deep Learning (DL): DL is a subset of machine learning that involves algorithms inspired by the structure and function of the brain called artificial neural networks. It has been crucial for tasks that involve large-scale, high-dimensional data (Goodfellow, Bengio, & Courville, 2016).

Natural Language Processing (NLP): NLP is a field of AI that enables computers to analyze, understand, and generate human language (Jurafsky & Martin, 2019).

Transformers: Transformers are a type of model architecture used in NLP that utilize self-attention mechanisms. They were introduced by Vaswani *et al.* in the ‘Attention is All You Need’ paper (Vaswani et al., 2017).

Language Model: A language model is a type of ML model that is trained to predict the next word in a sequence. It learns the probability distribution of the word sequences (Bengio, Ducharme, Vincent, & Jauvin, 2003).

Fine-tuning: Fine-tuning involves taking a pre-trained model (usually trained on a largescale dataset) and adapting it to a specific task with further training, typically involving a smaller, task-specific dataset (Howard & Ruder, 2018).

Few-Shot Learning: Few-shot learning is a concept in machine learning where the aim is to design machine learning models that can learn useful information from a small number of examples - typically about 1-10 training examples (Lake, Salakhutdinov, & Tenenbaum, 2015).

Keeping the above-mentioned terms in mind, four quotes and paraphrases are mentioned to reveal the core nature of Large Language Models:

“Language model size really does matter – in a big way. In fact, we found that transformer models trained on large text corpora in many languages can not only learn to generate coherent sentences and paragraphs, but also perform well on many language tasks — like translation and question answering — with only minimal changes to the base model.” (Brown et al., 2020)

“Large Language Models, such as GPT-3, can few-shot learning. This means that they can perform tasks accurately after only seeing a few examples. This versatility allows these models to adapt to a wide variety of tasks without needing extensive re-training.” (Brown et al., 2020)

“Models like GPT-3 are trained to predict the next word in a sentence, and by doing so, they absorb a large amount of information about the world. This broad 'knowledge' base allows them to generate creative, human-like text based on the prompts given to them.” (Radford et al., 2019)

“Large language models, such as GPT-3, are not only useful in specific, guided tasks, but they also excel in open-ended tasks where the goal is not strictly defined, such as drafting an essay or creating a story. This shows the creative potential of these models.” (Radford et al., 2019)

Large language models have revolutionized many areas of AI, including NLP, ML, and human-computer interaction. The field of NLP started with the rule-based systems in the 1950s and 60s, where programmers manually wrote sets of rules for language processing tasks (Jurafsky & Martin, 2009). With the advent of ML techniques in the 1980s, statistical models began to take the center stage. They were based on methods such as decision trees, hidden Markov models (HMMs), and later, support vector machines (SVMs) (Manning & Schütze, 1999). In the 2000s, neural networks, particularly recurrent neural networks (RNNs), began to make waves in the NLP community due to their

ability to capture complex dependencies in sequential data (Bengio, Ducharme & Vincent, 2003). The concept of sequence-to-sequence learning emerged around 2014, with models like Long Short-Term Memory (LSTM) and Gated Recurrent Units (GRU) becoming popular for tasks such as machine translation (Sutskever, Vinyals & Le, 2014). The development of attention mechanisms, particularly the Transformer model, represented a breakthrough, as it improved the performance and efficiency of these tasks significantly (Vaswani et al., 2017). The idea of pretraining large language models on large corpora of text and then fine-tuning them for specific tasks emerged as a powerful paradigm in NLP. Models like ELMo (Peters et al., 2018), GPT (Radford et al., 2018), BERT (Devlin et al., 2018), and their subsequent iterations like GPT-3 and GPT-4 have recently set new benchmarks in a wide array of NLP tasks.

Large language models in the GPT series have made significant contributions to the field of AI. These models have several benefits that make them advantageous in a variety of applications. Large language models have achieved state-of-the-art performance across a range of language tasks. They can generate human-like text, answer questions, write essays, summarize texts, translate languages, and even generate Python code (Brown et al., 2020). Large language models like GPT-3 can perform few-shot learning, that is, they can understand and adapt to new tasks given just a few examples, without explicit fine-tuning. This makes them highly versatile and adaptable to different applications (Brown et al., 2020). Since they are trained on a wide variety of internet text, large language models possess broad factual knowledge about the world, allowing them to provide useful information on a diverse range of topics (Radford et al., 2019). Large language models can also enhance human creativity by providing inspiration, helping to brainstorm ideas, writing assistance, and even creating art or poetry (OpenAI, 2022). The performance of large language models tends to improve with more data and bigger models, which bodes well for future advances as computational resources and data availability continue to increase (Kaplan et al., 2020).

While large language models such as GPT-3 and GPT-4 have achieved impressive results in various NLP tasks, they also raise a number of significant concerns and challenges. Large language models can inadvertently generate biased or inappropriate content, reflecting biases present in their training data (Bolukbasi et al., 2016). Additionally, they can be used to produce misinformation, deepfake text, and to automate trolling or spamming, raising critical ethical and societal concerns (Chesney & Citron, 2019). Moreover, the training of large language models involves significant computational resources, which contributes to carbon emissions and environmental concerns (Strubell, Ganesh, & McCallum, 2019). Besides, as the size of these models increases, it becomes more challenging to understand how they make specific decisions or predictions. This lack of transparency hinders debugging and creates difficulties in ensuring that these models behave as expected (Gunning, 2017). Also, large language models can sometimes generate plausible sounding but incorrect or nonsensical answers, highlighting issues with their robustness (Lipton, 2018).

To sum up, this paper aims at providing an examination of the current state-of-the-art in large language models, shedding light on their evolution, architecture, capabilities, applications, and the challenges and opportunities they present in advancing the field of NLP.

RELATED STUDIES

The origins of large language models (LLMs) can be traced back to the concept of Bag of Words (BOW) work (Harris, 1954). The BOW representation is a foundational technique in NLP that represents a document as an unordered collection of words. It discards word order and grammar, creating a vocabulary of unique words from the entire corpus. Each document is then represented as a sparse vector, where each dimension corresponds to a word from the vocabulary, and the value in each dimension is the frequency of the corresponding word's occurrence in the document. Later, BOW was improved with the concept of Term Frequency-Inverse Document Frequency (TF-IDF) (Sparck Jones, 1972). TF-IDF is a technique that adjusts the scores of the words in the BOW representation to emphasize the importance of rare words in a document collection. It combines two metrics: term frequency (TF) and inverse document frequency (IDF). TF measures the frequency of a word in a document, while IDF measures the rarity of a word across the entire document collection. The TF-IDF score of a word is the product of its TF and IDF scores, giving higher scores to rare words and lower scores to common words. Later, TF-IDF was tried to improve with Word2Vec (Mikolov et al, 2013). Word2Vec is a word embedding technique that represents each word as a high-dimensional vector. These word embeddings are learned by a neural network that explores word correlations within a large corpus. By capturing the semantic meaning of words based on their contextual usage, Word2Vec enables operations like word similarity and analogy, making it a powerful tool in various NLP tasks. However, RNN (Recurrent Neural Networks) (Rumelhart et al, 1986) offered a better approach towards NLP tasks. RNNs address the limitations of word embeddings by enabling the computation of document embeddings through leveraging word

context within sentences. They are capable of handling variable-length input sequences, making them suitable for NLP tasks. LSTM (Long Short-Term Memory) (Hochreiter et al, 1997), a variant of RNN, was introduced to capture the long-term dependencies in sequences, and Bidirectional RNNs (Schuster, 1997) further improved context understanding by considering both left-to-right and right-to-left dependencies. The Encoder-Decoder RNNs (Sutskever et al, 2014) emerged to create document embeddings that can be decoded back into text. Then, the transformer model (Vaswani et al, 2017) revolutionized NLP by introducing the attention mechanisms. It is an encoder-decoder model that efficiently attends to relevant parts of the input sequence, allowing for better alignment of the output sequence with the input.

Transformers have led to significant advancements in various NLP tasks, such as machine translation, language modeling, and text generation. GPT (Generative Pre-trained Transformer) (Radford et al, 2018) is the first autoregressive model based on the Transformer architecture. It marked a significant milestone in NLP by demonstrating impressive language generation capabilities. Subsequent versions, GPT-2 (Radford et al, 2019) and GPT-3 (Brown et al, 2020), further improved upon GPT's performance by increasing the model size and training on larger datasets. GPT-3 was pre-trained on the common crawl corpus and highlighted unprecedented language generation capabilities. Lastly, GPT-4 (OpenAI, 2023), the fourth version of the GPT series, became a large-scale, multimodal model which acquired capacities of processing image and text inputs to generate text outputs. Let us now focus our discussion on the architecture of the LLM's.

ARCHITECTURE OF LARGE LANGUAGE MODELS

The architecture of the LLMs play a pivotal role in their success and performance. Over the years, the development of sophisticated architectures has led to significant advancements in NLP tasks (Liu et al, 2023). This section provides an overview of the key architectural components of LLMs, with a focus on the Transformer architecture, pre-training and fine-tuning mechanisms, and the transfer learning paradigm.

The Transformer architecture, introduced by (Vaswani et al, 2017), revolutionized the field of NLP. Unlike traditional RNNs (Rumelhart et al, 1986), which had limitations in capturing long-range dependencies in sequential data, Transformers leveraged the concept of self-attention mechanisms to process the entire sequences simultaneously (Choi, 2023). This innovation enabled the models to effectively learn contextual relationships between words in a sentence (Akula et al, 2021). At the core of the Transformer is the self-attention mechanism, which allows the model to weigh the importance of different words in a sentence when processing a specific word. The attention mechanism facilitates capturing global dependencies and identifying salient contextual information. Moreover, Transformers use multiple self-attention layers, enabling the model to incorporate hierarchical information effectively (Niu et al, 2023).

Pre-training and fine-tuning are fundamental steps in the development of large language models. Pre-training involves training the model on a large corpus of unlabeled text using unsupervised learning. The objective is to predict missing words in a sentence or mask certain words and then train the model to predict them. This process allows the model to learn language patterns, semantics, and grammar from vast amounts of data (Guu et al, 2023). After pre-training, the model is fine-tuned on specific downstream tasks using labeled data. Fine-tuning tailors the model to perform specific NLP tasks, such as text classification, question-answering, or machine translation. By fine-tuning on task-specific data, the model adapts its knowledge to the target task while preserving the general language understanding learned during pre-training (Jin, 2020).

The transfer learning paradigm, exemplified by LLMs, has been a transformative aspect of NLP. In traditional ML, each task requires individual training from scratch. However, LLMs can leverage their pre-trained knowledge and adapt it to various downstream tasks. This transfer learning approach not only reduces the need for extensive labeled data for each specific task but also enables the sharing of knowledge across different domains and languages (Krishnan et al, 2023). The transfer learning paradigm typically involves two stages. In the first stage, the model is pre-trained on a large corpus of text using unsupervised learning. In the second stage, the pretrained model is fine-tuned on task-specific data using the supervised learning technique. This process enables the model to generalize well on new tasks, even with limited training data, making it highly efficient and versatile (Krishnan et al, 2023).

Despite the impressive capabilities of LLMs, several challenges persist in their architecture design. One significant challenge is the model size and the computational complexity. As models scale up to billions of parameters, they demand substantial computational resources for training and inference, making them less accessible to researchers

and developers with limited resources (Chowdhery et al, 2023). Another challenge is the interpretability of LLMs. The black-box nature of these models makes it difficult to understand their decision-making process, which raises concerns about transparency and trustworthiness, particularly in critical applications like healthcare and finance (von Eschenbach, 2021). Furthermore, the ethical implications of language model architectures need careful consideration. Models trained on vast amounts of data may inadvertently perpetuate biases present in the training data, leading to biased outputs and unfair decision-making (Ferrara, 2023). To address these challenges, ongoing research is focused on optimizing model architectures for efficiency, developing techniques for interpretability and explainability, and ensuring fairness and ethical considerations are incorporated into the design process (Saeed & Omlin, 2023).

CAPABILITIES OF LARGE LANGUAGE MODELS

LLMs have demonstrated remarkable capabilities that have transformed the landscape of NLP. Leveraging their vast number of parameters and powerful architectures, these models have shown impressive performance across a wide range of NLP tasks (Jian et al, 2019). This section explores the key capabilities of LLMs highlighting their strengths in language, understanding generation, contextual reasoning, and multilingual support. One of the primary strengths of LLMs is their ability to understand and comprehend natural language. Through pre-training on massive amounts of text data these models acquire a deep understanding of linguistic patterns, semantic relationships, and syntactic structures. The self-attention mechanism in Transformer-based architectures allows them to capture long-range dependencies, enabling more comprehensive language understanding (Petroni, 2019). In practice, this capability translates into state-of-the-art performance on NLP tasks such as text classification, sentiment analysis, and named entity recognition.

LLMs can accurately classify text into predefined categories, gauge the sentiment expressed in a piece of text, and identify entities such as names of people, organizations, or locations (Alsayat, 2022). LLMs excel at language generation tasks, enabling them to produce human-like text. These models can generate coherent and contextually appropriate responses making them suitable for chatbots, virtual assistants, and creative text generation applications (Abdullah et al, 2022). Text generation can include tasks such as machine translation, text summarization, and dialogue generation. LLMs have demonstrated impressive results in machine translation, outperforming traditional rule-based and statistical machine translation approaches. They can also generate concise summaries of lengthy documents, condensing information while maintaining the key content. Moreover, they can participate in natural and contextually relevant conversations making them valuable for dialogue systems (Hu et al, 2018).

Contextual reasoning is a crucial aspect of language understanding and LLMs excel in this domain. By capturing the contextual relationships between words in a sentence, these models can infer nuanced meanings and make informed decisions based on the broader context (Wong et al, 2023). This capability is particularly evident in question-answering tasks. LLMs can accurately answer questions by contextualizing the information provided in the question and leveraging their knowledge from pre-training. They can handle complex queries, requiring reasoning over multiple pieces of information (Yasunaga et al, 2021). Another remarkable capability of LLMs is their ability to handle multiple languages effectively. By being pre-trained on multilingual corpora, these models acquire cross lingual knowledge, allowing them to understand and generate text in various languages without the need for separate language-specific models (Zhao, 2023).

Multilingual support is advantageous in scenarios where data availability is limited for certain languages or when dealing with multilingual communication. LLMs can perform tasks like cross-lingual document classification, machine translation between language pairs, and even multilingual question-answering (Huang et al, 2019). While the multilingual capabilities of large language models are impressive, they may face challenges with low-resource languages, where data scarcity can hinder their performance (Riabi, 2021). As LLMs continue to evolve ongoing research aims to enhance their capabilities further. Incorporating fine-tuned strategies, external knowledge, and developing models that can reason over longer contexts are some of the directions researchers are exploring in this area (Thoppilan, 2022). Moreover, addressing biases in language models is crucial to ensure fair and ethical behavior in their responses and outputs. Efforts are being made to mitigate biases during pretraining and fine-tuning thus promoting responsible AI applications in real-world scenarios (Bender et al, 2021).

APPLICATIONS OF LARGE LANGUAGE MODELS

LLMs have demonstrated their versatility and effectiveness across a wide range of NLP applications. Leveraging their deep language understanding and generation capabilities these models have significantly advanced the state-of-the-art in text mining applications. This section explores some of the key applications of LLMs and their impact on the field of NLP.

Text generation is one of the primary applications where LLMs have excelled. These models can generate coherent and contextually relevant text making them invaluable for tasks like creative writing, content generation, and story generation. They have been employed in various creative projects including generating poetry, authoring short stories, and even composing music (ÖZÇİFT, 2023). In addition to creative writing, LLMs have found practical applications in generating product descriptions, news articles, and personalized recommendations. They can be used to automate content creation for websites, blogs, and social media platforms saving time and effort for content creators (Solaiman et al, 2019).

Machine translation is another area where LLMs have shown impressive performance. Their ability to capture cross-lingual semantics and context enables them to excel in translating text between different languages (Litschko, 2021). With the advent of multilingual pre-training, LLMs can handle translation tasks involving multiple language pairs without the need for language-specific models. This multilingual translation capability is particularly valuable in scenarios where resources for individual language pairs are limited (Liu, 2020).

LLMs have brought significant advancements in question-answering systems. They can process and comprehend complex questions and provide accurate and contextually relevant answers (ÖZÇİFT, 2023). Question-answering systems powered by large language models are widely used in customer support chatbots, virtual assistants, and search engines. Users can obtain information and answers to their queries in a conversational manner, enhancing the user experience and improving the accessibility of information (ÖZÇİFT, 2023).

Sentiment analysis; the task of determining the sentiment expressed in a piece of text, has been improved with the advent of LLMs. These models can accurately identify the sentiment as positive, negative, or neutral, and even capture more nuanced emotions (Alsayat, 2022). Sentiment analysis has practical applications in social media monitoring, market research, and brand reputation management. LLMs enable businesses to analyze customer feedback, gauge public opinion, and make data-driven decisions based on sentiment insights (Alsayat, 2022).

With the advent of the LLMs the chatbots and virtual assistants have also become increasingly sophisticated and human-like. These models underpin the natural language understanding and generation capabilities of modern chatbot systems (Ray, 2023). LLMs enable chatbots to engage in contextually relevant and meaningful conversations with users. They can assist users with various tasks, such as providing information, answering queries, and even executing actions based on user requests (Ray, 2023).

The applications of LLMs are continually expanding, driven by ongoing research and development. Future directions of LLMs include:

- **Advancements in creative writing:** LLMs have the potential to become creative co-authors, assisting writers in various genres and enhancing storytelling in interactive narratives and video games (Anderson, 2023).
- **Domain-specific applications:** Tailoring large language models to specific domains, such as legal, medical, or scientific, can lead to more accurate and specialized language understanding, enabling more sophisticated applications in these fields (Zheng et al, 2023).
- **Personalized conversational agents:** Further developments in personalization techniques will enable chatbots and virtual assistants to adapt their responses and behavior according to individual user preferences, making interactions more personalized and effective (Omarov, 2023).
- **Explainable AI in applications:** Incorporating explainability mechanisms into LLMs will enhance their transparency and interpretability, making them more trustworthy and suitable for critical decision-making scenarios (Albarracin et al, 2023).

Next, we will discuss about the challenges of the LLMs.

CHALLENGES IN LARGE LANGUAGE MODELS

While LLMs have shown unprecedented success in various NLP tasks, their development and deployment also come with significant challenges. As LLMs scale up in size and complexity certain issues arise that need to be addressed to ensure their efficiency, fairness, and their responsible use. This section discusses some of the key challenges faced in the realm of LLMs.

One of the primary challenges in LLMs is the demand for substantial computational resources during training. Training models with billions of parameters requires specialized hardware, such as Graphics Processing Units (GPUs) or Tensor Processing Units (TPUs) and can be expensive and time-consuming. As a result, access to such resources may be limited for researchers and developers with fewer resources at their disposal (Jia, 2023). Furthermore, the environmental impact of training LLMs is also a concern due to the significant energy consumption involved. Research efforts are being made to optimize model architectures and training procedures to reduce the computational requirements and environmental footprint (George et al, 2023). LLMs trained on vast amounts of text data may inadvertently inherit biases present in the data. These biases can lead to unfair or discriminatory outputs, perpetuating societal inequalities and reinforcing stereotypes. It is crucial to address these ethical considerations to ensure that language models produce unbiased and inclusive responses (Hadi, 2023).

Mitigating bias in LLMs is a complex task that requires careful curation of training data, evaluation metrics, and post-training analysis. Researchers and developers must adopt responsible practices to identify and rectify biases and ensure that language models are sensitive to the needs and values of diverse user groups (Hadi, 2023). The black-box nature of LLMs poses challenges in interpreting their decisions and understanding the reasoning behind their outputs. The lack of transparency in their decision-making process hinders the identification of potential errors, biases, or safety concerns (Albarracín et al, 2023). Interpretability is crucial, especially in critical applications such as healthcare, finance, and law, where model decisions have significant implications. Efforts are underway to develop techniques for model interpretability, enabling users to gain insights into how the model arrives at its predictions (Albarracín et al, 2023).

LLMs trained on extensive datasets may inadvertently memorize sensitive or confidential information present in the training data. This poses data privacy and security risks when these models are deployed in real-world applications. Unauthorized access to model weights or intermediate representations could lead to data leakage or potential exploitation of confidential information (Sabastian, 2023). Secure and privacy-preserving methods are being explored to mitigate these risks and safeguard user data. Techniques like differential privacy and federated learning aim to protect user privacy while ensuring model performance (Sabastian, 2023).

Deploying LLMs in real-world applications can be challenging due to their size and computational requirements. Integrating these models into production environments and ensuring real-time performance while serving many users requires careful engineering and optimization (Hsieh et al, 2023). Moreover, adapting language models to low-resource languages or specialized domains presents scalability challenges. Research efforts are directed towards developing more efficient and lightweight models that can cater to diverse deployment scenarios (Kheddar et al, 2023). Ensuring fairness and inclusivity in large language models is critical to avoid perpetuating biases and providing equitable access to their benefits. Fairness-aware training and evaluation techniques aim to address bias-related issues and ensure that the models produce equitable outputs across different user groups (O'Connor & Lui, 2023). Inclusivity also involves accommodating users with diverse linguistic backgrounds, including those with non-standard or marginalized languages. Multilingual support and efforts to make models more accessible to speakers of low-resource languages are essential for promoting linguistic diversity and inclusivity (O'Connor & Lui, 2023).

OPPORTUNITIES IN LARGE LANGUAGE MODELS

The development of LLMs has opened a plethora of opportunities in the field of NLP. Leveraging their powerful architectures and extensive pre-training these models have the potential to drive significant advancements and innovations. This section explores some of the key opportunities offered by LLMs and their potential impact on various NLP applications. As LLMs continue to grow, optimizing their architectures and improving their efficiency become crucial research objectives. Developing more compact and efficient models while maintaining high performance can democratize access to NLP advancements. Efficient models would allow researchers and developers with limited computational resources to harness the power of LLMs for diverse applications (Dey et al, 2023).

Research efforts are focused on exploring novel model architectures, compression techniques, and parameter reduction methods to create efficient variants of LLMs. These advancements not only benefit resource-constrained environments but also contribute to reducing the environmental impact associated with training and deploying these models (Kamath & Renuka, 2023). Continual learning and lifelong learning paradigms represent exciting opportunities for LLMs. These paradigms enable models to continuously learn and adapt to new data and tasks over time, without catastrophic forgetting of previously acquired knowledge (Lin et al, 2023).

Implementing continual learning in LLMs can facilitate their adaptation to dynamic environments, emerging language patterns, and evolving user needs. Continual learning also allows these models to retain domain-specific knowledge and improve their performance across a wide array of applications (Lin et al, 2023). Integrating LLMs with domain-specific knowledge sources can unlock their full potential in specialized applications. Combining general language understanding with domain-specific information can lead to more accurate and contextually appropriate responses in specific domains like healthcare, law, finance, and scientific research (Zhu et al, 2023). Hybrid models that integrate LLMs with structured knowledge graphs, domain-specific ontologies, or external databases hold promise in enhancing the language model's domain expertise and providing more informed and accurate outputs (Zhao et al, 2023). The lack of interpretability in LLMs raises concerns about their trustworthiness and reliability in critical applications.

Developing techniques for explaining model decisions and generating human-readable justifications can enhance user confidence in the model's outputs (Susnjak, 2023). Explainable AI techniques, such as attention visualization, feature attribution, and counterfactual explanations, provide valuable insights into the model's decision-making process. These explanations not only enhance model trustworthiness but also aid in identifying and rectifying biases and potential errors (Albarracin, 2023). Expanding LLMs to incorporate multimodal understanding is a promising opportunity for advancing NLP applications. Integrating visual and auditory information with textual context can lead to more comprehensive language understanding, enabling language models to analyze and generate content across multiple modalities (Göpfert et al, 2023). Multimodal language models have applications in image captioning, video analysis, and speech-to-text tasks. They can facilitate more interactive and engaging user experiences and foster the development of more sophisticated AI systems (Göpfert et al, 2023). LLMs have the potential to influence and impact a wide range of users and communities. Therefore, ensuring responsible and ethical AI practices is of paramount importance (Ferrara, 2023). Opportunities exist for embedding ethical considerations into LLM development, including promoting fairness, addressing biases, and ensuring inclusivity. Emphasizing the alignment of language models with human values and societal norms can lead to more responsible and beneficial AI applications.

DISCUSSION OF OBSERVATIONS

The observations and advancements in LLMs have brought about significant transformations in the field of NLP. In this section, we discuss the key observations and insights gained from the evolution, architecture, capabilities, applications, challenges, and opportunities of LLMs. The evolution of LLMs has seen a remarkable shift from traditional language modeling techniques to the transformer architecture. The introduction of self-attention mechanisms in transformers has revolutionized the way language models process and understand sequential data. This attention-based approach has enabled the models to capture long-range dependencies and contextual information effectively (Vaswani et al, 2017). The scaling up of model size and parameter count has led to substantial improvements in language understanding and generation capabilities. However, it has also brought challenges related to computational resources and model interpretability.

Ongoing research in model optimization and efficiency aims to strike a balance between model performance and resource requirements (Zhao et al, 2023). LLMs have demonstrated exceptional capabilities in language understanding, generation, contextual reasoning, and multilingual support. These capabilities have paved the way for a wide range of applications, including text generation, machine translation, question-answering systems, sentiment analysis, and chatbots (ÖZÇİFT, 2023). The transformative impact of LLMs is evident in creative writing, content generation, and personalized virtual assistants, where these models have significantly improved the user experience and efficiency. Moreover, their multilingual support has fostered communication across language barriers, enhancing accessibility and global interactions (Ray, 2023).

As LLMs become more prevalent, they bring forth certain challenges and ethical considerations. Training and deploying such models require substantial computational resources, limiting access for researchers with fewer resources. Optimizing model architectures and training procedures is essential to democratize access to NLP advancements (Ferrara, 2023). Ethical concerns regarding biases, fairness, and data privacy necessitate responsible AI practices in the development and deployment of large language models. Addressing these challenges is crucial to ensure that language models serve diverse user groups impartially and responsibly (Ferrara, 2023).

LLMs present a myriad of opportunities for advancing the field of NLP. Opportunities lie in developing more efficient and compact models, enabling continual learning and adaptation, integrating domain-specific knowledge, and promoting explainability and trustworthiness (Göpfert et al, 2023). Embracing multimodal language understanding and prioritizing responsible AI practices open doors for creating more sophisticated and ethical AI applications. These opportunities can contribute to the growth and accessibility of LLMs in diverse domains and industries (Ferrara, 2023). The future of LLMs lies in addressing challenges and embracing opportunities to make them more powerful, efficient, and responsible. Continued research and development in model optimization, ethical AI, multimodal understanding, and domain-specific applications will shape the trajectory of NLP advancements (Ferrara, 2023). Collaboration among researchers, developers, policymakers, and society at large is essential to drive innovation while ensuring that LLMs serve the common good and contribute positively to humanity.

CONCLUSION

Here we have examined the realm of LLMs, aiming to show their evolution, architecture, capabilities, applications, and the challenges and opportunities they present in the landscape of NLP. The objectives outlined in the introduction section have been addressed through the subsequent sections. Firstly, this work delved into the development and astonishing popularity of Chat Generative Pre-Trained Transformer 4 (ChatGPT-4), highlighting its role as a chatbot that interacts with users through language and images. The introductory section also emphasized the rapid growth of users, reflecting the increasing demand for AI-driven conversational agents. The subsequent sections embarked on an exploration of the architecture, capabilities, and applications of LLMs.

The evolution from GPT to ChatGPT-4 was presented, showcasing how these models are fine-tuned for human-like conversation. This survey research underscored that LLMs like ChatGPT-4 stand as exemplars of AI advancement due to their extensive parameters, complexity, and ability to grasp intricate language patterns. The review further highlighted the benefits of LLMs: their proficiency in various language tasks, versatility in few-shot learning scenarios, capacity to generate creative text, and their wide-ranging applications in aiding human creativity, translation, coding, and more. However, this work also unmasked challenges intertwined with the prowess of LLMs.

Ethical dilemmas, misinformation propagation, environmental concerns, transparency issues, and potential for generating inaccurate information were outlined, revealing the nuanced terrain that accompanies their deployment. Because of not responsibly embracing the potential of LLMs, we risk perpetuating biases, disseminating misinformation, exacerbating environmental concerns, compromising transparency, and generating unreliable outcomes. This could hinder societal trust in AI technologies and impede the realization of their transformative potential.

To summarize, this research not only achieved its stated objectives but also offered a comprehensive perspective on LLMs' intricacies. As humanity ventures deeper into the age of AI-driven language models, understanding their complexities, harnessing their capabilities responsibly, and addressing their challenges are imperative steps towards unlocking the full benefits of these transformative technologies in the realm of NLP and beyond.

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Thursday November 2, 2023

Registration – Registration Desk 7:30 am - 3:00 pm

Breakfast – Senate Suite 7:30 am - 9:00 am

Welcome – Senate Suite 8:00 am - 8:15 am

***Discussion Regarding Publication in the Peer-Reviewed
Conference Proceedings*** 8:30 am - 9:30 am

*Norman Sigmond, Kutztown University of Pennsylvania
Chairman, NABET Executive Board*

Session 1: Room 102 9:35 am – 10:35 am

ARTIFICIAL INTELLIGENCE

Session Chair: Jeffrey Yi-lin Forrest, Slippery Rock University

SWOT Analysis and Best Practices for Using AI in Auditing

Thomas James Tribunella
Heidi Tribunella

State University of New York at Oswego
University of Rochester

As Joseph Schumpeter (1911) proposed, new technology can cause creative destruction that increases productivity and profits in the long run. But like all other innovations of the past, this will cause growing pains and disruptions. Accordingly, we must learn how to use new technology tools effectively to realize the opportunities associated with innovation. This paper provides a guide on how to use Artificial Intelligence (AI) in audits. In this paper we apply SWOT (Strengths, Weaknesses, Opportunities, and Treats) analysis by Albert Humphrey (1960) to financial statement audits. Our purpose is to develop a framework to guide auditors when they consider the use of AI to assist with audits. We used ChatGPT to help us understand the quality of information and decisions that would be generated by AI when applied to audits. We find that there are significant opportunities and threats to using AI. For example, there is the opportunity to increase auditor productivity and make audits more efficient as well as lower audit fees and the related cost of capital. However, this comes with the threat and weakness of increased errors and liability if AI hallucinates and supplies the auditor with erroneous or biased information. Accordingly, AI can help develop the internal strengths of a CPA firm if the auditors are trained to employ the technology with proper techniques. Many of these techniques and best practices are listed in the paper as a practical guide to auditing with AI.

Integration of Digital Technology For Employment Preparation: On Impact And Practice

Joseph A. Rosendale
Leann Wilkie

Indiana University of Pennsylvania
Indiana University of Pennsylvania

Mock interviews are an evidence-based method of preparing learners for real employment situations. The effect of novel approaches, such as digital, asynchronous and AI-mediated mock interviews have likewise shown beneficial to students but are currently underrepresented in the literature. This presentation will discuss outcomes related to a larger study examining college students' satisfaction levels and perceptions related to virtual mock interviews. Reported findings show that students had a net positive experience, insofar as they believed it to be useful in increasing their ability to perform better in a real interview. While differences were noted among multiple variables, the primary factor associated with positive student outcomes seems to be their level of preparedness and preparation prior to the simulation.

Session 2: Room 104

9:35 am – 10:35 am

TECHNOLOGY AND BUSINESS

Session Chair: Nuraddeen Nuhu, Bridgewater College

The Impact of RFID Technology Adoption on Economic Performance in Various Industries

Samir Shah
Bay Arinze

Drexel University
Drexel University

This paper investigates the relationship between the adoption of Radio-Frequency Identification (RFID) technologies and the economic performance in various industries. By examining sales or profits as dependent variables, we aim to assess the relative economic performance of NAICS industries in relation to their adoption of RFID technologies. Using a comprehensive dataset encompassing various NAICS industries, we employ statistical techniques such as regression analysis and control variables to analyze the influence of RFID adoption on economic indicators. The study also considers industry-specific characteristics, firm size, and market competition as potential moderating factors. RFID use has grown rapidly in different economic sectors. In the retail sector, major clothing retailers have implemented RFID technology to improve inventory accuracy and reduce stockouts, resulting in increased sales and improved customer satisfaction. In healthcare, many hospitals implemented RFID systems to enhance asset tracking and management, leading to reduced equipment loss, improved efficiency, and cost savings. The findings of this research will contribute to existing literature by revealing the effects of RFID technology adoption in disparate industries. The results will inform industry stakeholders, policymakers, and investors about the strategic implications and potential returns on investment associated with RFID implementation.

Robo-Advising: Incorporating Artificial Intelligence and Machine Learning

Loreen Marie Powell
Ronda Mariani
Dina Clark
Lijuan Sun

Marywood University
Commonwealth University of PA
Commonwealth University of PA
Commonwealth University of PA

The financial technology (FinTech) industry has undergone a profound transformation in recent years, marked by groundbreaking innovations, regulatory developments, and evolving consumer preferences. One notable technological advancement is the emergence of Robo-Advisors. These digital investment platforms have revolutionized the wealth management sector by harnessing algorithms and artificial intelligence to provide personalized investment advice and portfolio management. Robo-Advisors have

democratized access to financial services, offering cost-effective and efficient investment solutions for both seasoned investors and newcomers to the financial markets. They exemplify how technology can enhance financial decision-making, making investing more accessible and affordable for a broader demographic. For this reason, educators need to find quality resources to teach these topics. However, finding texts that comprehensively cover this topic are limited. As a result, educators' resort to academic journal articles, white papers, and websites. This paper will add to the literature by providing a comprehensive review of scholarly academic literature that educators can quickly utilize to teach this topic within their class. This study is not without limitations but, it does have practical impacts for university, colleges, faculty, and students teaching advanced technology topics like Robo Advising within the classroom.

Direct and Indirect Effect of Fear and Response Cost on Card Payment Protection

Motivation

Erika Gallindo

Nuraddeen Nuhu

Sundaay Adewale Olaleye

Universidad de las Americas Puebla

Bridgewater College

Jamk University of Applied Sciences

This study employs the Protection Motivation Theory (PMT) to examine the influence of fear and response costs on card payment protection motivation within the Latin American context. We conducted a quantitative study utilizing non-probability convenience sampling to gather data from 210 university students in Puebla, Mexico. Our findings shed light on both the direct and indirect impacts of fear and response costs on the protection motivation of card payment service users. The study reveals that while perceived fear associated with card payment usage triggers protection motivation among users, the perceived response cost linked to card payment usage does not have the same effect. These results emphasize the necessity of enhancing consumer awareness regarding the advantages of employing anti-theft tracking software and other protective measures. In conclusion, this research advances card payment and PMT by delivering significant contributions in theory, empirical insights, managerial implications, and policy considerations.

Session 3: Room 105

9:35 am – 10:35 am

BUSINESS / PEDAGOGY

Session Chair: Norman C Sigmond, Kutztown University

Preliminary Study to Design Mindful Leadership Class for Graduate Students in IT and Management Specializations

Hideki Takei

Central Washington University

Mindful employees tend to be more productive as they can focus on tasks. Also, mindful leaders tend to lead people with stronger mutual trust and task focus. There is no wonder why companies have started developing employees' mindfulness. Many of them also have asked universities, especially graduate programs in IT and management specializations, to ensure their graduates are mindful when employed. Several universities, such as Southern Utah University, Vanderbilt University, and Purdue Global, have introduced mindfulness classes for their students. Our program has also decided to introduce a mindful leadership class as one of its capstone courses. However, developing the class will be challenging because our program has both hybrid and online modalities. As a first step, we conducted a preliminary study on employee mindfulness and mindfulness training to design the class. This study will show the benefits of mindful employees and effective ways of developing employee mindfulness. Then, we will show our initial ideas about the class.

Do Interdisciplinary and Experiential Courses Add Value to Higher Education

Shweta Singh
Denise Anderson
Suzanne Schwab

Kean University
Kean University
Kean University

Considerable debate exists on the value-add provided by higher education in the face of rising costs. As Universities look for ways to attract, retain and prepare students for future success through enhanced student engagement and higher graduation rates, the role of experiential learning and interdisciplinary studies assumes importance as potential contributors to student success. Using survey data from students pursuing their undergraduate degree from four-year universities in the United States, we develop a conceptual model and empirically examine the impact of interdisciplinary studies, participating in experiential learning and the mitigating role of student demographics on student learning outcomes. Interdisciplinary studies refer to studies between two or more fields of study and involve students working in an environment transcending disciplinary boundaries. Experiential learning refers to learning through hands-on experiences, where students apply the theories learnt in the classroom to real-life situations using higher-order thinking (DiCecco et al, 2004; Krane, 2005; Gilbert et al, 2014). Factors affecting student learning outcomes in higher education have been identified as lacking knowledge in other disciplines (Fruchter and Emery, 1999), working with an actual client (Coker et al., 2017), effective team collaborations (Machemer and Crawford, 2007), student engagement (Kuh et al., 2008; Letterman and Dugan, 2004), motivation (Pintrich and DeGroot, 1990; Deci et al, 1999), amongst others. The proposed research will support the important role of interdisciplinary studies and experiential learning in achieving favorable student learning outcomes, providing empirical direction to Universities in offering more interdisciplinary courses and experiential learning opportunities to students.

Session 4: Room 106

9:35 am – 10:35 am

PEDAGOGY / MARKETING

Session Chair: David W. Jordan, Slippery Rock University

Ditching the Textbook...Utilizing Trade Journals to Study Evolving Marketing Strategies and Tactics

John M Zych

The University of Scranton

In today's fast-moving markets, developing an effective marketing strategy requires accurate information; relevant data must be found and analyzed. An integral part of the analysis is the ability to follow emerging competitor strategies. For the automotive market application used for this class relevant issues impacting strategy include analyzing incentive programs, estimating market segment size, and anticipating competitive moves. Students were assigned a group project to develop a marketing plan for an automobile model. Tasking the groups with exclusively conducting their own independent research for every phase of the project results in their having sources of varying quality and relevance. In contrast, utilizing an automotive trade journal provides every group with quality, curated data that forms a common basis for the course and a framework to conduct supplementary independent research. The trade journal approach provides quality information on multiple facets of the automotive market by providing data on sales, incentives, and product introductions, as well as important industry articles and opinion pieces. Customized teaching modules provide "textbook" information that offers context as students analyze data, and integrated quizzes explore students' understanding. Importantly, all students are working from the same quality source, just as they would be with a textbook, which facilitates discussion of relevant marketing concepts and how they relate to the automotive market. The conference

presentation will use examples of this approach from a marketing strategy class. Student reactions to the assignment also will be discussed.

Cocreating values for Marketing Classes with Students' Preferences in Course Design

Kuan-pin Chiang

Central Connecticut State University

The idea of customer co-creation has been documented as a successful marketing strategy especially for new product development (NPD). Consumer co-creation represents an attractive approach for companies for a variety of reasons. In particular, ideas generated through co-creation will more closely mirror consumer needs. It has been clearly recognized that successful NPD depends on a deep understanding of consumer needs and product development efforts that meet those needs. Despite the increasing amount of research on co-creating values, only few studies examined the concepts in the context of higher education (e.g., Baron and Harris, 2006; Ford and Bowen, 2008; Sauter and Jones, 2009). Currently, most courses are often designed based on the course objectives by the instructors without students' inputs. Taking the rationale of co-creation, this study will take a first step to examine students' preferences on course components for marketing classes.

Abstractness in Action: How Logo Design Influences Consumer Attitudes and Product Acceptance

Sang Yong Bok

West Chester University of Pennsylvania

A company logo is an element consumers use to recognize a brand. Like other living organisms, logos evolve to adopt a new marketing landscape to survive and influence choice. Despite frequent logo redesigns to align with strategic shifts, as exemplified by Facebook's metamorphosis into Meta to underscore its metaverse vision, research examining the efficacy of different logotypes in marketing communication is scarce. This study seeks to bridge this gap by examining the differential impacts of logotypes—pictorial, wordmark, and hybrid—on brand evaluation, message persuasiveness, and receptivity to new product concepts. To investigate the underlying psychological mechanisms, this research adopts the Construal Level Theory (CLT) as its theoretical framework. According to CLT, high-level construal engenders a mindset that is both goal-oriented and desirability-focused, consequently leading to enhanced creative cognition and an increased willingness to embrace novel concepts. Extant literature within the realm of CLT consistently posits that pictorial stimuli evoke higher levels of abstract thinking compared to textual stimuli and that moderate levels of abstraction can facilitate information processing and engender a more positive affective state. Based on these premises, the study hypothesizes that logos with a higher degree of perceived abstractness will exert a more positive influence on the perceived message persuasiveness and enhance receptivity to new product concepts. Furthermore, it posits that the construal level elicited by the abstractness of a logo mediates these observed effects. Three experiments are designed to investigate the influence of logotypes on various marketing scenarios. Practical implications of the results are discussed.

BUSINESS

Session Chair: Joshua Beck, West Virginia Wesleyan College

The Shifting Talent Pool and Emerging Employee Engagement. Re- evaluating flexible Work arrangements

Sharon M. Didier

St. Joseph's University

The study hoped to measure the factors that may influence flexible work arrangements with younger populations and to identify issues related to employee engagement. Background: The demographic shifts of age groups in the United States have motivated employers to develop strategies to attract and engage the new generation of workers. Method: Inferential and descriptive statistics were used to identify key factors affecting flexible work arrangements. Measures: Nine variables were used to assess factors impacting effective work arrangements for younger generations. A 5-point Likert Scale was used. Sample: A convenience sample of n=51 was used to in the study. Surveys were distributed via LinkedIn, Whatsapp and email over a three-week period. Sixty surveys were distributed and 51 surveys were collected. Results The descriptive results were impressive. Seven out of the eight variables were significant with benefits showing the most significant. The highest coefficient was between benefits and belonging and between motivation and flexible work environments. Communication and values directly impact flexible work arrangements from the hypothesis results. The regression results for communication, employee engagement, values and belonging were significant. Benefits had the highest level of significance. Conclusion: The results indicate that there are many motivating factors that are unique to the changing employment landscape and insights into how best to develop work arrangements are discussed.

An Investigation of Emotional Intelligence Competencies for Early Career Insurance Professionals Across Mutual Insurance Companies

Jane Brooker

Alvernia University

A problem exists between employers and individuals they seek to hire with non-technical skills, adding value and leadership to their companies. These skills are hard to define and identify when interviewing candidates. The researcher further defined, clarified, and explored interpersonal and emotional intelligence competencies among early-career insurance professionals. Goleman's research on emotional intelligence in the workforce provides a theoretical framework for this study (Goleman, 1998). Goleman's research determined that emotional intelligent employees consistently outperformed their more intelligent coworkers, lacking in emotional intelligence (Goleman, 1998). A review of literature surrounding the early stages and benefits of emotional intelligence followed by emotional intelligence in leaders and the insurance industry will be shared. The research was conducted through semi-structured interviews with 16 insurance executives and two focus groups consisting of five insurance executives in the mutual insurance industry. These executives were selected and volunteered from Pennsylvania mutual insurance companies. Interviews were transcribed and coded to find recurring themes. This research benefits employers in their hiring practices and in identifying insurance professionals for leadership and promotion opportunities.

Insights into Effective Business Communication: An Employer's Perspective

Kimberly Conrad
Joshua Beck
Tracie Dodson

West Virginia Wesleyan College
Shepherd University
West Virginia Wesleyan College

This research aimed to understand and address the business communication needs within organizations. Utilizing a focus group methodology, we explored the challenges and opportunities surrounding effective communication practices. The study aimed to identify key areas of improvement, highlight needs and emerging trends, and provide valuable insights into the ever-evolving demands of business communication. Through analysis of focus group discussions and participant feedback, this research sheds light on the critical factors influencing successful communication strategies. Our findings aim to guide organizations in enhancing their communication frameworks and fostering better collaboration and productivity in the business environment.

Session 6: Room 102

10:50 am – 11:50 am

PEDAGOGY / BUSINESS / EMPLOYMENT

Session Chair: Thomas James Tribunella, State University of New York at Oswego

Learning Strategies and Styles

Sinéad Gallagher
Bethany Spencer

Juniata College
Juniata College

In a survey conducted earlier this year by Inside Higher Ed, more than half of the 3,000 plus respondents said that “teaching style” made it hard for them to succeed in class since starting college. Students responded that the “teaching style [used] didn’t work” for them and this was the number one perceived barrier to academic success they cited (Flaherty, 2023). This prompted us to consider several issues: learning styles, learning strategies and what teaching styles students believe would promote their success. This paper is the start of that journey. We will briefly review the literature on learning styles (and some of the associated myths). In addition, we will present data on the learning styles and strategies exhibited by first-year students in our Accounting, Business and Economics Department. Later in the semester, when students have ‘sampled’ various teaching styles, we will move on to the second element of our research: we will illicit their opinions on how we, as educators, can modify our teaching styles to help them succeed.

Session 7: Room 104

10:50 am – 11:50 am

BUSINESS

Session Chair: Samir Shah, Drexel University

A Glimpse into the Future of Work

Nuria Garcia Nogueron
Diane Galbraith

Slippery Rock University - MBA Student
Slippery Rock University

The future of the workplace post COVID may no longer be defined by specific space in commercial real estate or specific timeframes or schedules. The pandemic has changed the way we work, forcing organizations to re-think their operations and re-imagine their respective cultures. Innovative thinking will be essential to deal with these new constructs of space and time. This new way of thinking will require

more than just adapting to the current situation; it requires developing a long-term vision that will enable organizations to become more resilient and agile. By focusing on building a strong sense of belonging in its culture, organizations can create an environment of growth and purpose, enabling them to be prepared for whatever the future may bring. Creating a culture of excellence for this “new normal” will be investigated in this paper as organizations seek to attract and retain their pool of talent, reinforce their values with remote options and to maximize their efficiency through meaningful work.

Covid's Impact on Organizations

Susan Aloï
Tracie Dodson

Davis and Elkins College
West Virginia Wesleyan College

In this presentation, we will share survey results from organizations in West Virginia regarding workplace issues post-Covid. These organizations include nonprofits and for-profit businesses in a wide variety of fields. Focus will be on the challenges these organizations are facing as a result of Covid, expectations of employees, and changes organizations have made to address these issues. In addition to discussing the challenges and possible solutions gleaned from the survey data, we will also share theory and best practices from the fields of change management and organizational behavior to identify strategies for addressing needs of employees in the post-Covid workplace.

Session 8: Room 105

10:50 am – 11:50 am

BUSINESS / ECONOMICS

Session Chair: *Dina Clark*, Commonwealth University

How Consumer Value-Belief System Affects His Budget Set and Demand Correspondence

Jeffrey Yi-lin Forrest

Zaiwu Gong

Zhen Li

Shynara Sarkambayeva

John Golden

Slippery Rock University

Nanjing University

Texas Woman's University

Satbayev University

Slippery Rock University

This paper investigates the budget set and demand correspondence of a consumer when his system of values and beliefs plays a role in his consumption decision making. In particular, when a person's values and beliefs dictate which commodity bundle and how much of the bundle he will consume, one can no longer assume that the consumer orders real numbers the same way as everyone else, although that has been assumed in the prevalent consumer theory. For such more realistic setting than the one conventionally considered, this paper explores the relationship between an individual's consumption preferences and his specific order of real numbers. And, it shows that many well-known properties of budget sets and demand correspondences are not generally true unless his order of real numbers is equal to the conventional order of real numbers and/or this consumption preference relation is complete, reflexive and transitive on his set of all possible consumptions.

The Impact of Federal Tax Credits for Middle- and Lower-Income Taxpayers

Andrew Junikiewicz

Albright College

Federal tax credits are instrumental in the U.S. tax system as they offer a wide array of benefits to individual taxpayers. Our research explores the importance of federal tax credits from the perspective of individual taxpayers and highlights their multifaceted impact on financial well-being. First, federal tax credits play a pivotal role in reducing the overall tax burden on individual taxpayers. By allowing deductions from the

total tax liability, credits effectively lower the amount of income subject to taxation. This, in turn, results in higher disposable income for taxpayers, enabling them to meet their financial obligations, save, and invest in their future. Furthermore, federal tax credits are vital tools for enhancing social equity. Various credits are designed to provide targeted relief to low and middle-income individuals and families. The Earned Income Tax Credit (EITC) and Child Tax Credit (CTC), for instance, assist working families in achieving financial stability and lifting them out of poverty. By addressing income inequality and helping vulnerable populations, these credits should contribute to a fairer and more inclusive society. The paper will examine the impact that Federal Tax Credits have on the middle- and lower-income taxpayers through different tax calculation scenarios. Our research will also survey middle- and lower-income individuals during tax season 2024 to provide a better idea of how federal tax credits are impacting them.

Health Care Seeking behavior: Evidence from the 2018 Sierra Leone Income and Household Survey

Elkanah Faux

Bowie State University

Abstract In this study, we investigate factors affecting health care seeking behavior in Sierra Leone. The data utilized for the study is drawn from the Sierra Leone Integrated Household Survey (SLIHS) collected in 2018. The SLIHS is the third income and expenditure survey of Sierra Leone that gathers data on household members' characteristics, agriculture, and consumption. The study uses a binary logit model that links illness reporting to specific socioeconomic factors, including age, gender, education, provider type, time, and cost. The study finds that gender and provider type are the most significant determinants of illness reporting in Sierra Leone. The findings also suggest that the cost of seeking health care was a critical underlying determinant of health care seeking and reporting behavior of households in Sierra Leone. The study indicates that there is room for improvement in illness reporting through policy interventions that address beliefs and behavioral and emotional traits associated with the unwillingness to report illness. Also, improving the quality of health services and expanding access to health care can increase healthcare-seeking behavior and reporting.

Session 9: Room 112

10:50 am – 11:50 am

BUSINESS

Session Chair: Sarah Stager, Pennsylvania State University

Identification and Mitigation of Tactics Techniques and Procedures Within Social Engineering-Based Phishing Attacks

Evan Mau

Pennsylvania State University

Sarah Stager

Pennsylvania State University

Eric James Talanca

Pennsylvania State University

In the realm of cybersecurity, social engineering remains an enduring and ever-evolving threat. This research paper delves into the strategies employed by malicious actors to exploit human psychology and trust, enabling them to gain unauthorized access to sensitive data, systems, and networks. The landscape of social engineering tactics is in constant flux, shaped by advancing technology and emerging trends in both public and private sectors. With an extensive array of potential threat vectors, identifying all attacker techniques is challenging, making employee security awareness a top priority. To combat these sophisticated threats, the research paper highlights essential strategies. It emphasizes the importance of recurrent security awareness training to help individuals recognize and report suspicious incidents promptly. Additionally, it underscores the significance of verification protocols, multi-factor authentication, and encryption to fortify defenses against unauthorized access and data breaches. Robust email and web filtering solutions, strict access controls, and timely security patch updates are crucial components of a comprehensive defense strategy. In

conclusion, a proactive approach that integrates technical safeguards, adherence to security best practices, and a security-conscious culture is vital for defending against social engineering attacks. The paper emphasizes the need for continuous evaluation, user behavior analysis, and simulated attacks to enhance an organization's cybersecurity posture in the ever-evolving threat landscape.

Leveraging Continuous Diagnostics and Mitigation for Cybersecurity Enhancement of Federal Agencies and Beyond

Joanna Burley Shore

National Defense University

Continuous Diagnostics and Mitigation (CDM) is a cybersecurity program developed by the Department of Homeland Security (DHS) to strengthen the security stance of federal government agencies. This abstract explores the ways in which CDM can help organizations improve their cybersecurity and outlines its applications. The CDM program focuses on delivering federal agencies with increased visibility into their network infrastructure, improved threat detection capabilities, and effective response mechanisms. Through continuous monitoring and automated incident response, CDM assists agencies in identifying and mitigating security risks rapidly. The program also prioritizes risk mitigation based on potential impact, ensuring optimal resource allocation, and enabling agencies to address critical threats proactively. CDM's collaborative tactic helps with information sharing and knowledge transfer among federal agencies. This collaborative environment promotes the discussion of best practices, emerging threat intelligence, and lessons learned. By leveraging this shared knowledge, agencies can stay informed of evolving cyber threats and implement effective security measures. Furthermore, CDM offers a phased implementation approach, allowing agencies to steadily improve their cybersecurity competencies. This phased approach ensures that current cybersecurity needs are met while proving a foundation for long-term enhancement. Standardized security capabilities and tools provided by CDM develop consistency and interoperability across different agencies, enabling continuous integration of cybersecurity systems. These issues and more will be discussed in this presentation.

Stepping into the Breach: The Dilemma of Assessing and Developing Emotional Intelligence

Scott T. Stroupe

Pennsylvania State University

Emotional intelligence (EI) is increasingly part of the collection of skills prospective employees, particularly candidates for leadership programs, are expected to show. (Cole, Cox, Stavros, 2016; Arora, 2017) Accordingly, business schools are under pressure to include EI skills among the competencies graduates will possess when they obtain their degrees. (NACE) But beyond the soft-skill buzz lies daunting issues for any school that approaches this challenge from an outcomes-based perspective. There is the persistent debate on whether an ability or skills-based measure is best correlated to job performance (see Robinson, Asad, Irvin 2023; Krishnakumar, Hopkins, Szmerekovsky, Robinson, 2016; and Day, Carroll 2004), and the complexities of implementing curricular-based intervention (Butler, Park, Yvas, Cole, Haney, Mars, Williams, 2022; Chernis, Goleman, Emmerling, 1998). But even if those can be resolved, schools must face the daunting question of access resulting from a prohibitive paywall around the only valid and reliable assessments (whether ability or skills-based). (CREIO) This review of research addresses whether, given these considerable challenges, any school--particularly public universities with socioeconomically diverse students--can claim emotional intelligence is among the outcome-based competencies included in its promise of graduating career-ready students.

ADVISORY BOARDS / BUSINESS EDUCATION

Session Chair: Scott T. Stroupe, Pennsylvania State University

A Case Review of Establishing and Leveraging an Effective Undergraduate Program Advisory Board: Not Just for Checking Accreditation or Engagement Boxes

David W. Jordan
Peter M Eberle

Slippery Rock University
Pennsylvania State University

Many advisory boards are at the school, college, or university level; however, program-level boards can offer tremendous value (Zahra, et al, 2011; Nagai & Nehles, 2014). Advisory boards must use best practices that focus on students' benefit that aligns with the university and community to provide maximum value. There are several accrediting bodies that require a program to incorporate an advisory board into their governance for numerous reasons (Wood, 2006; Koong, 2003). The interest associated with accreditations relates to how an institution engages and responds to community stakeholder needs (Wood, 2006; Koong, 2003). Furthermore, many programs without accreditation stipulations are encouraged to also establish advisory boards for university visibility, community engagement, and program currency to its industry (Taylor, et al, 2010; Ellingson, et al, 2010). This presentation will share the experience of establishing an effective undergraduate advisory board and the value-added outcomes that have been realized for the program, students, college, and university.

Service Learning in Accounting Education: A Research Proposal

Amy Washo

Marywood University

This presentation will discuss the topic of service learning in accounting education as a proposed research study. Service learning, simply defined, includes real-life academic or community service components in the larger realm of the education curriculum. It allows students to experience and work through events with classmates and the larger community and requires connection during and reflection after the experience. Specifically, the proposed research study will focus on student perceptions of community service in accounting education. Service projects not only have an impact on the people or organizations that the students work with, but they also have an impact on the students themselves. The subject of ethics is instilled in accounting education and service projects can provide an opportunity for students to see how their work as accountants fits into the larger realm of society. Decisions they make can have far-reaching impacts. Students in accounting and accounting-related classes will be required to complete a student-driven service project in a team during the semester and will receive a grade upon completion. Students will be surveyed at the beginning of the semester to measure their understanding, willingness, and excitement about completing a service project and then again at the end of the semester when their projects are complete. Understanding student perception about service learning will help educators determine how best to implement service learning as part of the accounting curriculum.

Doctoral and Graduate Education in a Post-COVID Era: The Rise of the Virtual PHD and DBA Degrees

Cheryl Crespi
Tony D Crespi

Central Connecticut State University
University of Hartford

During the COVID-19 pandemic, virtually every university in the United States offered online education. From Yale University to smaller state and private colleges and from executive D.B.A. offerings to the online Ph.D. degree, future business faculty can select from a vast array of graduate study. Still, many faculty are

unaware of the data or the proliferation of opportunities. This presentation explores the data behind virtual graduate education providing information on the explosion in these curricula. Implications for faculty applicants and search committees are examined, illustrative examples are provided, and ample opportunity for a vigorous discussion will be provided intended to explore this exciting albeit controversial area.

Session 11: Room 104

1:05 pm – 2:05 pm

TECHNOLOGY / PEDAGOGY

Session Chair: *Michael Knupp, Husson University*

Grading as Performance Management: Student Perspectives on Alternative Grading in Upper Division Business Course

Mark Capofari

Pennsylvania State University

Alternative forms of grading, such as specs and contract grading, have become increasingly popular across multiple disciplines in higher education to enhance students' intrinsic motivation, alleviate student anxiety, support career-readiness and simplify the grading process for faculty. That said, the un-grading movement has had limited penetration in business education; the reasons for this unenthusiastic reception are not known. In this session, we present a lesser-known form of un-grading, consultative grading, as a stronger candidate for adoption in the context of business education. Consultative grading closely resembles performance management practices, as employees are "graded" based on how well they met their stated objectives, as determined by consultation, between the employee and supervisor. The session will present the results of a two-semester study of student perceptions of consultative grading in small-enrollment, upper division business courses; including the connections they see between this form of grading and their future ability to navigate the performance management process.

Identifying Critical Factors That Impact Learning Analytics Adoption by Higher Education Faculty

Michael Knupp

Husson University

Higher education institutions (HEI) are beginning to invest heavily in learning analytics as a compliment to their existing suite of technologies used to enhance the pedagogical practices of instructors. However, learning analytics continues to see low adoption and integration by higher education faculty. While a culture of learning analytics within HEI is emerging, there is not consensus on the value and effectiveness of the tools and practices that make up the culture. With promises of reduced student dropout rates, improved student outcomes, better course pedagogy and backed by pressures of assessment and accountability, learning analytics is being trumpeted as the next best solution to our educational woes. However, despite these promises, and despite the general belief that learning analytics may have true value, instructors have been slow, if not resistance, in learning analytics adoption. And while research on learning analytics design abounds, usage and adoption literature is scant. More research is needed to understand factors that either threaten or enable a higher education faculty member's willingness to adopt learning analytics. The following paper constitutes a research agenda that focuses on the enablers to higher education faculty's willingness to adopt learning analytics into their professional practice. The research specifically uses the TPACK framework and SEM analysis techniques to extend elements of traditional technology adoption theory to include professional identity expectancy in order to help explain a higher education faculty member's willingness to adopt learning analytics.

Do Your Students See What You See

Robert John O'Connell

York College of Pennsylvania

With the proliferation of Learning Management Systems (LMS) and other supportive electronic tools for learning across education institutions, are students becoming overwhelmed by the abundance of and complexity of these tools? Teaching at York College for over 20 years, the college progressed through several LMS tools, including Blackboard, Moodle, and Canvas, plus many other automated resources available through My.YCP, including Spartan Success, YCP Web, Zoom, Schmidt Library access, and more. Is this overwhelming for new students to navigate, combined with making the transition from high school to the rigors of college? We now physically distribute less and less in the classroom, instead posting documents online, and textbooks are frequently online, often requiring publisher-specific tools to access. Such proliferation is not new. A parallel to this may be drawn to the prevalence in the early 1990s of word processing, spreadsheet, graphics, and pc database software packages. WordStar, WordPerfect, Freelance, Harvard Graphics, Lotus 1-2-3, dBase, FoxBase, and other tools led their specific productivity segment at some time, but the Microsoft Office Suite eventually evolved as the leader in most, if not all, personal productivity software. This exploratory research will attempt to catalog the common online tools in use and review and consolidate the current research into this topic, with the goal of evaluating if this perceived proliferation is negatively impacting the educational process. Additionally, does the existing research foresee an emergence of common tools across colleges?

Session 12: Room 105

1:05 pm – 2:05 pm

BUSINESS / INTERNATIONAL ECONOMICS

Session Chair: *Dina Clark*, Commonwealth University

Current Reflections: Swedish Public Housing

Timothy Wilson

Clarion University (retired)

A housing policy is an important element upon which development is built. For over 20 years, the authors have followed Sweden's housing policy as it affected development. During that time, municipal public housing was a key element in Sweden's policy, which stood in stark contrast to social housing in the U.S., and Sweden provides a meaningful base on which to make comparison. That is, it leads the U.S. in International Indices such as competitiveness, human capital, transparency (low corruption), and happiness. Further, it is commonly considered that Sweden is the cleanest, most sustainable place in the world to live. Today, however, finding a place there would be difficult because Sweden's housing policy is under pressure. Although there is a shortage in housing, municipal public housing companies have not been able to freely develop capital to meet demands. Further, there are ancillary issues with which they have had to cope. The purpose of this paper is to review the present state of public housing in Sweden. Interest stems from concerns academics may have for Sweden's fortunes, and the potential guidance that Sweden presents for U.S. National and State policy.

Economic growth in New Zealand: Are there Asymmetric or Symmetric Effects from Exchange Rates and Tourism

Hanafiah Harvey

Somjit Barat

Pennsylvania State University

Pennsylvania State University

Earlier literature, in the case of New Zealand, examines if the effects of exchange rates, tourist arrivals, and economic growth are linear. We re-evaluate using both symmetry and asymmetry cointegration using disaggregated data from 10 major tourist arrival countries, 1990Q1-2021IV. In most cases, we find support

for short-run asymmetric effects and significant asymmetric effects in the long-run three major tourist arrivals to New Zealand.

Session 13: Room 106

1:05 pm – 2:05 pm

BUSINESS / LEADERSHIP

Session Chair: *C.J. Rhoads, Kutztown University*

The Evolution of the C-Suite

John Keiser

The College at Brockport

In American business, the title of Chief Executive Officer (CEO) is the apex of corporate success. Reporting to the CEO are functional titles such as Chief Operating Officer, Chief Financial Officer, Chief Marketing Officer, etc. As common as these titles are, they do not have a long history in American business. As recently as the 1960s, very few companies had a “Chief Executive Officer”, but now the title has become ubiquitous. It’s not only CEOs, but other C-level titles (Chief Operating Officer, Chief Financial Officer, etc.) have proliferated and we find corporations have entire tiers of C-level managers, otherwise known as the “C-Suite.” Ironically, there is no legal requirement for publicly held corporations to have a CEO or any other titled “C-Officer.” This paper will present archival research documenting the growth of the C-Suite over the last 60 years in companies comprising the Dow Jones Industrial Average.

Managerial Ownership in a Private Firm Framework

Mitchell Johnston

University of Dayton

Understanding Collective Forms of Leadership Through Text Mining-Based Review of Literature

Jong yu Park

CUNY - City University of New York

Bora Kwon

Sacred Heart University

Kijung Park

CUNY - City University of New York

Collectivistic leadership has been widely discussed in various studies to involve multiple individuals in a leadership process in which a hierarchical and single-leader form of leadership is not effective in modern organizations. Although the literature in collectivistic leadership provides various leadership concepts and approaches, they have been represented by similar collectivistic leadership labels without clear characterization. As a response, this study uses a text mining approach to identify underlying key themes discussed in a large collection of articles relevant to collectivistic leadership and thereby to provide new categorization of collectivistic leadership studies. First, the collected article sets associated with the common labels of collectivistic leadership – team leadership, shared leadership, distributed leadership, collaborative leadership, collective leadership, complexity leadership, and relational leadership – were analyzed by extracting frequently occurring terms and their correlations through text mining. The results showed that the different leadership labels in the extant literature share similar keywords and thereby provide ambiguous leadership concepts. To identify appropriate categorization and conceptualization of collectivistic leadership approaches in the existing literature, latent topics in the collectivistic leadership literature were extracted by correlated topic modeling. As a result, seven latent topics were identified as main themes in the existing studies. The findings from this study imply the necessity of a new viewpoint to understand collectivistic leadership approaches from domain- and context-specific aspects.

BUSINESS / ECONOMICS / TECHNOLOGY

Session Chair: *Denise Ogden*, Pennsylvania State University

The Technological Impact of Patent Classes and the Innovation Trajectories of Firms and Locations

Thomas Dominic Craig

DeSales University

The technological impact of innovations is commonly measured using forward citations linked back to individual patents, or forward citations linked to portfolios of patents at the firm level. Taking a different approach, this study calculates impact at multiple patent classification levels, revealing the changing importance of each underlying technology category over a 40-year period. Applying the calculated class- and subclass-level impact values from each year to firm and location patent histories, the evolving impact trajectories of firms and locations during the period 1975-2014 can be observed and quantified to provide new insights into historical patterns of innovation.

The How and the What: Integrating Sustainable Decision Making across the Business Curriculum

Maung Min

Pennsylvania State University

Subhadra Ganguli

Pennsylvania State University

The present study seeks to assess student learning outcomes related to sustainability-themed content across the business curriculum. The study utilizes a comparatively novel form of assessment, scenario-based assessment, to measure how students operationalize their understanding of sustainable behaviors, especially decision making. The study considers two different courses within the business program at Penn State University's Lehigh Valley Campus. One of the courses is a General Education Microeconomics course at the foundational level and the other is a Management Studies course at an advanced level. Our hypothesis is that inquiry-driven models, through which students advance their understanding of sustainability through integration into practice (the how), will strengthen their understanding of sustainability as a construct (the what); more so than conventional approaches, in which the what precedes the how. The paper investigates how robust the findings are across levels and subject matter in the business program through survey and analysis.

News Shocks and Sudden Stops

Jin Lau

Rutgers University

Motivated by news of a positive future outlook before Sudden Stop episodes, this paper investigates the impact of news shocks. Today's positive news shock about TFP likely being high tomorrow leads to more borrowing to finance additional consumption and capital investment. Borrowing based on a current value collateral constraint incorporating the price of capital generates a pecuniary externality, which the social planner internalizes. The results show that news shocks cause financial instability with a higher Sudden Stops probability for current or future value collateral specification. During normal times, false positive news, where tomorrow's higher TFP is not realized, increases the likelihood of a future binding constraint. Although, positive news in bad times aids in faster recovery. The optimal policy that decentralizes the planner's allocation is a tax in normal times and a subsidy in bad times. Finally, news shocks provide greater emphasis for policy intervention.

BUSINESS / NOT-FOR-PROFIT

Session Chair: *John Keiser, The College at Brockport*

Evaluating an Online Course: A Tool Based on Three Types of Interactions

Monica L. Law

Marywood University

There continues to be an increase of online courses and programs of study within the realm of higher education. Therefore, it becomes relevant, as well as important, to effectively evaluate these online courses. Proper evaluation of online classes will enable the collection of meaningful feedback in order to help instructors assess where strengths are and where improvements could be made. The purpose of this presentation is to discuss the evaluation of an online course. Specifically, an evaluation tool that was developed by the presenter will be explained and reviewed. The tool was based on research by Moore (1989) assessing three types of interactions: student to student, student to instructor, and student to material.

The Triple Cliff

Michael J Gallagher

DeSales University

The Triple Cliff: Decline in number of students enrolling in college, Decline in enrollment at catholic colleges, Decline in enrollment for accounting majors The financial realities of higher education override many of the commitments that institutions make to the various potential missions of a Catholic University. Small regional tuition driven catholic colleges follow the demands of the customer and the higher education landscape. The issue with following demands of the student is that the market has changed to allow larger universities and on-line enrollments to possibly become the new market. Catholic Colleges and Universities are also facing financial risks because of the “narrowing enrollment pipeline from Roman Catholic K-12 enrollment. This enrollment fell by 6.4 percent in the fall of 2020” (Seltzer,2021). The third threat addressed is the decreasing number of students majoring in accounting. The Pennsylvania Institute of Public Accountants (PICPA) shows a decrease in accounting enrollments at Pennsylvania Colleges and Universities of 80,719 students from 2018 to 2022. This is a decrease of over 12% (2022 Eastern PA Impact Study, 11/17/2022) This presentation discusses the three threats to the viability of accounting programs at tuition driven catholic universities. The decline in number of students enrolling in college, the decline of enrollment at catholic colleges, and the decline in enrollment for accounting majors.

HEALTHCARE / BUSINESS

Session Chair: David W. Jordan, Slippery Rock University

Chronic Health Challenges: Systematic Review Lessons of Lifestyle Therapies

C.J. Rhoads
Roger Jahnke
Joseph Baumgarden
David Rosenthal
Wen Liu
Heidi La Bash

Kutztown University
Fielding Graduate University
D'Youville University
Harvard Medical School
University of Kansas Medical Center
Stanford University

Evidence on the effectiveness of a variety of integrative health interventions (healthy lifestyle therapies such as healthy food, nutrition, physical activity, mind-body exercises like tai chi, qigong, yoga, and Pilates, meditation, as well as cognitive behavioral therapy) is growing. We systematically searched MEDLINE Complete, Academic Search Ultimate, and Health Source: Nursing/Academic Edition following PRISMA 2020 guidelines and extracted the information found in the resulting studies. Out of the original 892 records, 869 were eliminated as not meeting the criteria, leaving 23 articles to be included in the systematic review. This study is registered on PROSPERO registry, number 42022288080. The preventable chronic health challenges evaluated within the reviewed studies included cancer (5), cardiovascular disease (5), type II diabetes (4), chronic pain (3), obesity (1), stroke (1), depression (2), and multiple chronic illnesses (1). We noted that 18 of the studies (78%) indicated that many integrative health interventions studied were cost effective. Seven of the 18 studies determined that the integrative health methods were not only cost effective, but also resulted in cost savings. The cost saving interventions included healthy lifestyle, physical activity, physical therapy, mind-body exercises, acupuncture, naturopathic care, and cognitive behavioral therapy. Overall, our conclusion was that integrative medicine can be cost effective for chronic health challenges, but more research is needed in the future to definitively confirm this conclusion.

Who is My Partner Exploring Community Health Outcomes Associated with Hospital Faith-Based Collaboration

Noyoung You
Ohbet Cheon

Siena College
Clarkson University

Hospital-community partnership has been increasingly emphasized to improve hospitals' performance. Among various community partners, faith-based organizations are considered longstanding and valuable allies for hospitals. However, little is known about under what community health outcomes hospitals are more likely to seek collaboration with faith-based organizations, compared to other community partners. We merged three nationwide datasets in 2016, including the American Hospital Association (AHA) annual survey, CMS Hospital Compare, and County Health Ranking National (CHRN) data. We measured nine different hospital-community partnerships, including faith-based organizations, at three different levels. We also measured three health outcomes (infant mortality, low birth weight, and overall poor/fair health outcome rates) to explore their associations with hospital-community partnerships. We estimated ordered logit models with robust clusters and controlled for other hospital-level characteristics and community socioeconomic conditions in the models. Among 1,979 hospitals, only 11.4% have formal alliances, and 50.8% have informal collaboration with faith-based organizations. The findings indicate that hospitals have the lowest level of partnership with faith-based organizations compared to other community partners. However, despite this lowest level of alliances, faith-based organizations are the only partners that hospitals seek to collaborate with when their communities have poor infant mortality rates

($p < 0.001$), low birth weight rates ($p < 0.001$), and overall poor/fair health rates ($p < 0.05$). Faith-based organizations are key partners for hospitals that serve deprived communities with poor health outcomes. More policy support is needed to promote hospital-faith-based partnerships.

Session 17: Room 112

2:20 pm – 3:20 pm

TECHNOLOGY / AI / BUSINESS

Session Chair: *Mitchell Johnston, University of Dayton*

Born Open Datasets for Research and Analytics Courses

Loreen Marie Powell

Ronda Mariani

Dina Clark

Lijuan Sun

Marywood University

Commonwealth University of Pennsylvania

Commonwealth University of Pennsylvania

Commonwealth University of Pennsylvania

Today, students, educators, and researchers search for easy access to data to run data analytics within the classroom or for research discovery. Many of the easy access datasets can be found online in the form of born open datasets found on GitHub (github.com), Figshare (figshare.com), Dryad (data.dryad.com), and Open Science Framework (osf.io). Theoretically, open born data implies that it is clean of any personal identifying data. For this reason, many educators and students are attracted to using open born data for their academic studies. However, there are several important data quality definitions and attributes that one must evaluate to properly ensure that an open born dataset is of quality for academic use within research and analytics courses. This theoretical paper will add to the literature by providing a multi-dimensional data quality definition and attributes via a comprehensive review of scholarly academic literature. This study is not without limitations but, it does have practical impacts for university, colleges, faculty, and students conducting and teaching research and analytic courses using open born data.

Hippocrates or Hypocrites: The Ethical use of AI in Health Care Delivery

Mohammad Ali

Rhoda Joseph

Pennsylvania State University

Pennsylvania State University

Health care, at the base level, refers to focus on the human physical and emotional well-being for an improved quality of life. The World Health Organization (WHO) defines health care as systems that promote healthy living, prevent, and treat diseases, support rehabilitation and palliative care, and empowers individuals, families, and communities to manage their health needs (WHO, 2023). Physicians, nurse practitioners and other professionals are the primary means of delivering healthcare solutions to patients. With the growth of technology, and specifically artificial intelligence (AI) healthcare delivery has increased in complexity and is much more reliant on data. The Hippocratic Oath, part of a pledge by physicians, indicates a refrain from doing harm. The primary research questions governing this study ask: 1. Where are the instances of AI biases in healthcare delivery? 2. Under what conditions does AI bias cause direct and indirect harm to patients and providers? 3. What could be an ethical way of using AI in healthcare? This study is not only focused on the harm to the patient but also the impact/harm that can be directed towards the providers such as physicians and nurse practitioners. The two phases of this study are: first, a meta-analysis of studies that examine bias in AI in healthcare delivery, and second, primary qualitative data collected from practitioners on harms of AI bias, both to the patients and providers. Implications and future directions for this study are also addressed.

BUSINESS / INDUSTRY

Session Chair: Cheryl Crespi, Central Connecticut State University

Skills Employers Desire in College Graduates

Denise T Ogden
Mark Capofari
Barbara Awad

Pennsylvania State University
Pennsylvania State University
Consumer Insights - Professional

Because companies invest heavily in new employee recruitment and training, employers have expectations about the skills college graduates should possess. These skills are often grouped into hard skills (technical knowledge or training) and soft skills (personal habits/traits). Our campus wanted to check on whether the skills desired by employers align with our academic offerings. We gathered information from people responsible for reviewing resumes/and or hiring. We will share existing research and the results of a business survey conducted in our region. Also shared will be employer perception's on actions that place recent graduates at a disadvantage when interviewing.

Student and employer perceptions related to career readiness

J. Christian Ola
Susan Ryan

PennWest University of Pennsylvania
PennWest University of Pennsylvania

Active learning techniques are an essential component in academic programs to ensure that curriculum meets or exceeds the expectations of students, alumni, and other stakeholders who are dependent on career-ready graduates. Business programs have also recognized the importance of active learning methods and frequently utilize internships as part of a student's curriculum. The Accreditation Council for Business School Programs (ACBSP) and the Association to Advance Collegiate Schools of Business specifically identify active learning as "interactive instructional techniques that engage students in higher order thinking such as analysis, synthesis, and evaluation. Additionally, neither the ACSBP nor AACSB provide a template or form for schools to follow. Consequently, students may experience dissimilar outcomes from their internship and employers may have differing experiences from interns attending different universities. This may lead to a confusion and conflicting opinions between a students' self-perception of essential skills for career readiness and employers' perception of a student's readiness. A student may think they are well-equipped to face the challenges of being employed while employers may feel that the student is not ready for the workforce. This paper analyzes these perceptions to determine where the two intersect on a series of questions administered at the end of a semester-long internship. Our research indicates that students participating in an internship rate their performance less favorably than their supervisor's evaluation in every category except equity and inclusion. Leadership, communication, and critical thinking were all statistically significant, suggesting that employers perceived the students' skills better than the students did themselves.

A Retrospective Look at Project Successes

Timothy Wilson

Clarion University (retired)

A popular text on project management lists 14 ways, with 37 contributing factors, in which projects may fail. In contrast, there is only one way in which a project can succeed, i.e., be on time, within budget and producing the scope of planned development. Considering the apparent odds against success, it is surprising that any project ever succeeds. In fact, these odds against success are frequently observed in large projects, the megaprojects. Megaprojects are big and bold, but they almost always overshoot in costs and time. Their patterns tend to follow the 'iron law' of megaprojects, "over budget, over time, over

and over again”. Recently, there has been reconsideration of success in project completion along the lines of relaxing judgement. In particular, the phenomenon of “phoenix projects” has been cited, i.e., project that “fail” but succeed after resurrection. Product development projects may be promising areas to study for phoenix behavior because of the inherently high risk they tend to bear. In this paper we will look at 20 product development projects that were terminated but were successfully un-shelved after the development environment changed.

Session 19: Room 112

3:25 pm – 4:25 pm

BUSINESS / ECONOMICS

Session Chair: Maung Min, Pennsylvania State University

ESG Fund Flows and Returns: Assessing the Impact of Presidential Veto

Cheryl A Moore

Mercyhurst University

President Biden’s first veto in office was to overturn a regulation allowing retirement-plan managers to consider Environmental, Social, and Governance (ESG) funds for private retirement plans. Employing a Difference in Difference (DiD) methodology, this research paper examines the impact of this veto on ESG fund flows and their returns. The intent is to investigate the short-term effects of this regulatory change on ESG investments. The analysis will span a thirty-day period capturing data fifteen days before and fifteen days after the event. Morningstar Direct, a comprehensive and reliable source for mutual funds’ information, will be the data source for the ESG funds. This study seeks to shed light on the potential consequences of this policy shift on the ESG investment landscape, specifically focusing on the dynamics of fund flows and returns. Analyzing the behavior of fund managers, in response to the veto, can provide insights into the implications of regulatory changes on the ESG market and inform future policy decisions.

Finding the Optimal Lorenz Curve

Mark L. Wilson

West Virginia State University

The Lorenz Curve is a widely-used tool for measuring society’s dispersion of income and wealth. The curve gained popularity in recent years as the incomes of “One percenters” became a political issue. This paper covers three themes: a description of the Lorenz Curve and related Gini coefficient; income inequality in the U.S. versus selected countries; and, a way to think about an “optimal” Lorenz Curve. Optimality is realized to the extent a country’s people have political and economic freedom and have “voted” for their Lorenz Curve. Selected countries are compared.

Consumers’ Browsing versus Searching Behaviors in EBusiness

Young Bae

Pennsylvania State University

Although there has been a huge growth in consumers’ mobile shopping experiences in e-business for the last decade, little is known for the roles of consumers’ device type selection (e.g., mobile vs. personal computer) and their shopping goal (e.g., browsing or searching goal orientation) on their online purchasing behaviors. To explore this under-researched area, we develop a conceptual framework that explores the mediating effects of consumers’ shopping goal on the relationship between their device type selection and purchasing behaviors and the moderating effects of online advertising and easy payment services. We empirically analyze big data using an appropriate empirical model. We provide empirical evidence for our conceptual framework. These findings provide e-business service providers with important managerial implications.

Special Session: Best Paper Presentation**4:30 pm – 5:30 pm****BEST PAPER PRESENTATION – Room 106**

Session Chair: Norman Sigmond, Kutztown University of Pennsylvania

Do Major Customers Affect Suppliers' ESG Activities

Feng Dong
John Doukas
Rongyao Zhang
Stephanie Walton
Yiyang Zhang

Siena College
Old Dominion University
Youngstown State University
Louisiana State University
Youngstown State University

This study examines whether major customers affect supplier firms' Environmental, Social, and Governance (ESG) activities. We find that companies with higher customer concentration engage in less ESG activities while directing more resources towards other long-term value-enhancing activities. This association is attenuated for suppliers with fewer business segments, customers with higher bankruptcy risk and lower switching costs, and during elevated equity market sentiment periods. We also provide compelling evidence that companies with at least one major customer tend to exhibit a greater propensity to invest in technology and maintain a higher level of intangible assets. Collectively, our findings demonstrate that the composition of suppliers' customer base has a notable adverse effect on their level of engagement in ESG activities.

NABET Social Hour – Senate Suite**5:30 – 6:30 pm**

Friday November 3, 2023

Registration – Registration Desk**7:30 am – 12:00 pm****Breakfast – Senate Suite****7:45 am – 9:00 am****Welcome – Senate Suite****8:00 am – 9:00 am**

*Welcome and Discussion Regarding Publication in the
Journal of Business, Economics and Technology (JBET)*

*Norman Sigmond, Kutztown University of Pennsylvania
Chairman, NABET Executive Board and co-editor of JBET*

ACCOUNTING / BUSINESS

Session Chair: *Monica L. Law, Marywood University*

A Review of Large Language Models

Jheison Urzola

Satish Mahadevan Srinivasan

Abhishek Tripathi

Panakkal Mathew

Pennsylvania State University

Pennsylvania State University

The College of New Jersey

Harrisburg University of Science and Technology

This paper is a review of large language models, with a focus on the evolution, architecture, capabilities, applications, challenges, ethical issues, and prospects of these models. Starting with the introduction of Chat Generative Pre-Trained Transformer 4 (ChatGPT-4), a chatbot by OpenAI, and its rapid user adoption, the study delves into its foundational basis in the Generative Pretrained Transformer (GPT) series. The paper traces the progression from Bag of Words (BOW) work (Harris, 1954) to GPT-4, emphasizing their immense scale and training data. ChatGPT-4's role as a fine-tuned conversational AI model is detailed, showcasing its extensive training and capacity for capturing language patterns and reasoning. Key concepts in AI, machine learning, deep learning, and natural language processing are also outlined to facilitate comprehension. This review discusses the significance of large language models and their inclusion of billions of parameters, training data, and the contextual complexity. It highlights ChatGPT-4 as an exemplar of these large models and underlines their application versatility, including few-shot learning and creative text generation. The historical progression of NLP techniques is traced emphasizing the transformative role of large language models. These applications span generating human-like text, answering questions, creative writing, and beyond, while their potential ethical, environmental, and robustness concerns are acknowledged. The paper concludes by offering a comprehensive overview of the advancements, challenges, and potential impacts of large language models in the domain of Natural Language Processing (NLP).

The Effect of Distributed Ledger Technology on the Attestation Function

Linval Frazer

SUNY - Old Westbury

The concept of Distributed Ledger Technology (DLT) has been the subject of discussions by many practitioners and scholars. It has affected how businesses operate in many ways, whether it is transactions, virtual currency, service, or Artificial Intelligence, among other business applications. This paper presents information on the effect of distributed ledger technology on assurance services. It explores whether distributed ledger technology will change the level of assurance, and expectations of auditors. The paper concludes that distributed ledger technology has and will continue to improve business processes. This will invariably lead to a better quality of information, and improved assurance services. However, based on the nature, extent, and time of auditing procedures (GAAS & PCAOB standards), and the subjective nature of generally accepted accounting principles (GAAP), distributed technology will not replace auditors nor obliterate reasonable assurance as the highest level of assurance, for now.

Factors Associated with Student Performance in Management Information Systems: An Empirical Study at a US Commuter Public University

Mostafa M. Maksy

Kutztown University

BUSINESS / ECONOMICS

Session Chair: *Sunando Sengupta, Bowie State University*

The Effect of Positive and Negative COVID-19 Announcements on the US Stock Markets

Sunando Sengupta

Bowie State University

Tibebe Assefa

Bowie State University

Satina Williams

Bowie State University

World Health Organization formally announced on 31 December 2019, that an unknown virus found in Wuhan City in China. On 20 January 2020, 282 confirmed cases of COVID-19 and 6 deaths reported from four countries, including China, Thailand, Japan and the Republic of Korea (WHO, 2020). On February 25, 2020, the Centers for Disease Control (CDC) announced COVID-19 heading to be pandemic. On the 11th March 2020, officially, WHO declared that COVID 19 characterized as pandemic disease. The White House announced Covid 19 as a national emergency on March 13th, 2020. On Dec 11th, 2020, FDA publicly announced its Emergency Use Authorization(EUA) for the first Covid 19 vaccine, the Pfizer-BionTech Covid vaccine. On Dec 18th, 2020, EUA was announced for the second vaccine, Moderna Covid-19 . On Feb 27th, 2021, FDA approved the EUA for the third vaccine, Janssen Covid-19 vaccine and on July 13th, 2022, they announced the EUA for the fourth vaccine, Novavax. The COVID 19 outbreak on global stock markets was staggering. Our research in this paper has been to look at the short-term market reaction to such media announcements regarding both the onset of Covid 19 and the successful testing and emergency use availability of covid vaccines in the U.S. markets.

Employment Change in the US Census Regions Through the COVID-19 Pandemic and Beyond

David Doorn

West Chester University

This paper takes a geographic look into the sectoral employment effects of the COVID-19 pandemic and recovery across the nine U.S. census divisions. Using dynamic shift-share analysis with a focus on NAICS super-sectors, we compare and contrast differences in industry performance from before the shutdown, through it and into the reopening of the U.S. economy. This dynamic method is extended to a graphical version that facilitates comparisons across regions with respect to the particular industry contributions to employment growth and decline in each region over this historical period.

Why Statistical Understanding is Necessary for College or Career Preparation

Joe Muscatello

Kent State University

Statistical training is necessary for a modern society so they can differentiate between solid quantitative analysis, versus opinions, trends, political dogma, or other dubious conclusions. Correlation is not causation! This paper builds a case for robust statistical understanding. Statisticians can help investigators avoid a wide variety of analytical traps. When analysts use statistical procedures correctly, they tend to produce accurate results. In fact, statistical analyses account for uncertainty and error in the results. Statisticians ensure that all aspects of a study follow the appropriate methods to produce trustworthy results. But accuracy is very difficult to achieve, and if you are not familiar with statistics, manipulations can be hard to detect. Statistical knowledge is the solution to this problem. With our current charge of making High school students' college or career ready, we have shifted our focus from completion to readiness. Statistics helps with readiness.

Session 22: Room 105

9:15 am – 10:15 am

BUSINESS / ECONOMICS

Session Chair: Gary H. Jefferson, Brandeis University

You Heard My Music Where's My Money How Recent Information Technology Developments May Be Used To Fix the Economy of the Royalty Distribution Business for the Public Performance of Music

Stuart B. Shapiro

Fredonia University

Since the 1940s, the collection and distribution of royalties (earned payments) belonging to the authors and publishers of musical compositions publicly performed in the United States (whether on radio, in nightclubs, at concerts, or in grocery stores) has been accomplished through a highly criticized and extremely antiquated system that unfairly favors popular music to the exclusion of other publicly performed compositions. This study will provide a historical perspective of the deficient operations of royalty collection agencies, followed by an exploration of how newly emerging technology, if properly employed, may be used to affect a much-needed change in the business of royalty distribution. The study will conclude with recommendations regarding mitigation of the current disparities.

Resolving the Problem of Solow Uzawa SteadyState Technical Change

Gary H. Jefferson

Brandeis University

Since Uzawa's Growth Theorem "proved" the requirement that technical change in the Solow steady state must be "purely labor augmenting," technical change in the growth literature has been largely represented as Harrod neutral. Strictly-speaking the fact that a world void of capital-augmenting change is inconsistent with readily observable reality renders the Solow model scientifically invalid. By identifying certain misconceived assumptions embedded in the Solow model and its standard journal and textbook-representations, this paper locates a straightforward remedy, centered on problems with the treatment of exogenously-augmented capital and endogenously-accumulated physical investment, leaving intact the highly "refineable" mathematical structure of the Solow model. Having opened the door to capital-labor-augmenting change, the paper formulates an interpretation of the nature of technical change grounded in certain fundamental properties of nature and the natural sciences.

Session 23: Room 106

9:15 am – 10:15 am

BUSINESS / TECHNOLOGY

Session Chair: Norman C Sigmond, Kutztown University

A Manager's Guide to Implementing Effective Remote Work Strategies

Joshua J. Beck

Shepherd University

Workplace dynamics in the modern work environment have been in question with implementing remote work. Some jobs were forced to work remotely due to COVID-19, and the work environment has had to adapt ever since. This paper provides a brief history of remote work, the challenges of remote work, and some of the positives and negatives for the employer and employee. There is also advice to managers with implementing an effective remote work strategy and includes some tips beneficial to employees working remotely.

Ethical Shortcomings of Machine Learning AND Artificial Intelligence and Proposed Solutions

Abhishek Tripathi

Satish Mahadevan Srinivasan

The College of New Jersey

Pennsylvania State University

Machine Learning (ML) and Artificial Intelligence (AI) technologies have become leading priorities for companies across different industries. Through consumer transactions and behaviors, companies collect and store vast amounts of data. Now everyone wants to dive deeper into those collected observations and use the available advanced algorithms and predictive analytics to drive business decisions, and ultimately understand the behaviors of the consumer. Within five years, there will be over 50 billion smart connected devices in the world, all developed to collect, analyze, and share data (Marr, 2015). Recently, this massive increase in both the amount of data available and the frequency at which these technologies are used has resulted in numerous instances of unethical applications of ML and AI. This literature review examines the current education around ethics within ML and AI with further detail into AI and how data is collected and utilized in analysis within different industries. Understanding the power behind ML, we will explore cases where data analytics are used in malicious ways or create possible dangers in the future. Our research integrates the healthcare, financial, and social media industries to understand what bias is built-in or removed from their particular algorithms. We will further explore the key research questions around how ML & AI are used throughout industries that contain bias or used in malicious ways.

Generative AI and Bloom's Taxonomy: Challenges and Opportunities for Deep Learning in the Digital Age

Andrew Mangle

Bowie State University

The advent of Generative AI has indelibly marked the landscape of modern pedagogy. This research outlines the impact of generative models, such as GPT-4, and its technology precursors and successors, such as search engines, on the foundational levels of Bloom's taxonomy: remembering and understanding. The author supports that while these AIs show promise in aiding memory and conceptual grasp, they also present nuanced challenges for educators and learners. Namely, students can quickly become reliant on AI for basic cognitive tasks, potentially impeding their capability to demonstrate the application of concepts. The application level is a critical skill for their careers and life-long learning that relies on remembering and understanding, which can be masked by technology.

Session 24: Room 112

9:15 am – 10:15 am

ECONOMICS

Session Chair: Michael J. Gallagher, DeSales University

Pricing Power and Inflation in The US: A Post-pandemic Era Analysis

Siamack Shojai

William Paterson University

Warren Buffet in his testimony to the Financial Crisis Inquiry Commission (FCIC, 2011) stated that: "...The single most important decision in evaluating a business is pricing power. If you have got the power to raise prices without losing business to a competitor, you have got a very good business. And if you have to have a prayer session before raising the price by 10 percent, then you've got a terrible business..." Pricing power is defined and measured in various ways by different researchers. For example, Simon-Kucher and Partners (2016) assert that "pricing power" is the ability of a company to get the price it deserves for the value it delivers. The contemporary concepts and measurements of pricing power such as market share, price-cost margin, product differentiation, the Lerner Index, and the Herfindahl - Hirschman Index are used to assess the pricing power of top two firms within select industries in the U.S. These include pharmaceutical, airlines,

fast food and the athletic apparel industries. In addition, the paper investigates the dynamics of pricing power and inflation in the post-pandemic era in the selected industries. The preliminary results indicate that firms such as Pfizer, Apple, and McDonald's have relatively strong pricing power, which contribute to inflation. These results are supportive of other recent conclusions reached by other researchers like Bivens (2022).

Exchange Rate Elasticity of Equity Returns at Different VIX Implied Volatility Zones

Michael David Herley

Saint John's University

We argue that the interactions between exchange rates and equity returns are asymmetric, state dependent on different VIX zones, and most pronounced during high VIX periods. Responsiveness of equity returns to the exchange rate is indiscernible when VIX is low. We examine co-movements between daily S&P 500 returns (log-changes) and log-changes in the Federal Reserve's Nominal Broad U.S. Dollar Index (BRUSD) and Nominal Advanced Foreign Economies U.S. Dollar Index (AEUSD) and the USD in EUR exchange rate (USD-EUR) at three VIX zones (low, intermediate, and high) for a January 03, 2006 – January 23, 2023 sample period. We employ the self-exciting threshold autoregressive SETAR(2,p) model to determine the VIX zones. We subsequently employ VAR tests for S&P 500 returns and log changes in USD exchange rates showing the most robust transmission of shocks in the high VIX zone. We further run Markov switching tests to identify specific jump periods from low to high responsiveness of equity returns to the USD exchange rate. Our tests confirm that the exchange rate elasticity of equity returns is low at normal VIX conditions and high during high VIX periods. Evidently, market participants -particularly those representing S&P 500 companies - focus more on currency risk at high levels of volatility.

Session 25: Room 102

10:30 am – 11:30 am

BUSINESS AND TECHNOLOGY

Session Chair: Susan Aloi, Davis and Elkins College

Job Requirements for Entry-level Supply Chain Professionals

Gary Chao

Qin Geng

Kutztown University

Kutztown University

The COVID-19 pandemic brought about significant disruptions in corporate supply chains, prompting a heightened recognition of the pivotal role played by supply chain management during periods of upheaval. This recognition has spurred a strong desire among businesses to bring aboard individuals who possess the essential skills and expertise in supply chain management. As we prepare our students for careers in the realm of supply chain management, it becomes crucial to align our educational objectives and training programs with the ever-evolving demands of the industry. Consequently, this study embarks on an in-depth exploration of knowledge, skills, personal attributes, and compensation levels in entry-level supply chain job listings across fourteen major metropolitan areas in the United States. We have identified twenty-five distinct variables encompassing areas such as business acumen, knowledge of supply chain functions, and managerial competencies. Employing a thorough analysis of the correlations between these variables, we have successfully pinpointed the most coveted proficiencies and knowledge domains within each sector. Subsequently, we have harnessed Principal Component Analysis to categorize these twenty-five variables into three distinct clusters. This clustering methodology aids us in identifying the specific skills, knowledge areas, and competencies that organizations actively seek when recruiting candidates for supply chain positions.

Developing a Post COVID-19 Learning System: The 5 E's of Learning: Education Engagement Energy Experiential & Excellence

Neil Malvone

Caldwell University

Business management education methods and learning systems after the COVID-19 pandemic need to be re-evaluated to better connect course learning objectives to the current enrolled student in higher education. This future research study will focus on an innovative learning system currently in development utilizing the “5 E's of Learning”: Education, Engagement, Energy, Experiential and Excellence. The resulting research will determine if bringing these five E's to the classroom will transform the normative methods of teaching into a modern constructive activity-based system. Further study will measure whether this system helped to retrain students whose education was interrupted by COVID-19 through pioneering learning and studying processes. The “5 E's of Learning” will focus on tangible short-term successes in the classroom and long-term achievements in the real-world business environment. The research will be conducted across the sport management collegiate ecosystem in multiple college courses on various college campuses. Through a combination of qualitative and quantitative research methodologies we can study teaching instruction and approach used, and also measure student population, class size, test scores, and class attendance. The challenge of integrating this learning system will be finding professors willing to change the status quo and for the students to find the new system compelling enough to fully participate in the learning process. Post COVID-19, professors of business management must meet this challenge head-on to ensure the viability and value of modern college education.

Artificial Intelligence AI: It's Impact on the Academy Are You Ready

Matt Fuss

Murphy Gerber

Curtis Songer

Geneva College

Geneva College

Geneva College

This paper strives to provide both the “Pros” or advantages and opportunities available to us in using AI in the classroom and the “Cons” or the disadvantages, dangers, and perils to using AI in the classroom (and outright Threats AI poses to academia at-large.) We will begin our discussion with the Pros of AI and then move into the Cons of AI. We will provide a background and grounding in ethics since “Responsible AI” use is what we are proposing. This ethical grounding will include a background on ethics at-large, on the background of AI/ChatGPT, and include an outline of six specific risk areas posed by large-scale AI language models (LMs): 1. Discrimination, Exclusion and Toxicity, 2. Information Hazards, 3. Misinformation Harms, 4. Malicious Uses, 5. Human-Computer Interaction Harms, 6. Automation, Access, and Environmental Harms. Finally, we will end with a list of specific ways teachers and students can use AI responsibly in the classroom. Specifically, we will propose why Higher Ed needs to embrace AI and reasons why teachers should use AI in the classroom. Since ChatGPT is currently one of the most talked about, affordable and widely available AI models for students and educators alike, we will propose several application ideas for using ChatGPT in the classroom along with other, more general ideas for educators.

MARKETING / BUSINESS

Session Chair: David Gargone, Misericordia University

Winning the Social Game: Utilizing University Mascots on TikTok

David Gargone

Misericordia University

TikTok is rapidly becoming one of the most prolific social media applications utilized around the world. Specifically, high school and college aged students engage with TikTok regularly for the purpose of entertainment. At the college level, universities have attempted to capitalize on the desire to watch TikToks by making their own accounts for the institution, admissions teams, clubs, sports programs, and other groups. Some universities have embraced the usage of their mascots in university TikTok accounts, or have created separate accounts on the application for their mascots. The purpose of this study is to examine the impact that individual university mascot TikTok accounts have on fan engagement for athletic departments. Additionally, an examination of best practices in the administration and design of these TikTok accounts is being completed.

Comparative Analysis of Healthy Workplace Concept

John C. Cameron

Pennsylvania State University

Comparative Analysis of Healthy Workplace Concept John C. Cameron Associate Professor The Pennsylvania State University Abstract The development of a healthy and safe workplace protects employees from workplace bullying. Employers have a responsibility to maintain a safe workplace environment. An offensive work environment needs to be considered in light of reports of workplace bullying. Currently, bullying does not constitute a violation of anti-discrimination laws. According to a United States District Court decision in the Eastern District of New York, the civil claim of alleged workplace bullying was dismissed because the victim failed to demonstrate that the bullying was motivated by discriminatory intent. Several states have introduced workplace bullying legislation that would enable victims to claim an abusive work environment without demonstrating discrimination. The interpretation of these statutory provisions by employers may present uncertainty because of recent court decisions and a multitude of scenarios. Prior research to examine variances in the provisions associated with healthy workplace legislation within the United States has been limited. To address this gap in the literature, this paper will examine healthy workplace legislative trends including abusive work environment, civility policies, reporting mechanisms, intervention training protocol, anti-bullying policies, immunity provisions, complaint procedures, and prevention policies. Keywords: offensive behavior, workplace bullying, anti-bullying, abusive conduct

BUSINESS / ECONOMICS / AI*Session Chair:* Adnan Chawdhry, Pennsylvania Western University**Can use of AI in Teaching and Learning to Change Student Perceptions?**

Subhadra Ganguli

Pennsylvania State University

The emergence of AI has been at the helm of controversy among academicians regarding the why and how of its use in academia. While no one can deny the dominance of AI in almost every sphere of human activity, higher education has been slow to adapt AI in its activities. There is no doubt that AI will have its significant impact on higher learning, however no one seems to be sure of how and what will be the outcome. Though we cannot predict the role of AI in future education, no one can deny that AI is here to stay and will continue to influence academia (like other areas) in a very significant way. The earlier we adapt to its onslaught and use it to the benefit of teaching and learning, the more we may benefit from its applicability and knowledge. The current paper describes situations where students will use traditional web search and non-conventional AI generated results using prompt engineering in an economic and business forecasting course assignment and most of them will conclude that AI is best used as an assistant for personal decision making and planning purposes but the decision maker still remains to be the human being and NOT AI.

Variation in a MidAtlantic’s State Opioid Response Services by Race Age Gender and Place-Based Economic Indicators

Tibebe A. Assefa

Bowie State University

Latanya Brown-Robertson

Howard University

Nega Lakew

Bowie State University

Ellen Meara

Harvard University

George Onoh

Bowie State University

Azene Zenebe

Bowie State University

As opioid overdose mortality and morbidity continue to rise in recent years, many states have pursued State Opioid Response (SOR) programs to facilitate access to opioid use disorder treatment. This study characterizes access to care and variation in federally funded SOR programs operating in a State in the Mid-Atlantic region since 2014. Using data from 53 jurisdiction-level service providers combined with information on demographic, economic, and social characteristics within a 10-mile radius of the SOR service providers, our research explores the equity of opioid treatment, referral services, and discharge in this Mid-Atlantic State’s SOR programs. From October 2020 through May 2022, our study area’s jurisdiction-level SOR providers served 8,659 adult clients. Among the rate of service received (per 100,000 population) adult men received more service, at 260, compared with adult women, at 110. In conclusion, access to treatment and recovery services among our study area are relatively equitable across the White and Black race groups; SOR service providers were an important point of access for MOUD with OUD (opioid use disorder) treatment needs living in majority Black communities. There are still great opportunities for outreach in those more economically vulnerable communities. Since rates of opioid-involved overdose deaths continue to grow fastest among Black residents in our study area, future research should examine whether opioid treatment correlates with a decline in opioid-involved deaths and if there is any difference in the quality of SOR provider services delivered by race as well as by type of program.

BUSINESS / ECONOMICS

Session Chair: Thomas James Tribunella, State University of New York at Oswego

Effectiveness of Economic Sanctions, The Impact of War, and Oil Price Shocks on The Iranian Economy

Siamack Shojai

William Paterson University

This paper uses an ordinary least squares (OLS) method to measure the impact of external shocks such as economic sanctions (“sanctions”), the Iran-Iraq war, and crude oil price shocks on output growth in Iran using data from the 1960-2021 period. The overall conclusions based on estimation results are: First, economic sanctions significantly and negatively affect the GDP by \$48.9 billion and the percentage annual change in the GDP of Iran seven years after their imposition by -16.15 percent. However, sanctions immediately and significantly reduce yearly percentage change in real per capita GDP by 4.42 percent. Second, crude oil prices significantly and positively affect real GDP and percentage change in real GDP. Third, the Iran-Iraq war has had a negative significant effect on the real GDP by \$ 58.6 billion and the percentage change in the real GDP of Iran two years after the start of the war. The Iran-Iraq war positively impacted the real GDP and the percentage change in real GDP during its first year. This is against the conventional wisdom about the impact of the war. However, immediately after the war, many resources were mobilized to meet the war requirements. Fourth, the lagged dependent variable positively affects the percentage change in real per capita GDP and has no impact on real GDP or its percentage change. Version C of the model drops the lagged dependent variable to avoid any potential bias in estimating the coefficients.

The Puzzling Dividend Policy of S&P Small Cap 600® Firms

Richard Paul Hauser

Gannon University

This research investigates the puzzling dividend policy of S&P Small Cap 600® firms. Prior studies of dividend policy show that dividend payers are large, highly profitable, and mature firms with limited growth opportunities for reinvestment. Companies that comprise the S&P Small Cap 600® are small, growing, and less mature, yet almost half of these firms (44%) paid a dividend in 2022. Based on analysis of the summary statistics and logit regressions, the 2022 S&P Small Cap 600® dividend paying firms are significantly less mature, less profitable, and utilize less leverage than a comparison sample of large cap dividend payers from the S&P 100. Contradictory to theories on reinvestment and dividend policy, the small cap dividend payers have significantly higher reinvestment opportunities as measured by the asset growth rate. Examining the payout policy of the S&P Small Cap 600® dividend payers confounds the puzzle. The small cap dividend payers are significantly more likely to cut or eliminate the dividend, and significantly less likely to grow the dividend. The higher asset growth rates of the small cap dividend payers do not correspond to higher dividend growth rates. Despite significantly lower dividend payout ratios, small cap dividend payers are significantly more likely to have negligible dividend growth.

A Thematic Data Analysis of the Definition of Sustainability among the Millennial Generation

Shruti Gupta

Pennsylvania State University

Denise T Ogden

Pennsylvania State University

The Millennial generation was both between 1980 and 1996. According to U.S. Census data, this group is the largest generation in the United States accounting for close to 25% of the population. This makes this group an important demographic with an estimated spending power of \$2.5 trillion/year. According to

several sources, this population is highly concerned with sustainability and are willing to spend more with companies that embrace these practices. We present results of qualitative interviews of millennials and the results of thematic data analysis aimed to uncover consumer perceptions and attitudes around sustainability. Of particular interest is how this cohort defines sustainability and how this definition impacts their consumption.

Session 29: Room 102

1:00 pm – 2:00 pm

BUSINESS / MARKETING

Session Chair: *C.J. Rhoads, Kutztown University*

Machine Learning in NFL Analytics: Showcasing the Creation of a ‘Rushing Yards Over Expected’ Metric Using a Gradient Boosted Tree Model

Brad J Congelio

Kutztown University

Regarding National Football League (NFL) analytics, a key goal is to quantify player performance beyond traditional statistics allowing for a deeper understanding of game dynamics. This presentation showcases the creation of a “Rushing Yards Over Expected” (RYOE) model, which is a metric aimed at evaluating the efficiency of a player’s rushing attempts. Using data from the NFL, I demonstrate creating the RYOE model using the ‘tidymodels’ framework in the R programming language to preprocess, feature engineer, and visualize the model’s results. Specifically, the ‘lightgbm’ package is utilized to construct a gradient boosted tree model. Preliminary results indicate that the RYOE model provides a more nuanced insight into rusher performance, accounting for situational variables often overlooked in traditional metrics.

Tai Chi in the USA: Perceptions Motivations and Promotional Strategies

Sue Kong

C.J. Rhoads

Violet Li

Kutztown University

Kutztown University

Kutztown University

The growing interest in holistic health in the U.S. has made Tai Chi, an ancient Chinese martial art known for its slow, graceful movements, deep breathing, and meditation, increasingly popular. Understanding how American Tai Chi practitioners perceive this practice, what influences their perceptions, and what motivates people to engage in Tai Chi can offer invaluable insights for Tai Chi studios seeking effective strategies to attract more customers. In our survey conducted in April 2023 with 682 valid responses, we found that American Tai Chi practitioners primarily perceive Tai Chi as both a healing and a martial art. Logistic regression analysis further demonstrated that individuals who perceive Tai Chi in this dual light are more inclined to practice Tai Chi, suggesting that the appeal of Tai Chi lies in its potential health benefits and self-defense elements. Different sources influence these perceptions. In particular, connections with Tai Chi practitioner groups and reading books on Tai Chi are associated with viewing it as a martial art and an embodiment of eastern philosophy. Exposure to Tai Chi-related media, such as movies and TV shows, influences the perception of Tai Chi as a performing art. These findings underscore the need for diverse promotional channels. To broaden their customer base, Tai Chi studios can use a multifaceted approach. This may include offering classes that highlight both the healing and martial aspects of Tai Chi and using diverse media channels, like movies, TV shows, books, and Tai Chi groups, to shape perceptions positively.

PEDAGOGY / MARKETING / E-SPORTS

Session Chair: *Eric James Talanca, Western New England University*

How Fun Are Games During a Pandemic Marketing the “2020” Olympics

Elizabeth L. R. Elam

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Marketing of any Olympic Games or Winter Olympics is not as straightforward as most people assume. Add to that the emergence of a global pandemic, and there was doubt that the “2020” Tokyo Olympics would even take place in the year for which they were rescheduled, in 2021. This exploratory paper looks at the ups and downs of the marketing process for the global event, and the impacts of a global pandemic.

Leveraging Open-Source Libraries for Small and Medium-Sized Business Growth: Addressing Challenges and Opportunities

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Small and medium-sized businesses (SMBs) constantly seek competitive strategies to foster growth and innovation. This imperative often involves the utilization of internal data sources, such as previous sales data and surveys. However, the quest for external data resources to inform business improvement strategies can be a challenging endeavor. This research explores a pragmatic solution to this challenge by emphasizing the potential of open-source libraries, exemplified by platforms like GitHub. These libraries represent publicly accessible, free-to-use data repositories that encompass a diverse array of information, thereby providing SMBs with valuable insights into statistical performance comparisons of similar businesses across different locations. This study underscores the pivotal role of open-source libraries in empowering SMBs to adapt and enhance their business methods, facilitating expansion and sustainable growth. Nonetheless, it is crucial to acknowledge that these libraries also present inherent cybersecurity threats, as the integrity of the datasets may be compromised by malicious code insertions. Thus, it becomes imperative for users to employ rigorous verification techniques and community-driven code auditing processes to ensure the trustworthiness of the downloaded data. By navigating the opportunities and challenges presented by open-source libraries, SMBs can leverage these invaluable resources to bolster their competitive edge, foster innovation, and realize sustainable growth. This research offers insights into the methods of safeguarding against potential threats while harnessing the potential of open-source libraries, contributing to the advancement of SMBs in an increasingly competitive business, economics, and technology landscape.

BUSINESS / TECHNOLOGY / PEDAGOGY

Session Chair: David Jordan, Slippery Rock University

The Pervasive Nature of Fraud: A Study of Organizations from Pre-Post Pandemic

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There are a number of reasons fraud proliferates during recessions and times of economic instability. A large factor is the increased pressure companies and their employees feel as they struggle to meet the challenges of a slowed-down economy. For example, struggling companies can face pressure to falsify their financials in order to meet earnings targets or secure financing. Financial statement fraud happens to be the most expensive type of fraud. According to data from the 2019 Global Fraud Survey, financial statement fraud costs an average of \$8.7 million. Given the immense negative impact of fraud incidences on the functioning of an economy, in this paper we analyze how the pandemic affected the risk of fraud for firms and auditors, comparing the 2018 and 2022 ACFE (The association of Certified Fraud Examiners) reports. We further discuss the signs of fraud post- COVID, focusing on occupational fraud. We identify the trends during and post pandemic, and analyze how the pandemic increased the risk of frauds. Finally, we discuss recommendations in preparing for a post-pandemic fraud landscape.

Bridging the Cyber Security Workforce Gap: A Comprehensive Analysis of Skills and Abilities

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Most universities offer two types of accounting curriculum. The introduction courses are designed for all “business students,” while the upper level – substantive – courses are for true “accounting majors.” It is essential for all “business students” to get a foundation in accounting theory at a basic level but it can be difficult for the few “accounting majors” to be engaged by basic material. Equally, increasing the difficulty of the material taught can be overwhelming for the regular “business student.” The upper-level accounting program usually begins with Intermediate Accounting I and has traditionally had a much lower success rate as students transition to the more difficult material. As educators, we need to forge bridges between courses to promote student success. Several ideas will be presented to ease the transition into the more substantive accounting courses.

BUSINESS / PEDAGOGY

Session Chair: David Gargone, Misericordia University

Effective Strategies for Academic and Career Success, the First Year and Beyond: Exploring The 7 Habits of Highly Effective College Students

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The goal of business faculty in institutions of higher learning is to produce students who will be prepared for success in professional positions at the time of graduation and grow into leadership roles over time. Immense resources of time and money are devoted to this mission. However, the experiences of employers in the United States have demonstrated that despite this massive effort to produce career ready students, recent graduates and new hires are still lacking in the necessary skills needed to be productive members of the workforce (Bridgeland et al., 2011; Deloitte and The Manufacturing Institute, 2015). This article addresses experiences of college students and their readiness for the global workforce by examining existing literature that focuses on issues related to effective skillsets for college success and beyond. Research indicates that organizations are experiencing deficiencies in these skillsets among recent college graduates they seek to hire. The authors draw on their anecdotal experiences in the first-year seminar courses they have taught for first-semester college freshmen. The questions addressed in this article include, “What roles do foundational life skills play in preparing students for college and beyond? Are today’s college students adequately prepared for the workforce? How can college educators assist in better preparing college students for successful, contributory futures? What strategies are effective in college and career success?”

Are Bonds a Good Modality for Financing Municipal Projects

Norman C Sigmond

Kutztown University

For many years, States, Cities and even smaller political subdivisions of States have relied on floating bond issues in order to fund numerous big dollar projects. This method of financing is often not questioned. The most common venue for challenge has been at the level of the State Legislature, City or Borough/Township Council, etc. Does the average citizen comprehend the range of potential problems with bond issuance? Would the citizen attend the City or Borough council meeting to challenge the politicians who promote the issuance of bonds? If they did challenge at the public inquery, what would be the essence of that challenge? Have there been major projects where the method of funding was reconsidered or redirected from bonds to another type of financing. Or, have there been major projects cancelled because the method of financing by bonds was proven faulty? This paper will explore these and related issues.

FINANCE / ECONOMICS

Session Chair: David Jordan, Slippery Rock University

INFLATION UPDATE: Hard Landing Soft or None

William Carlson

Duquesne University

This is an interim report on the current inflation. How it ends is still to be determined. Paul Volcker solved the 1965-82 Great Inflation with a very hard landing: the back-to-back 1980 and 1981-2 recessions which sent the unemployment rate to 10.8%. The current inflation is less severe and there is hope that we may escape with less pain. Exhibit 1 shows the major differences between the 1972-82 inflation and the current one. Oil prices were the key to the former and a huge quantitative easing to the Covid disruption to the latter. With different causes it is hoped that there may be different endings. We look at the effect of recessions on inflation and whether soft landings where inflation has declined without a recession have occurred. Also, how inflation is related to GDP, money, interest rates, labor market conditions, and oil. Professor Jeremy Siegel of Wharton has noted that the housing sector distorts the CPI as has the San Francisco Fed. Also, monthly, and quarterly measures give a different perspective than the year over year method of the Fed. While inverted yield curve theory indicates a recession is coming, we believe that a soft or no landing solution is possible if everything goes right. Factors still playing out are the auto strike, student loan payments, a government shutdown, consumer money balances, the 10-year Treasury rate, and will the Fed break something else.

Corporate Transparency Transnational Tobacco Companies and Illicit Trade in Tobacco Products

Amit Mukherjee

Stockton University

This research analyzes government relations efforts of a powerful group of Transnational Tobacco Companies (TTCs) to secure their industry interests in the contested policy area of global tobacco control. TTC efforts to influence the World Health Organization (WHO) initiatives to establish, and secure compliance to, the Illicit Trade Protocol (ITP) regime of the Framework Convention on Tobacco Control (FCTC) are examined. TTC government relations efforts, on the national and international level, and the Codes of Conduct publicly embraced by the industry suggest that TTCs have systematically, but secretly, violated their professed Codes of Conduct, thereby falling to meet corporate transparency expectations of information disclosure, clarity, and accuracy. The implications of these transgressions are briefly discussed.

TECHNOLOGY / ECONOMICS

Session Chair: Audrey Guskey, Duquesne University

Technological Revolution Information Technology Capability and Stock Return Volatility

Daesung Ha

Marshall University

In this study, we investigate the effect of IT capability on firm performance, as gauged by stock prices, by analyzing the impact of the latest technological revolution on stock values. In the early stages of technological revolutions, the efficacy of new technologies remains ambiguous and subject to fluctuation. This ambiguity gradually transitions from being idiosyncratic to becoming systematic over time. The resulting surges in stock prices are unpredictable, yet they become discernible once technological adoption nears completion. This phenomenon is commonly observed in technologies, such as information technologies, which are characterized by high levels of uncertainty and rapid adoption. For our empirical investigation, we select 916 firms recognized as top users of information technology from the InformationWeek 500 between 1989 and 2012. Our sample is constructed by merging financial data from the Compustat database and the CRSP stock files. We uncover empirical evidence supporting firms with strong IT capabilities during the technological adoption period. However, this support diminished after the technological adoption concludes. We also discuss the significance of this finding in relation to the relationship between IT capability and firm performance.

Digital Marketing Role in Understanding, Adapting & Transforming the Business Ecosystem

Shahriar Gias

Slippery Rock University

Marketers continue to help the world create resilient business ecosystems amid difficult challenges. Marketing role is to help businesses understand how to handle these crisis issues head-on, but it must also assist in ensuring the sustainable, proactive, and equitable responses of businesses. In this paper, authors discuss how marketing has impacted the resilience of these ecosystems during times of unrest, such as during the Covid-19 pandemic, the ongoing Russian-Ukrainian War, the current volatility of our economy, and the greater supply chain disturbances. A common theme discovered amongst all challenges faced in these recent events is the increase in both digital marketing and social media tactics. Digital Marketing as well as Social Media Marketing strategies have been a successful marketing strategy to overcome those challenges as it has helped marketers to adopt more proactive and agile marketing strategies to deal with the market uncertainty. Statement of Key Contributions Our research provides directives on how the business marketing world is understanding, adapting, and transforming in this rapidly changing business environment. Our paper discusses the major economic disruptions within the business world and how the field of marketing is trying to handle these problems. This paper covers some of the current crisis such as the Covid-19 pandemic, the Russian-Ukrainian war, politics, regional conflicts, inflation, social media, technology, sustainability, and global warming. By addressing these issues, this paper explains how marketers generally are adapting their marketing strategies continuously in response to the present and future global changes.

Consumer Sense makes Sense for Students

Audrey Guskey

Duquesne University

This paper addresses the importance of student organizations and provides justification for the benefits students reap when involved in professional groups. This article provides recommendations for how to initiate and sponsor a professional student club. Undergraduate students are busy with many activities nowadays – school work, internships, jobs, social activities, professional organizations, and sports. I

organized a student group to work on a social media platform Consumer \$ense. This student group has morphed into an active, energetic team of over 20 students who self-designate what functions will they do. There is a blog team, podcast crew, video editing, marketing analytics, business partnerships and sponsorships, and social media team who focus on Facebook, Twitter, Instagram, TikTok, and Linked In. Students gain experience in any or all of these areas. They meet on a regular basis and delegate tasks to be completed. In addition to learning about social media, analytics, video production, and creative writing, they also develop leadership and teamwork skills. This paper shares tips on how to get a student organization started. The benefits to both faculty and students are explored. This type of learning requires faculty to be coaches and mentors. For Consumer \$ense, I spent time outside the classroom offering advice and tips on how to improve their work. Mentoring students is one of the most effective and rewarding ways to ensure student learning is happening.

Conference Concluded

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