

2023

Associations Between Mindfulness Meditation, Health Status, and Activity Limitation Among United States Armed Forces

Bettie J. DuBose
Walden University

Follow this and additional works at: <https://scholarworks.waldenu.edu/dissertations>



Part of the [Psychiatric and Mental Health Commons](#)

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact ScholarWorks@waldenu.edu.

Walden University

College of Health Sciences & Public Policy

This is to certify that the doctoral study by

Bettie J. DuBose

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee

Dr. Joseph Robare, Committee Chairperson, Public Health Faculty
Dr. Gwendolyn Francavillo, Committee Member, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2023

Abstract

Associations Between Mindfulness Meditation, Health Status, and Activity Limitation

Among United States Armed Forces

by

Bettie J. DuBose

MPH, Capella University, 2014

BS, American Military University, 2011

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

November 2023

Abstract

A ready military force is essential for the safekeeping of the United States and the well-being of United States Armed Forces personnel. Today, healthcare professionals report disproportionately high rates of chronic disease and substance abuse among United States Armed Forces personnel and disabling mental health disorders that often go untreated. This quantitative research aimed to determine if there was a relationship between United States Armed Forces personnel using mindfulness meditation and their health status. The study used Bandura's social cognitive theory as its framework and theoretical foundation. Also, a quantitative experimental research design examined the causal relationships between the predictor, outcome, and control variables. The study utilized the 2017-2021 census and survey data from the IPUMS Health Surveys: NHIS and MEPS database and SPSS (version 28) to analyze data on the military population and their health status. The study employed ordinal logistic regression, Chi-square test, and one-way analysis of variance (ANOVA) as statistical analyses. The research questions and corresponding hypotheses were formulated to examine the associations between the variables of interest. The study found using mindfulness meditation in military settings was associated with reduced risks of chronic pain, stress, depression, and posttraumatic stress disorder resulting from combat exposure among military members. Mindfulness meditation was linked to decreased activity limitation and shorter duration of depression, anxiety, and emotional problems in military personnel. Administrators may use findings for positive social change to better serve military members.

Associations Between Mindfulness Meditation, Health Status, and Activity Limitation
Among United States Armed-Forces

by

Bettie J. DuBose

MPH, Capella University, 2014

BS, American Military University, 2011

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Public Health

Walden University

November 2023

Dedication

I dedicate this capstone project to my loving and patient family and friends. A special dedication to my beloved sister, Ruth (Ma) Williams, who saw the potential in me long before I did. I wish I could tell you I did it...but I am sure you already knew I would. I felt your encouragement and love along this journey. Keep holding my hand, Ma! To my husband, Jerome, for always believing in me and lending me your smile that melted my heart from day one. Finally, my Lord and Savior, Jesus Christ for being the shining example I needed throughout this journey and teaching me what service before self really means—I thank you with all my being.

Acknowledgments

First and foremost, I thank God for giving me the strength and ability to accomplish all things through Him. To the many classmates who have journeyed with me, especially Dr. Amy Whiting, this experience will pay off. To my chair, Dr. Joseph Robare, and my committee member Dr. Gwendolyn Francavillo for finding my study interesting, pushing hard for me, and being willing to help me pursue my passion for helping others. To my big brother, Don P. Bailey, for sparking the interest in me as a child that education is important. I always wanted to go to the “big” schools you went to (smile). I love you with all my heart and being. To my main squeezes, Ruth, Thomas, and David, thank you for encouraging and supporting me through this long challenging yet rewarding journey. I promise you guys this is it...for now (smile). I love you guys to the moon and back! To my loving husband, Dr. Jerome R. DuBose, having your support makes this journey easy. I appreciate your loving spirit, invaluable advice, and being an amazing role model — thanks, “Chief!”

Table of Contents

List of Tables.....	iv
List of Figures.....	v
Section 1: Foundation of the Study and Literature Review	1
Introduction.....	1
Background.....	7
Problem Statement.....	9
Purpose of the Study	11
Research Questions and Hypotheses	12
Framework	13
Nature of the Study.....	15
Literature Search Strategy.....	15
Theoretical Framework.....	17
Literature Related to Key Variables	19
The Use of Mindfulness Meditation in the Past 12 months.....	20
Health Status.....	21
Activity Limitation from Depression and Emotional Problems	25
Duration of Limiting Depression, Anxiety, and Emotional Problem: Time	25
Sex of US Armed Forces Personnel.....	28
Race of US Armed Forces Personnel	29
Age of US Armed Forces Personnel	30
Definitions.....	30

Assumptions.....	32
Scope and Delimitations	33
Limitations	34
Significance.....	35
Summary and Conclusions	37
Section 2: Research Design and Data Collection	39
Introduction.....	39
Research Design and Rationale	39
Methodology.....	40
Sampling Procedures Used by Original Creators of Data Set	41
Operationalization.....	43
Data Analysis Plan	46
Threats to Validity	52
Ethical Procedures	57
Summary.....	58
Section 3: Presentation of the Results and Findings.....	60
Introduction.....	60
Accessing the Data Set for Secondary Analysis	63
Results	66
Descriptive Statistics.....	66
Statistical Analysis	68
Summary.....	103

Section 4: Application to Professional Practice and Implications for Social

Change	105
Introduction	105
Interpretation of the Findings	106
Limitations of the Study.....	109
Recommendations.....	115
Implications for Professional Practice and Social Change	117
Professional Practice	117
Positive Social Change.....	122
Conclusion	124
References.....	128

List of Tables

Table 1 Operationalization of Variables	45
Table 2 Frequency and Percentages for Predictor and Outcome Variables	67
Table 3 Model Fitting Information	71
Table 4 Goodness-of Fit Model	73
Table 5 Pseudo R-Square	74
Table 6 Parameter Estimates	77
Table 7 Crosstabulation of RQ2Variables	80
Table 8 Chi-Square Tests	81
Table 9 Descriptives for RQ3	83
Table 10 Test of Homogeneity of Variances	86
Table 11 ANOVA Test for RQ3.....	89
Table 12 ANOVA Effect Sizes	90

List of Figures

Figure 1. Adaptation of Bandura's Social Cognitive Theory	19
Figure 2. Sample Size Formula	43
Figure 3. Mean Plot.....	103

Section 1: Foundation of the Study and Literature Review

Introduction

According to Brintz et al. (2020), chronic pain rates were disproportionately high among military personnel and often associated with comorbid conditions related to mental health and substance use disorders. In an incidence analysis between 2009 and 2018, researchers Smith et al. (2020), Dr. Hunter Smith, Dr. Stephen Taubman, and Dr. Leslie Clark conducted an incidence analysis that reveal that many military members with chronic pain have diagnoses of both specified and unspecified neurological conditions. The researchers define military populations as any inpatient or outpatient encounter linking chronic pain to trauma, postthoracotomy, neurologic disorders, and acute and chronic pain diagnoses that do not attribute to a specific cause. The prevalence of chronic pain in military populations was a significant problem, affecting 50.2% of U.S. veterans with chronic pain and 25.5% with high-impact chronic pain, persisting for at least three to six months and exceeding 12 months or beyond (Karthia et al. (2019).

In contingency operations, chronic pain was common among military service members and was often associated with mental health and chronic pain symptoms. Military service members and veterans frequently experience physical and mental health issues resulting from their military service. The high operational tempo of recent military conflicts, including Operation Enduring Freedom (OEF) in Afghanistan and Operation Iraqi Freedom (OIF) in Iraq, has been linked to increased rates of mental health conditions such as posttraumatic stress disorder (PTSD) and depression (Barr & Kintzle, 2019). Studies conducted by the Veterans Health Administration have revealed that the

prevalence rate of PTSD among OEF and OIF veterans utilizing their services was approximately 23%, with depression rates increasing by as much as 11-16% and up to 23% (Barr & Kintzle, 2019).

The study found that chronic pain harms military mission readiness throughout the U.S. Armed forces affecting over 44% of all U.S. service members who experienced chronic pain after combat deployment, compared to 26% of the public (Ransom et al., 2022). Bedford et al. (2022) suggested between 10% and 28% of over 30 active-duty soldiers display chronic pain conditions such as PTSD and seek treatment for long-term opioid therapy. Likewise, in 2019, Barr and Kintzle reported estimates of 23% and as high as 21% of chronic illness, PTSD, and depression in OEF and OIF veterans using Veterans Health Administration services. Also, using evidence-based behavioral treatments as alternatives to medications found mindfulness practices like mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) to be better strategies to help individuals reduce chronic pain and substance abuse (Barr & Kintzle, 2019).

Mindfulness-based interventions improve health and well-being and address specific behaviors and habits that affect military personnel's physical, mental, and emotional health (Barr & Kintzle, 2019). Researchers have presented that mindfulness interventions and practices such as MBSR, yoga, and martial arts were mind-body activities that improved an individuals' physiological and psychological health (Bonura & Fountain, 2020). Also, these practices aim to reduce depression, anxiety, blood pressure, cholesterol, and pain symptoms. *Mindfulness meditation* was the third wave of cognitive

and behavioral therapy and practice focusing on awareness of the moment without judgment (Andersen, 2022; Gawrysiak et al., 2018; & Kabat-Zinn, 2003). The practice involves using various breathing techniques, guided imagery, or other relaxation techniques to calm and relax the mind and body, freeing them from anxiety or trauma.

Military service characterizes a vocation that entails significant levels of stress, thereby rendering military personnel highly susceptible to psychological distress (de Abreu Costa et al., 2019). Individuals adapting to a military lifestyle frequently confront diverse stressors that require a heightened level of physical and mental alertness in the execution of their military responsibilities. The study found that the degree of stress experienced by military personnel may be contingent upon their Military Occupational Specialty (MOS) and the nature of their duties, particularly concerning combat-related duties (Rice & Schroeder, 2019).

Additionally, military personnel experience frequent exposure to physiological and psychological stressors such as death, sexual assault, long work hours, high task demands, repeated exposure to danger or trauma, strict living conditions, family separation, and a range of negative emotional states, including anxiety, pain, psychosis, PTSD, depression, and moral injury, among others (Romero et al., 2020), requiring health interventions that promote specific behaviors and habits that can improve mental and physical health. For example, the rigorous nature of military training presents significant challenges for individuals transitioning from civilian to military life. Such challenges can result in a range of physical and mental health issues, including anxiety, depression,

PTSD, chronic diseases, and the adoption of avoidant coping strategies (de Abreu Costa et al., 2019).

Implementing health interventions such as mindfulness meditation was essential to support military personnel's mental and physical health and address potential activity limitations resulting from the physiological and psychological stressors associated with their occupational duties. Such interventions can promote specific behaviors and habits that support military personnel's mental and physical well-being. Roemer et al. (2023) conducted a feasibility study to evaluate the effectiveness of a low-dose mindfulness-based intervention (MBI) called Mindfulness-based Attention Training (MBAT) in reducing stress, anxiety, and depression symptoms among military personnel, particularly those in critical work occupations such as aviation, medical, and pre-deployment training. The study found that MBIs can help prevent mind wandering and promote healthy and resilient leadership qualities. Likewise, researcher Ihme (2020) reported that leadership effectiveness should occur before and after implementing MBAT, emphasizing the importance of cultivating healthy and resilient leaders who can positively influence organizational environments and demonstrate high effectiveness in their leadership roles.

Alternatively, leaders experiencing stress or lack of healthy leadership qualities may display poor outcomes such as anxiety, depression, burnout, ineffective coping behaviors, lower job satisfaction, and reduced productivity. Maladaptive leadership behaviors can create disorder in the workplace, often without the leader realizing their role in producing adverse outcomes. Leadership plays a crucial role in shaping the workplace, with healthy and resilient leaders demonstrating higher effectiveness and

positively influencing organizational communities. Multiple studies have highlighted the importance of leadership behavior on employee well-being and organizational outcomes, emphasizing the need for leaders to cultivate healthy leadership behaviors to benefit themselves and their organizations (Ihme, 2020).

In a study on the efficacy of different mindfulness training delivery methods for reducing symptoms of anxiety, stress, and PTSD in U.S. military service members and veterans, Rice and Overby (2020) examined how mindfulness-based practices, such as MBCT, MBSR, yoga, and Tai-chi, might enhance military members' activity limitations, such as their physiological and psychological readiness and resilience. In Rice and Overby's (2020) study on mindfulness meditation delivery methods, the authors maintain that military operations with heavy psychological burdens produce stress and anxiety, often requiring the management of the activity limitation.

For example, the U.S. Armed Forces manage activity limitation through a comprehensive approach that addresses physical, psychological, and social factors that may impact the ability of military personnel to perform their duties effectively (Ramsey et al., 2022). Managing activity limitations involves identifying and assessing any limitations or disabilities early on, which may involve regular medical evaluations, mental health screening, and monitoring performance metrics to identify changes in individual abilities (Stevellink et al., 2019).

Managing activity limitations in the U.S. Armed Forces necessitates a concerted and collaborative approach involving multiple stakeholders, including military personnel, healthcare professionals, senior military leaders, and peers. This approach was critical to

ensuring that military personnel could perform their duties to the best of their abilities while maintaining their health and well-being. Once a healthcare professional identifies and develops a personalized management plan that considers the military member's individual needs and goals, a variety of medical treatments, rehabilitation efforts, assistive technology, and modifications to the individual's duties and responsibilities were applied (Ramsey et al., 2022).

Moreover, it was essential to support military members as they adapt to challenging environments, such as austere living conditions in high heat stress and high ambient temperature deployment areas (Ashworth et al., 2020). Such conditions can result in heat strain, which can compromise the health and safety of military personnel, thus limiting their activity. To address this issue, ongoing support and resources were necessary. For example, military personnel may require specialized training and education on heat stress prevention, and access to appropriate medical care and treatment should be readily available (Ashworth et al., 2020). Effectively managing activity limitations in the U.S. Armed Forces requires a comprehensive and integrated approach involving various stakeholders' input and cooperation. By prioritizing the health and well-being of military personnel and providing them with the necessary resources and support, the U.S. Armed Forces can ensure they can perform their duties to the best of their abilities, even under challenging conditions.

Overall, the effective management of activity limitations in the U.S. Armed Forces requires a comprehensive and integrated approach involving various stakeholders' input and cooperation. By prioritizing the health and well-being of military personnel and

providing them with the necessary resources and support, the U.S. Armed Forces can ensure a total force that performs their duties to the best of their abilities, even under challenging conditions.

Military preparedness, optimal performance, and well-being were essential for national defense. The Armed Forces require individuals who possess physical and metabolic endurance to function under stress in combat and training roles (Bonura & Fountain, 2020). Examining mindfulness meditation among military personnel was necessary for building evidence-based practices to develop highly resilient professional military personnel who were preparing to face mental health disorders and chronic diseases.

Background

Jon Kabat-Zinn was a renowned mindfulness meditation teacher and researcher who developed MBSR. Kabat-Zinn's mindfulness meditation was a cognitive process that helps individuals focus on present-moment experiences without judgment and accepting attitudes (Kabat-Zinn, 1993). In recent years, mindfulness meditation practices such as MBSR and MBCT, yoga, and Tai-chi have grown to enhance U.S. Armed Forces military personnel's physiological and psychological readiness and resilience and reduce stress and anxiety among military personnel (Park et al., 2019). The study examined the associations between the use of mindfulness meditation and the potential health status and activity limitation among U.S. Armed Forces personnel. Also, dysfunctional attitudes and rumination were associated with vulnerability to developing, maintaining, and

relapsing into depressive disorders and extreme assumptions and beliefs about self-worth and interpersonal approval (Ramel et al., 2004).

Incorporating mindfulness meditation practices into military training and support programs could be a promising strategy for improving the health and well-being of military personnel (Park et al., 2019). However, little research examined the relationship between US Armed Forces personnel using mindfulness meditation, their health status, activity limitation from depression, anxiety, and emotional problems, and the duration of limiting depression, anxiety, and emotional problems in terms of time. The study also considers the control variables of sex, age, and race. Prior research has shown that even with mindfulness meditation delivery methods in military operations with heavy psychological burdens that produce stress and anxiety, there was still required management of activity limitations (Rice & Overby, 2020).

The study presents results from systematically reviewed existing research on the effects of mindfulness meditation on the activity and functional limitations of U.S. Armed Forces members. The study used data from the Integrated Public Use Microdata Series (IPUMS), a database of anonymized census data. The study employed a cross-sectional design, collecting data at a single point in time. Also, the study conducted a meta-analysis, a statistical technique combining the results of multiple studies to draw broader conclusions. In this case, the meta-analysis summarized the results of the research studies included in the systematic review. Overall, based on the available research, the study aims to understand how mindfulness meditation might influence the activity and functional limitations of U.S. Armed Forces members.

The study used Albert Bandura's 1986 social cognitive theory (SCT) framework and theoretical foundation. Bandura's theory posits that learning occurs in a social context with self-motivated and reciprocal interaction or reciprocal determinism of the person, environment, and behavior (Glanz et al., 2015). However, research has not explicitly been conducted for the U.S. Armed Forces that have experienced disabilities relating to activity limitations such as difficulty seeing, hearing, walking, or problem-solving (Goldberg et al., 2020).

The study contributes to the knowledge of previous studies on how mindfulness meditation affects the military population by filling a gap in the existing literature to increase the awareness of mindfulness meditation use, health, and activity limitations among the U.S. Armed Forces. The social change implications for mindfulness meditation may include collaborating with healthcare providers, health educators, and community organizations to understand the unique military population's specific culture and social structures.

Problem Statement

The health of U.S. Armed Forces personnel was a growing concern. Many military personnel were experiencing health issues while on active duty and following their discharge from the military. Military populations in the U.S. Armed Forces were disproportionately affected by high rates of chronic diseases and mental health disorders (Rice & Overby, 2020). For example, mental disorders were common, disabling, and usually untreated among individuals suffering from trauma and loss (World Health Organization [WHO], 2022). Also, beginning rates of chronic pain in military personnel

were excessively high, often associating chronic pain with mental health and substance use disorders (Brintz et al., 2021). For example, the beginning rates were the proportion of individuals in the sample population who meet the inclusion criteria at the beginning of a study (Goodarzi et al., 2020). The beginning rates or the proportion of individuals were essential to quantitative research design as they inform the selection and recruitment of participants for a study and derive from the researcher's collection of the characteristics or attributes of the subjects in the study.

The study found research that pertained to adapting mindfulness training aimed at mitigating chronic pain. This investigation was conducted through an analysis of completed surveys that were linked to the prevalence of diseases across different geographic regions among active-duty military personnel, specifically within the Army (Brintz et al., 2020). The proportion of individuals in the study data may include criteria such as age, gender, and health status (Goodarzi et al., 2020). Further, the research identifies the sample population by calculating the beginning rates. For example, according to Brintz et al., the prevalence of chronic pain in U.S. soldiers deployed to contingency operations was over 40% (ratio) and over 50% in U.S. military veterans or (ratio).

Recent research on mindfulness meditation among military personnel indicates very little or no literature on mindfulness meditation use between the U.S. Armed Forces, their health status, and activity limitations. For example, there were inconsistent effects that MBCT improves functional limitations such as the physical, cognitive, or psychological ability to independently perform routine activities of daily living or self-care,

primarily until researchers adequately conduct powered trials. The statement regarding "inconsistent effects" suggests that despite existing research on the application of mindfulness meditation within the military context, there was a lack of literature that examined the use of mindfulness meditation among the U.S. Armed Forces about their health status, activity, and functional limitations. The current literature also shows inconsistent findings on MBCT enhancing functional limitations such as physical, cognitive, or psychological abilities to independently perform daily routines or self-care tasks.

To address the gaps in knowledge, researchers must conduct randomized control trials (RCTs) where participants receive randomly assigned assignments to either a treatment group or a control group. Additional interventions, such as psychotherapy and medication, were recommended (Saeed et al., 2019). The current body of literature does not entirely address the usefulness of mindfulness meditation, mainly when MBSR was used to reduce activity limitations such as signs of anxiety, depression, and cognitive decline (Marciniak et al., 2020) and health status among U.S. Armed Forces personnel. The military population was a unique community whose mental and physical health can impact the safekeeping of the United States. The psychological and physiological challenges of U.S. Armed Forces personnel, especially chronic physical and mental health conditions, prompt further research.

Purpose of the Study

The purpose of the quantitative research study was to examine the relationships between the independent *variable, used mindfulness meditation, past 12 months and the dependent variables, health status, activity limitation from depression, anxiety, and emotional problems, and the duration of limiting depression, anxiety, and emotional problems: time* while controlling for *sex, race, and age*.

Research Questions and Hypotheses

RQ1: What is the relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the U.S. Armed Forces?

H_0 1: There is no relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the U.S. Armed Forces.

H_a 1: There is a relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the U.S. Armed Forces.

RQ2: What is the relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems that occur while controlling for sex, age, race, and the U.S. Armed Forces?

H_0 1 – There is no relationship between using mindfulness meditation in the past 12 months, and activity limitation from depression, anxiety, and emotional problems that occur while controlling for sex, age, and race, and the U.S. Armed Forces

H_{a2} – There is a relationship between using mindfulness meditation in the past 12 months, and activity limitation from depression, anxiety, and emotional problems that occur while controlling for sex, age, and race, and the U.S. Armed Forces.

RQ3: What is the relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the U.S. Armed Forces?

H_{03} : There is no relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the U.S. Armed Forces.

H_{a3} : There is a relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the U.S. Armed Forces.

Framework

The study used an adaptation of Albert Bandura's SCT model (*see Figure 1*) to describe the behavioral association between mindfulness meditation and cognitive behavior of what some military personnel might encounter regarding their health status and the length of time using the practice and the activity limitation and duration of limiting depression, anxiety, and emotional problems that occur over time. The SCT model originated from the SLT, and supposes that various personal, environmental, and behavioral factors influence human learning. By observing and understanding their own experiences and those of others, individuals can develop new behaviors that can positively impact their well-being. Bandura (1986) expounded on this theory,

emphasizing the importance of self-efficacy and how individuals can use their knowledge and skills to achieve desired outcomes.

Cognitive and behavioral difficulties can occur in individuals trying to understand their thoughts and emotions that influence others' behaviors. One of these conditions includes adults with chronic pain and intervening with a behavioral health intervention such as MBRP and grounded in SCT (Fanning et al., 2022). Gaining insight into one's thoughts and emotions that affect the actions of others is an approach that individuals can use to tackle cognitive and behavioral difficulties. Health behavioral interventions, including MBRP, based on SCT (Fanning et al., 2022), and other interventions such as MBCT, MBSR, yoga, and meditation can also be valuable resources to address issues encountered by adults experiencing chronic pain.

For the study, the variable health status determines whether a U.S. Armed Forces member used mindfulness meditation over a 12-month period and has any activity limitation from depression, anxiety, and emotional problems that occur, and the duration of limiting depression, anxiety, and emotional problems in terms of time. The cognitive construct for this study determined how the U.S. Armed Forces use their cognitive skills in combat situations (Flood & Keegan, 2022) and whether the SCT helps military personnel understand their social environments, such as outcome expectancies and efficacy expectations, which affect their ability to manage their social skills, and cope with challenges that relate to, influence, and impact their social and built environments (Dawkins et al., 2021), and physical activity which also influences their reaction to their social and built environments (Beauchamp et al., 2019).

The SCT model relates to the study's approach by explaining the logical connections between the framework presented and the nature of the study, the external or causal factors impacting an individual's reciprocal determinism, human capabilities that directly affect individual health, personal cognitive factors that self-regulate behavior, and socioenvironmental factors (Glanz et al., 2015).

Nature of the Study

To address the research questions in this quantitative study, the specific research design was a secondary analysis of data collection from the Integrated Public Use Microdata Series (IPUMS) with a cross-sectional survey design to understand how mindfulness meditation may influence the health status of the U.S. Armed Forces. IPUMS consists of microdata samples from the United States Census records and surveys, including National Health Interview Survey (NHIS) data. IPUMS converts the data into a consistent format and was available to researchers through a web-based data dissemination system such as IPUMS Health Surveys. The participants in the study include the U.S. Armed Forces: The Army, Marine Corps, Navy, Air Force, Coast Guard, Reserves, and National Guard.

Literature Search Strategy

In conducting the literature review, the study used academic search engines and databases, including the Walden University Library search catalog, US IPUMS-Health Surveys, NHIS, MEDLINE, CINAHL, SAGE Journals, PubMed, Springer, Thoreau Multi-Database Search, National Center for Biotechnology Information (NCBI), ProQuest, and Google Scholar. Criteria for inclusion in the literature review were primary

peer-reviewed research articles on *mindfulness in the military, chronic diseases and military readiness, physical activity and functional limitations, behavioral health interventions for the military and adapting mindfulness training for military service members.*

The literature search strategy includes keywords and databases containing *U.S. Active-Duty Personnel, U.S. Armed Forces Personnel, mindfulness, meditation, military, mindfulness-based interventions, yoga, mind-body, mindfulness-based cognitive therapy, mindfulness-based processes, veterans, race, socio-economic status, health status, activity limitation, physical activity, functional limitation, and mindfulness-based stress reduction.* The selection of articles for the literature was written in English, peer-reviewed, and limited to 5 years between 2018 through 2023, except seminal articles on the use of mindfulness meditation and Bandura's SCT, which was the theoretical framework for this research, and articles that fill gaps in the literature. In addition to the academic search engines, the study includes grey literature sources of specific organizations and government agencies websites such as the U.S. Department of Veterans Affairs (VA), Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH), and the U.S. Department of Health and Human Services (DHS).

The literature review also includes several articles relevant to the study's variables. The articles chosen to pertain to research on therapeutic interventions of mindfulness. For example, MBCT was a therapeutic intervention combining MBSR and CBT elements to treat people with depression. MBSR was a therapeutic intervention that teaches mindfulness through yoga and meditation. Articles regarding the conceptual

framework were also included, except for articles before 2018 and seminal articles that explain the history of mindfulness meditation and Bandura's SCT. Some articles in the study were not scholarly and peer-reviewed because the articles did not focus on mindfulness meditation concerning the health of military personnel.

Theoretical Framework

The theoretical framework that will guide this study was an adapted model of Albert Bandura's (1986) SCT which originates from the SLT. Bandura's 1986 SCT framework was a widely used and robust health behavior change theory often used in health promotion activities to decrease stress and promote positive psychological and physiological health perceptions in individuals. The study will use SCT to understand the influence of social determinants of health and individual experience on behavior change and theorizes that learning occurs in a social context with self-motivated and reciprocal interactions or the reciprocal determinism of the person, environment and behavior (Glanz et al., 2015), and how mindfulness meditation embodies various components of SCT, such as self-efficacy, behavioral capability, expectations, self-control, observational learning, and reinforcements.

SCT will serve as the theoretical framework for the cross-sectional study. The study will use data on IPUMS Health from two leading sources of self-reported health and health care access information: the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS). Overall, the SCT will focus on how individuals maintain their behavior in social settings while also accounting for their previous experiences, which factor into whether a particular behavioral action may occur.

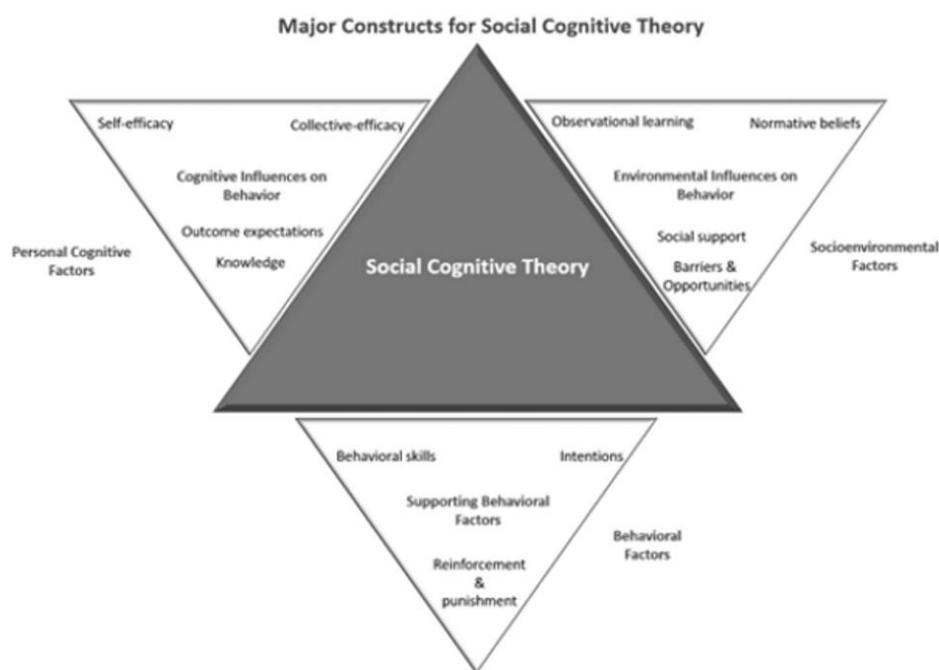
The study addresses the major theoretical proposition: *An increase in US Armed Forces mindfulness meditation use caused an increase in health status*. The theoretical proposition made a statement that may be deemed true or false. However, it must be empirically testable using data so the study can assess its feasibility. The logical connections between the framework presented and the nature of the study include external or causal factors that impact an individual's reciprocal determinism (Glanz et al., 2015) and formally predict and clarify the study's primary purpose, specific design objectives, direction, and broad social and health implications (Barroga & Matanguihan, 2022).

Albert Bandura's SCT aims to understand and explain human behavior from the standpoint of observational learning and how humans believe their self-efficacy influences whether they would repeat an observed behavior. In a study on SCT and physical activity, Beauchamp et al. (2019) specified that researchers can use SCT to understand diverse human behaviors in which individuals were influenced by and react to their social and built environments. For example, *Figure 1* displays a dynamic triad of factors: (a) personal cognitive factors, (b) socioenvironmental factors, and (c) behavioral factors. An individual's cognitive factors affect their performance and learning and influence behavior, such as their ability to process information, apply knowledge and change their preferences (Glanz et al., 2015). Also, the socioenvironmental factors reveal an individual's believed consequences of their behavior (outcome expectancies) and their abilities and competencies, which enable them to manage their skills effectively to cope with challenges (efficacy expectations) (Dawkins et al., 2021). Additionally, physical, and

social factors affect an individual's behavior, such as the social and physical conditions in which they live and work (Glanz et al., 2015). Further, the behavioral factors relate to adding new behaviors, modifying existing behaviors, abilities needed to perform a specific behavior, and reinforcement and punishment or removal of rewards and punishments for certain behaviors (Glanz et al., 2015).

Figure 1

Bandura's Social Cognitive Theory



Note: The major constructs for SCT.

Literature Related to Key Variables

The independent variables in this study *used mindfulness meditation, past 12 months*. The dependent variables in the study included *health status, activity limitation from depression, anxiety, and emotional problems, and duration of limiting depression,*

anxiety, and emotional problems in terms of time. Also, the study used the variables: *sex, race, and age* as control variables. The study also reviewed studies related to the research questions.

The Use of Mindfulness Meditation in the Past 12 months

Many individuals desire the long-term benefits of focusing and carrying out their daily responsibilities without feeling stressed and exhausted. Mind-body medicine (MBM) programs offer active-duty service members and veterans over 7-week period strategies on stress management and post-programming assessment for perceived stress, functional impairment, and psychological (Millegan et al., 2019). The effect of mindfulness meditation on the duration of use can often underestimate the effectiveness of controlled exercises that focus on present-moment awareness and other cognitive methods to improve attention and memory (Droit et al., 2019).

Alternatively, some surveys on participants self-reporting the effectiveness and use of meditation exercises show scores that indicate increases in the level of present-moment awareness and decreases in anxiety. In a study on pain and stress management in active-duty service members and veterans, Droit et al. (2019) research shows participants' scores on self-reported scales indicating the effectiveness of the meditation exercises decreases anxiety, increases levels of present-moment awareness and happiness (Droit et al., 2019). Other studies show results that promote long-term benefits in changing how one relates to their inner and outer experiences and increases in levels of alertness, focus, contentment, and compassion (Walsh et al., 2019).

Other studies that relate to the scope of the studies' constructs of interest were

methodology and methods that show the importance of statistical analyses researchers used to understand sociodemographic characteristics. Researchers also used Paired t-tests to determine changes in outcome measures from pre- to post-program completion and perceived stress scale (PSS), demonstrating good reliability and consistency. The study analyzed Millegan et al. (2019) research on using MBM's post-program evaluation results and data, with results of 68.6% of participants reporting no use of meditation. Also, the research reported whether MBM potentially performs a critical role in reducing stress and improving functioning in active-duty service members and veterans (Millegan et al., 2019).

Health Status

Mindfulness meditation was a sought-after practice in the United States (US). Since the late seventies, the practice has been a mainstream component of American culture earning over 1 billion dollars (Salmoirago-Blotcher, 2022). It is increasingly popular among schools, businesses, the entertainment industry, professional sports, and the military to optimize performance, improve mental and physical health, and increase strength and resilience (Jha et al., 2019; Zhang & Baltzell, 2019).

A component of mindfulness meditation, mindfulness-based cognitive therapy (MBCT) was a mindfulness-based intervention that draws from elements of MBSR and MBCT to enhance an individual's mental and physical health. The practice helps individuals pay attention on purpose by focusing on present-moment awareness nonjudgmentally and includes meditation and breathing exercises. MBCT was a cognitive therapy formulated to address depression and stressful events that require

preventive interventions, such as mindfulness programs that reduce PTSD and depressive symptoms (Cerna et al., 2021). Focusing on the present can positively impact individuals' health and well-being by helping them reduce anxiety, and depression, lower blood pressure, improve sleep, and reduce physical pain.

The founder of the mindfulness-based stress-reduction program, Dr. Jon Kabat-Zinn, began the mindfulness movement by integrating Buddhist principles of mindfulness grounded in his work in science and medicine with a variety of practices ranging from therapies to coaching as part of a stress-reduction program, commonly known as MBSR, as a means of lowering stress levels and enhancing individual overall well-being (Kabat-Zinn, 1993). Many of the meditative practices began in Eastern traditions. The widely used Buddhist practice Americans call "The Mindfulness Movement" was birthed from several practices originating from meditation that focused on enhancing the mind and body integration while also applying principles of MBSR, such as Vipassana, means clear awareness or insight. (National Center for Complementary and Integrative Health [NIH], 2022).

According to a 2017 US survey, between 2012 and 2017, 4.1% and 14.2% of American adults practiced some form of mantra-based meditation, mindfulness meditation, or spiritual meditation (NIH, 2022; Centers for Disease Control and Prevention. [CDC], 2018). Other contributors to the mindfulness movement, Zindel Segal, a contemporary psychiatrist, and psychologists Mark Williams and John Teasdale furthered the development of Kabat-Zinn's work using mindfulness in health by developing mindfulness-based cognitive therapy (MBCT) (Segal, Teasdale, & Williams,

2004).

The quantitative study on mindfulness meditation has characteristics of both an experimental and observational study. For example, the study used secondary interview data and observations from IPUMS Health Surveys. The data comes from a large, nationally representative dataset of microdata samples from the United States IPUMS Health Surveys, Census records, and NHIS. The secondary data the interviews and observations contain were calibrated, standardized, and controlled prior to use to ensure internal validity (Blewitt et al., 2019). The study used an experimental approach in quantitative research to conclude the relationships between the independent and dependent variables. The experimental research design was an ideal quantitative research method because of its ability to gather quantitative data and conduct statistical analysis for research purposes.

Also, the quantitative experimental research design examined the causal relationships between the independent (intervention vs. control) variable, *ever used mindfulness meditation in the past 12 months*, and the dependent (outcome) variables, *health status, activity limitation from depression, anxiety, and emotional problem, and duration of limiting depression, anxiety, and emotional problem: time*. The researcher often manipulates the independent variables in experimental research designs to test their effects on the dependent variables. All variables except for the independent variable were controlled or held constant so that it does not influence the dependent variables (Bloomfield & Fisher, 2019).

Similar research on using mindfulness training to help working memory shows

significant consequences for mental health that derive from PTSD and depressive symptoms (Cerna et al., 2019). However, mindfulness intervention programs can reduce these stressful events and allow researchers to identify suitable therapeutic alliances, with quantitative indicators of positive change, significant decreases in depressive and PTSD symptoms, and increases in posttraumatic growth and satisfaction with well-being.

Likewise, other approaches to mindfulness meditation include studies by Bloomfield and Fisher (2019) that propose formal, objective, and systematic processes that describe variables, test the relationships between them, and examine the cause-and-effect associations between variables. The process helps find answers to research problems by testing hypotheses using objective and impartial scientific methods (Davies & Fisher, 2018).

Alternatively, some of the limitations in the approaches researchers found in studies on mindfulness meditation include small sample sizes, lack of comparison of results among control groups (Cerna et al., 2019), and inconclusive assumptions about the effectiveness of the study's procedures (Bloomfield & Fisher, 2019). A common theme among the selected studies on mindfulness meditation was investigating the effectiveness of various mindfulness interventions to determine their effectiveness in stress-related biological pathways and behaviors. Understanding stress-related physical health outcomes in populations and whether mindfulness interventions have relative treatment advantages on physical health compared to other behavioral stress management interventions (Creswell et al., (2019).

Activity Limitation from Depression and Emotional Problems

US Armed Forces personnel were continuously at risk for stress-related disorders because of combat or deployment missions. Three of the top health issues among this group entail depression, anxiety or posttraumatic stress responses, and sleep issues, all of which were activity limitations (Kizakevich et al., 2018). Although mindfulness meditation can be an essential psychological construct that can help promote resilience and reduce stress in military environments, studies report that there were often stigmas that relate to seeking help for post-deployment health problems such as PTSD and depression from war-related devastation such as bombing, terrorism, and death (Rice & Schroeder, 2019). Sud et al. (2021) report that psychological comorbidities, like chronic pain, contribute to adverse health outcomes and poor quality of life. However, there were limitations in finding evidence-based support for managing depressive symptoms for chronic pain, particularly in finding mind-body interventions. (Kizakevich et al., 2018). Additionally, the study showed that military members using self-help interventions like mobile applications were self-management techniques that can reduce stress-related symptoms and dysfunctions.

Duration of Limiting Depression, Anxiety, and Emotional Problem by Time

The duration of limiting depression, anxiety, and emotional problems over a period can vary on the health status of the armed forces member. Some research has suggested that military populations prefer specific integrative treatments like massage and nutritional therapies, with approximately 15% of the military population using meditation and yoga, most likely because rigorous organizational demands make military

members uncomfortable with relaxation (Combs et al., 2018).

Likewise, in a study on the likelihood of mindfulness meditation inducing gray matter changes, over forty healthy non-meditating adults between 20 and 47 years of age practiced mindfulness meditation to enhance their health. According to a randomized control trial (RCT), Tang et al. (2020) found varying results in structural changes in gray matter between people who practiced short-term mindfulness meditation (<30 days) compared to those who practiced long-term (>30 days and longer). Also, the emotional states in the healthy adults who practiced long-term and were more experienced showed considerable differences in gray matter plasticity, especially in individuals with clinical depression.

Similarly, in a study on MBIs effectiveness in enhancing efficacy in individuals with a generalized anxiety disorder (GAD), Hoge et al. (2018) used an RCT to study over 70 adults in vulnerable populations experiencing GAD to receive MBSR therapy to enhance their biological resilience and psychological stress. The benefit of MBIs may enhance resilience to stress in people with a history of depression (Hoge, 2018) and minimize generalized anxiety disorders resulting from stress, depression, and anxiety using mindfulness meditation therapy to improve and prevent relapses of anxiety disorders.

Further, moral injury was a severe and debilitating condition that jeopardizes an individual's social, psychological, and behavioral beliefs and values, causing indecision and adverse outcomes. According to a cross-sectional research design conducted on veterans deployed to military conflicts, such as the War in Afghanistan and the Iraq War

(2003-2011), an estimated 244 military personnel experiencing moral injury resulting from alcohol misuse, drug misuse, PTSD symptoms, and several secondary features of moral injury such as distrust in others, distrust in self, anxiety, depression, self-harm, and social problems use mindfulness-based approaches (Davies et al., 2019). Although mindfulness-based approaches attempt to inspire healthy lifestyles, the intervention showed moderating effects between moral injury and PTSD symptoms leading researchers to consider other therapies that may be able to explain the totality of the effects of moral injury in military personnel (Davies et al., 2019).

There was substantial scientific evidence and therapeutic benefit that MBIs like exercise, yoga, tai chi, and mindfulness meditation support individuals' mental and physical health. For example, researchers conducted a meta-analysis on the effectiveness of tai chi in individuals with depression and anxiety disorders. According to Saeed et al. (2019), the quantitative epidemiological study reported anxiety recurrence rates significantly lower in the tai chi control group (9.09%) compared with the control group (42.86%). Although the findings report low- to moderate-quality evidence because of inconsistencies in the MBI's effects; however, some MBIs, like mindfulness-based meditation, have enduring effects in people with depression, with treatment effects lasting six months longer or more (Saeed, 2019).

Similarly, researchers examine numerous mindfulness-based therapy studies to help treat people by reducing stress, anxiety, depression, and substance abuse and balancing emotions, thoughts, and behaviors. Guided meditation or imagery can provide individuals with a sense of calm, peace, and balance that can benefit an individual's

emotional well-being and overall well-being. For example, Beaudoin (2019) maintains that every emotion of an individual has a biological connection that relates to physiological reactions such as love and anger, and mobilizing positive effects within oneself associates an enhanced perspective, increased motivation, and a remarkable ability to control undesirable embodied impulses. However, MBIs were gaining mixed results, particularly regarding inconsistent findings in RCTs of restoring attention so individuals can regulate their emotions, connect to them, and decrease emotional reactivity while increasing compassion. An RCT on MBIs and their effectiveness on attention in adults found that MBIs have limited positive effects on the emotional state of healthy adults (Yakobi et al., 2019). More research was needed to address participant motivation and possible overestimating effect size in previous studies using meta-analyses.

Some quantitative studies include pretest-posttest randomized control group designs like randomized control trials (RCTs). The design can recruit and randomly assign participants to studies that measured the effectiveness of a new intervention or treatment and ensure no biases in the assignment (Patten & Newhart, 2018). Researchers also use meta-analyses, or a descriptive, cross-sectional design, to examine various psychological correlations of mental health, physical health, limitations relating to functioning, and primary health perceptions from military populations (Ramon et al., 2020).

Sex of US Armed Forces Personnel

The study used the sex of an individual as a control variable. Measure the “sex” of

participants in a research study were significant to all areas of public health research, particularly when researchers ask participants general survey questions about their sex without further defining their underlying assumptions of these concepts. The study finds it vital to include both male and female participants to understand whether one group might not represent another group's life experiences and how the sex of a participant interacts within the social context of the world. Without properly studying how theories may operate differently within and across sexes, the study may inadvertently overlook pertinent information when measuring and analyzing sex using quantitative methods. Current research finds that only a small body of literature focused specifically on the sex, and other identity-based vulnerabilities military members encounter that relate to health outcomes, trauma experiences, employment, housing, and access to care and services (Eichler et al., 2021).

Race of US Armed Forces Personnel

Like *sex*, the study used *race* as a control variable because the variable may relate to a particular outcome the study is interested in explaining, such as health, educational attainment, or financial status. Previous studies on race and ethnicity among military personnel and veterans reveal racial and ethnic disparities among these groups. Herbert et al. (2018) noted that African American veterans have higher rates of PTSD compared to their non-Hispanic White counterparts, and Asian American veterans report significantly lower psychological resilience than non-Hispanic White veterans. The study will analyze this data to see whether there was a relationship between the health status of armed forces personnel, mindfulness meditation, and activity limitation. For example, cultural

differences in how and why Asian American or African American veterans use mindfulness meditation may underlie racial or ethnic differences in the relationship between using mindfulness meditation and the main reason for activity limitation from depression, anxiety, and emotional problems.

Age of United States Armed Forces Personnel

The study used *age* as a control variable. Age and sex were two vital elements of a population. The study finds this variable valid because *age* provided insight into the participant's use, knowledge, and experience with mindfulness meditation or their self-reported health status. The survey questions from the IPUMS Health Survey ask the participants their age mainly to gather information about their social, economic, political, and cultural backgrounds. Likewise, *age* was an essential variable to the study because the research on activity limitations within the military population shows high incidences of substance abuse relating to age, service type, combat exposure, and mental health (Osborne et al., 2022). The study aims to provide descriptive statistics to describe the participants included in the study, which comprise active-duty personnel and veterans, in ways that were easy for readers to understand the different demographic groups with different needs and potential social barriers to overcome.

Definitions

The following definitions provide a clear description of the keywords and concepts used throughout the development of this quantitative study to decrease misinterpretation: *Mindfulness meditation: Mindfulness meditation is the third wave of cognitive and behavioral therapy and practice focusing on awareness of the moment*

without judgment (Andersen, 2022; Gawrysiak et al., 2018; & Kabat-Zinn, 2003). *US Armed Forces*: active-duty US military service members, aged 18 or older, from six service branches: the Army, Marine Corps, Navy, Air Force, and Coast Guard including the Air Force Reserve and the Air National Guard with at least one year in service including boot camp and military occupational specialty school. (Ganz et al., 2021; US Department of Defense, 2022).

Mindfulness-Based Stress Reduction (MBSR): a therapeutic technique like meditation and yoga to reduce perceived stress, anxiety, depression, addiction, high blood pressure, and chronic pain (Gawrysiak et al., 2018).

Mindfulness-Based Cognitive Therapy (MBCT): therapy that increases an individual's self-esteem and self-concept and reduces social anxiety and symptoms, including physiological symptoms, fear, and avoidance (Rae et al., 2022), and prevents relapses to major depressive disorders such as rumination and depressive moods (Chesin et al., 2021).

Microdata Samples: individual-level survey data for research from two leading sources of self-reported health and healthcare access information: the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS). The harmonized and free data from the IPUMS Health Surveys comprise individual and household characteristics, providing analysis from standard census outputs. Microdata samples range from 10% to 1% of households or individuals. The study used the *Integrated Public Use Microdata Series (IPUMS)*, a global census and survey data integrated across time and space for the convenience of studying change, conducting

comparative research, merging information across data types, and analyzing individuals within family and community contexts (Ruggles et al., 2020).

Health Status: measuring the presence or absence of disease or activity limitation. For example, health status rates as *poor*, *average*, or *excellent*. Also, measuring the presence or absence of disease or activity limitation can include individuals beginning to use mindfulness meditation as an MBI to increase psychological attributes, reduce negative thinking, or other reasons (Shapero et al., 2018). Health status can also relate to an individual's activity limitation from depression, anxiety, and emotional problems based on the admission of their perceived health or disability. Additionally, an individual can measure the duration of limiting depression, anxiety, and emotional issues that exist over the number of days, weeks, months, and years and if the individual's limitation was an intellectual disability, developmental disability, learning disability, age-related changes, or chronic health condition.

Further, an individual's health status can relate to sex, race, or age, which can measure the presence or absence of disease or activity limitation. For example, the study examined the respondent's sex and male and female; the race as White only, Black/African American only, American Indian/Alaska Native, Asian only, and other race or multiple race groups. Lastly, the study examined the absence of disease or activity limitation in adults aged 18 years to 99 years.

Assumptions

The study used secondary data from the IPUMS-HEALTH SURVEYS. The data consisted of consensus records, surveys, and data from the National Health Interview

Survey (NHIS). The assumption of the study pertains to the accurate collection of data, a record of respondent responses, and that the respondents understand the intent of the research. Also, the study assumed the respondents answered the survey and interview questions truthfully without prejudice. These assumptions were essential for the validity of the study.

Scope and Delimitations

The specific aspect of the research problem that the study will address was the lack of research on the functional elements of mindfulness meditation use among military populations and whether intervening with mindfulness meditation as an adjunctive component or on its increases or maintains physiological and psychological activity among military people. The military population was a small, unique community whose mental and physical health impacted the safekeeping of the US. Addressing the social, emotional, psychological, and physiological challenges of US Armed Forces personnel, especially when chronic physical and mental health conditions were a factor, prompts further research. Also, managing the aspects of the research problem, the study used a cross-sectional study design to simultaneously determine the exposure and outcome for each participant. For example, cross-sectional studies capture one moment in time (Patten & Newhart, 2018). Also, the study could use a cross-sectional study to identify specific types of mindfulness meditation practices, such as MBCT, MBSR, yoga, and Tai-chi. Similarly, the study could use the cross-sectional design to estimate the relationship between mindfulness meditation and health and activity limitations.

Limitations

Some of the study's limitations include using secondary data, which may not address the specific research questions or contain detailed data required for research. Although the variables were adequate, more control over the data collection process should occur because of the need for more accuracy in the data. The sample size used to generate the secondary data may be small, and statistics may reflect the bias of the collector, thereby limiting the accessibility of data. Also, data collection may not represent the broader population of overall military personnel.

Additionally, the study used a cross-sectional study design to examine the relationships between a condition and other variables of interest as they exist in a defined population simultaneously (Patten & Newhart, 2017). For example, the study used *age*, *race*, and *sex* as confounders. Confounders in a cross-sectional study design can confuse the relationship between exposure (mindfulness meditation) and outcome (health status). The confounder *age* can result in an inaccurate relationship because *age* was a potential confounder of the relationship between mindfulness meditation and health status. The assumption could be that the female participants were associated with better mindfulness meditation practices because of their age but were more likely than men to encounter depression because of a genetic predisposition, thus affecting their health. Because of the confounding variable's association with exposure (health status), age was an independent outcome predictor and not in the causal pathway between the exposure and the outcome; therefore, *age* was not the result of the exposure.

A reasonable measure of association that addresses limitations in a cross-sectional study design was the odds ratio (OR) or prevalence ratio (PR). The cross-sectional study design measures the prevalence of health outcomes or determinants of health in populations at a point in time or over a short time. For example, the study measured prevailing characteristics in a sample group to determine if the characteristics of the study participants were different from those of non-participants, which can lead to research bias in the outcome of the cross-sectional study (Dong et al., 2022). Also, the OR explains whether interventions contribute to improvements in health and help researchers determine relationships between interventions and outcomes in both positive and negative directions (Park & Han, 2022). Another reasonable measure to address limitations in the study was the sample size. According to Samaranayaka et al. (2021), the sample size a researcher selects was a reasonable measure that indicates if it can adequately and accurately analyze a population's health condition when testing a hypothesis that compares two groups to see if there were varying effect estimates.

Significance

The significance of the study on mindfulness meditation use was that the practice may provide a better understanding of the intervention health status of US Armed Forces Personnel, an area of research that was relatively new and has limited data. The findings from the study may help to understand how mindfulness practices in military settings address post-deployment-related stress and anxiety, which can significantly impact duty and family life. Practicing mindfulness meditation in military settings can reduce the risk of chronic pain, stress, depression, cognitive performance,

post-traumatic stress disorder, and attention deficit and hyperactivity disorder (ADHD) resulting from combat exposure (Babbie, 2017).

The study has the potential to be significant because it will fill a gap to increase the awareness of mindfulness meditation use, health, and activity limitations among the US Armed Forces. The study wanted to discover why there was a lack of understanding between the activity aspects of mindfulness meditation use among the US Armed Forces population and whether intervening with this practice, either as an adjunctive component or on its own, increases or maintains the military's physiological and psychological activity. The military population was a small, unique community whose mental and physical health impacts the safe keeping of the US. The study considers it necessary to address the US Armed Forces personnel's social, emotional, psychological, and physiological challenges, especially when chronic physical and mental health conditions were a factor, prompting further research.

In a study on mindfulness meditation delivery methods, Rice and Overby (2020) maintained that military operations with heavy psychological burdens produce stress and anxiety, often requiring the management of the activity limitation. Increasing individual resilience through social interventions such as mindfulness-based stress reduction (MBSR) can have some intended results (Babbie, 2017). The social change implications for mindfulness meditation may include collaborating with healthcare providers, health educators, and community organizations to understand the unique military population's specific culture and social structures. Overall, more time was needed to study the many

challenges health practitioners encounter in understanding military social differences and the functional aspects of mindfulness that may benefit this unique population.

Summary and Conclusions

The military population often encounters many physical, mental, and social challenges because of their rigid environment. This study will explore whether the US Armed Forces experience activity limitations in their environment, specifically from physical, social, psychological (activity limitation), and cognitive and physical inability for self-care (functional limitation). The literature shows the effectiveness of MBIs such as MBSR and MBCT in military populations and how the interventions can reduce physical and mental issues ranging from anxiety to chronic pain in treatment-seeking individuals. According to Howarth et al. (2019), MBIs and MBCTs primarily focus on psychological and physiological issues relating to anxiety, depression, and difficulty managing tasks; however, the interventions effectively increased mindfulness through relaxation techniques such as yoga and meditation.

The theoretical framework for the study was Albert Bandura's SCT which looked at an individual's behavior in a social environment (Glanz et al., 2015). The study analyzed literature relating to the study's key variables to use as a framework to build an appropriate hypothesis. The literature review also familiarized the study with past and current research on mindfulness meditation, the military population, and related health disparities to help the study identify what was known and unknown about the study's topic. Also, the study's assumptions pertain to the accurate collection of data by IPUMS Health Surveys and that the participants in the research were aware of the survey's intent

and answered the questions without prejudice. The study also discussed the scope and delimitations addressing the lack of research on the functional aspects of mindfulness meditation among military populations and whether the practice was a suitable intervention. The study focused on the relevancy of the analysis and the limits within the examination. Further, the study discussed the significance of the limitations with secondary data used in the study, a lack of control over data collection, and potential inadequate representation of the military population. In section 2, the study will discuss the research design and rationale, methodology, and threats to validity.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to examine whether mindfulness meditation use has an overall association between health status and activity or functional limitation among the US Armed Forces after adjusting for race, gender, and age. This section reviewed research design and data collection methods, methodology, threats to validity to include ethical procedures, and a summary of the section.

Research Design and Rationale

The study has one predictor (independent) variable, *used mindfulness meditation in the past 12 months*. The moderating variables were *self-reported race* and *health status* of the individual, which were ordinal and nominal variables respectively. There were three outcome (dependent) variables:

- Health status
- Activity limitation from depression, anxiety, and emotional problems
- Duration of limiting depression, anxiety, and emotional problems: time

There were control variables of *sex*, *race*, and *age*.

This study used secondary analysis of data from the Integrated Public Use Microdata Series (IPUMS) with a cross-sectional design to understand the influence of mindfulness meditation on the US Armed Forces while controlling for race, sex, and age. IPUMS consists of microdata samples from the United States (IPUMS-HEALTH SURVEYS) census records and surveys, including data from the National Health Interview Survey (NHIS). IPUMS converted the data into a consistent format and was

available to researchers through a web-based data dissemination system. The sample adult respondents were civilian, non-institutionalized population living in the United States who were 18 years or older and randomly selected from each household following a brief initial interview that identified everyone who usually lives or stays in the household.

Methodology

The target population of this study consists of adults ages 18 years and older who serve on active duty in the U.S. Armed Forces, military Reserves, or National Guard. The military population was a small, unique community whose mental and physical health impacts the safe keeping of the United States. The target population consists of approximately 78,132 US Armed Forces men and women, including veterans.

The study examined the relationship between the predictor (independent) variable *used mindfulness meditation, past 12 months*, and the outcome (dependent) variables *health status, activity limitation from depression, anxiety, and emotional problems, and duration of limiting depression, anxiety, and emotional problems: time*. The predictor variable *used mindfulness meditation, past 12 months* was a dichotomous variable with a *yes* or *no* response. Likewise, some of the responses for each of the outcome variables have indicators rating as *not intentional* (score of 1), *intentional* (score of 2), *days* (with a score between 1-7), *intellectual disability* (with a score of 1), *developmental disability* (with a score between 02 and 11, and *refused* (with a score of 97), *excellent* (with a score of 1), *very good* (with a score of 2), *good* (with a score of 3), *fair* (with a score of 4), and *poor* (with a score of 5) with each of the responses being calculated for a final score for

each individual US Armed Forces member. The outcome variable was ordinal because of the scale and scoring. Further, there were several control variables, including sex, race, and age. The variable *sex* measured as a nominal variable with male and female responses. Likewise, the variable *race* measured as a nominal variable, with responses of *White, Black/African American, American Indian/Alaskan Native, Asian, other races, and multiple races*. The variable *age* measured as an interval-ratio variable and includes all ages up to 99 years.

The study used secondary data from a nationally representative dataset, Integrated Public Use Microdata Series (IPUMS), which consisted of microdata samples from the United States (IPUMS-Health Surveys). The database consists of census records, surveys, and data from the National Health Interview Survey (NHIS) and a cross-sectional design to examine the influence of mindfulness meditation on military personnel. The study comprised approximately 16,000 individuals. Participants completed questionnaires assessing their service on active duty, whether in training or not in the Reserves or National Guard training. The dependent variables: *health status, activity limitation from depression, anxiety, and emotional problems, and duration of limiting depression, anxiety, and emotional problems over time*, were the effects and its values depended on the changes in the independent variables. IPUMS Health Surveys converts the data into a consistent format and was available to researchers through a web-based data dissemination system.

Sampling Procedures Used by Original Creators of the Data Set

IPUMS Health Surveys provided free individual-level survey data for research

purposes to the public from two leading sources of two top sources of self-reported health and healthcare access information: the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS). The NHIS conducts an annual cross-sectional household interview survey of approximately 87,500 persons in 35,000 households.

The NHIS Collects survey information on the health, healthcare access, and health behaviors of the civilian, noninstitutionalized US population, with digital data files available from 1963 to the present. IPUMS Health Surveys harmonizes these data and allows users to create custom NHIS data extracts for analysis. This data selection for the current study represents the appropriate population and data needed to identify possible health inequities and the necessity for social change implications. Participants complete questionnaires that assess their service on active duty, whether in training or not in training, and the Reserves or National Guard.

The study determines statistical significance by using a measurement called the *p*-value. The result was statistically significant if the *p*-value falls below the significance level (Kang, 2021). The study used power analysis to estimate the minimum sample size required for the research, given the desired significance level, effect size, and statistical power. Also, the study used a software application known as CheckMarket to estimate sample size and to determine statistical significance. The CheckMarket online survey software analysis tool calculates the number of respondents needed in a survey using a sample size calculator.

The study has a sample size of 59,957 respondents who completed surveys in the

IPUMS Health dataset. The study used the CheckMarket sample size calculator to find the minimum sample size for the total population surveyed in the IPUMS Health dataset. The CheckMarket estimated a response rate of 20%, produced a minimum sample size of 2330 respondents. *Figure 2* showed an example sample size formula of the actual population size of respondents surveyed ($N = 59,957$), the margin of error ($e = .05\%$), the significance or confidence level ($Z = 95\%$), and a sample proportion ($p = 0.5$).

Figure 2

Sample size formula

Sample Size Formula

$$n = N \times \frac{\frac{Z^2 \times p \times (1 - p)}{e^2}}{\left[N - 1 + \frac{Z^2 \times p \times (1 - p)}{e^2} \right]}$$

Note: Sample size formula for calculating and determining minimum sample size. (Taken from wallstreetmojo.com (2022). Sample size formula. <https://wallstreetmojo.com/sample-size-formula>)

Operationalization

The purpose of the study was to test the relationship between mindfulness meditation use and the health status of US Armed Forces personnel. Further, I will test the relationship between mindfulness meditation use, activity limitation from depression, anxiety, emotional problems, and duration of limiting depression, anxiety, and emotional problems over a certain time among U.S. Armed Forces personnel. The study had one predictor variable and two moderating variables. The response of the variables categorizes as dichotomous, ordinal, and interval-ratio respectively. The predictor

variable was *if a person has used mindfulness meditation in the past 12 months*, with responses of *yes* or *no*. The moderating variables *race*, and *health* have responses that answer by self-reported race, and by the respondent's condition of their health status respectively. The control variables were *sex*, *race*, and *age*. The control variable *sex* was a dichotomous variable with a response of *male* or *female*. The control variable *race* was a nominal variable with responses of *White*, *Black/African American*, *American Indian/Alaska Native*, *Asian*, and *other races*. Lastly, *age* was an interval-ratio variable with ages between 18 and 99 years.

There were three outcome variables in the study: *health status*, *activity limitation from depression, anxiety, and emotional problems*; *duration of limiting depression, anxiety, and emotional problems: time*. The outcome variables measured the perceived health status, activity limitation, and duration of limiting depression, anxiety and emotional problems among the participants surveyed in the IPUMS Health Surveys. The survey used a Likert-type rating scale based on the typical Likert 5- or 7-point ordinal scale that measured the respondents' opinions, attitudes, or behaviors. For example, the responses of health status had separate responses of *excellent* (score of 1), *very good* (score of 2), *good* (score of 3), *fair* (score of 4), and *poor* (score of 5). Also, the remaining outcome variables were ordinal and had similar Likert-type rating scale responses. Table 1 described the variables and their measurements.

Table 1*Operationalization of Variables*

Variable Name	Category	Variable Meaning	Measurement/Variable Type
Used Mindfulness Meditation, Past 12 Months	1 = No 2 = Yes	If a US Armed Forces person has ever used mindfulness meditation in the past 12 months.	Predictor/Categorical
Health Status	1 = Excellent 2 = Very Good 3 = Good 4 = Fair 5 = Poor	The health status of a US Armed Forces person has been excellent, very good, good, fair, and poor.	Outcome/Ordinal
Activity Limitation from Depression, Anxiety, and Emotional Problems	1 = Not mentioned 2 = Mentioned	If the US Armed Forces person has activity limitation from depression, anxiety, and emotional problem.	Outcome/Ordinal
Duration of Limiting Depression, Anxiety, and Emotional Problems: Time	1 = Days 2 = Weeks 3 = Months 4 = Years	If the US Armed Forces person has duration of limiting depression, anxiety, and emotional problems in terms of time.	Outcome/Ordinal

Variable Name	Category	Variable Meaning	Measurement/Variable Type
Sex	1 = Male 2 = Female	Sex of US Armed Forces personnel	Control/Nominal
Race/ethnicity	100 = White only 200 = Black/African American only 300 = American Indian/Alaska Native 400 = Asian only 500 = Other race	US Armed Forces person's race or ethnicity at time of survey.	Control/Nominal
Age	Ages 18 years to 99 years	Age of US Armed Forces person at time of survey.	Control/Continuous

Data Analysis Plan

The study used ordinal logistic regression, chi-square test, and one-way ANOVA as statistical methods to analyze the relationships between variables for all three research questions. Although the different statistical techniques varied in terms of outcome, the ordinal logistic regression was used as a regression technique for ordinal dependent variables (RQ1), the chi-square test assessed associations between categorical variables (RQ2), and one-way ANOVA compared means across multiple groups of a categorical independent variable (RQ3). For example, *RQ1* stated, *What is the relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, age, race, and the US Armed Forces?* The outcome

variable, *health status*, was ordinal and the predictor variable, “*used mindfulness meditation, past 12 months*”, was a categorical (nominal) variable. The IPUMS Health Surveys asked respondents to rate their level of health status with a statement on a five-point scale from "excellent" to "poor." Ordinal logistic regression was used when the outcome variable was ordinal, meaning it had three or more ordered categories. Also, the statistical techniques estimated the relationship between the predictor variable and the ordered categories of the outcome variable (Williams & Quiroz, 2020).

Likewise, *RQ2* asked, *What is the relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems while controlling for sex, age, and race, and the US Armed Forces?* In this instance, the outcome variable had three or more categories, indicating that it was a nominal variable with multiple distinct categories, and the predictor variable, “*used mindfulness meditation, past 12 months*”, was a categorical (nominal) variable. The IPUMS Health Surveys asked respondents to rate their level of agreement with activity limitation from depression, anxiety, and emotional problems that occur with a statement on a five-point scale ranging from *mentioned* to not *mentioned*. The chi-square test for independence or association assessed whether there was a statistically significant relationship or association between two categorical variables. The test compared the observed frequencies of the joint distribution of the two variables with the expected frequencies under the assumption of independence. If the observed frequencies significantly deviated from the expected frequencies, the test would indicate that the variables were associated (Williams & Quiroz, 2020). The categorical (nominal) variable,

activity limitation from depression, anxiety, and emotional problems that occur, had two categories: *not mentioned*, and *mentioned*. The predictor variable, *used mindfulness meditation, past 12 months*, was categorical (nominal) and had categories that ask questions about the characteristics or attributes of people, such as if they ever used a type of mindfulness meditation. The order of both the nominal variables did not have an inherent order.

Lastly, RQ3 asked, *What is the relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety and emotional problem over a period while controlling for sex, age, race, and the US Armed Forces?* The outcome variable for this research question, *duration of limiting depression, anxiety and emotional problem over a period* was continuous, and the predictor variable, *used mindfulness meditation, past 12 months*, was categorical (nominal). The IPUMS Health Surveys asked respondents to rate their level of agreement with the duration of limiting depression, anxiety, and emotional problems over a period with a statement on a five-point scale ranging from “days,” “weeks,” “months,” “years,” and “since birth.” The one-way ANOVA statistical technique was used in this research to compare means across multiple groups or categories of a single independent variable. ANOVA was the most appropriate test because the dependent variable, *duration of limiting depression, anxiety, and emotional problem over time* was a continuous variable, and the predictor variable, *used mindfulness meditation, past 12 months*, was categorical (nominal). ANOVA also examined whether there were significant differences in the means of the dependent variable across the different categories of the independent variable (Wilcox, 2022).

Also, the study used SPSS version 28 to analyze data in IPUMS Health Surveys (Blewitt et al. (2019)). Once the data was uploaded into SPSS, the study reviewed its accuracy. The study performed data cleaning and screening procedures that thoroughly analyzed the data and addressed issues that may jeopardize confidence in the results that could lead to mistakes or erroneous scores in the dataset. The study accounted for the dataset not being 100%; however, the study began the analysis to make informed decisions about how to deal with the limitations of real-world data. The process the study used to screen and clean the quantitative data involved the following components:

1. **Check data accuracy.** Apply data validation techniques to review dataset for inconsistent, invalid (errors), missing, or outlier data in SPSS or manually and if the data was erroneously entered in SPSS. Also, the study screens the dataset for errors or inconsistencies and removes any empty rows.

2. **Check data completeness.** Diagnoses data and entries by checking how much data were missing and if there were patterns of data missing within the set of responses or recorded values in the dataset. Checks rows of data for duplicate entries and if there were specific values in some columns that appear to be extreme outliers.

3. **Assess the data for normal distribution.** How were values spread out in my sample? Develop codes for mapping my data into valid values. Visually explore data with boxplots, scatterplots, or histograms. Create summary (descriptive) statistics for each variable. Summarize quantitative data in frequency tables.

4. **Missing data.** The study will identify any missing data or values that do not have data stored for specific variables or participants. There was the possibility of

incomplete data entry in the survey, such as missing values may appear as blank cells in the dataset.

5. **Assess the validity and reliability of measures.** Am I measuring what want to measure? Were my results repeatable? Transform or remove data based on standardized procedures.

The research questions with null and alternative hypotheses were:

RQ1: What is the relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the U.S. Armed Forces?

H₀₁ – There is no relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the U.S. Armed Forces.

H_{A1} – There is a relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the U.S. Armed Forces.

RQ2. What is the relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems that occur while controlling for sex, age, race, and the U.S. Armed Forces?

H₀₂ – There is no relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems that occur while controlling for sex, age, and race, and the U.S. Armed Forces?

H_{A2} – There is a relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems that occur while controlling for sex, age, and race, and the U.S. Armed Forces?

RQ3. What is the relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the U.S. Armed Forces?

H₀₃ – There is no relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the U.S. Armed Forces.

H_{A3} – There is a relationship between using mindfulness meditation in the past 12 months, and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the U.S. Armed Forces.

The study makes general assumptions pertaining to the statistical analyses. The assumptions and the process for testing/assessing the assumptions pertained to assumptions of normality, assumptions of homogeneity of variance, homogeneity of variance-covariance matrices assumption, violation of assumptions were:

1. **Assumptions of Normality.** The data were normally distributed or bell-shaped with 0 mean, 1 standard deviation, and a symmetric bell-shaped curve.
2. **Assumptions of Homogeneity of Variance.** The military group that was being compared has a similar variance. The groups were comprised of both men and women. For example, the homogeneity of variance within each group being

compared was identical among all groups. If one group has much more variation than others, it will limit the test's effectiveness.

3. **Homogeneity of Variance-Covariance Matrices Assumption.** The study can use "randomness" to assume that the sample observations in the dataset were random.
4. **Violation of Assumptions.** Violations of the assumptions of the study will impact the ability to trust the results and accurately draw inferences about the results. The study can use a non-parametric analysis if multiple assumptions were violated, or a data transformation does not correct the violated assumption. Or the study can use alternative statistics for determining significance, such as F statistics, if the assumption of homogeneity of variance was violated in the analysis of variance (ANOVA) to determine if there was statistical significance. The study will use SPSS to calculate the statistics of the ANOVA analysis.
5. **Multiple Statistical Tests.** The study will use the Bonferroni correction method. According to VanderWeele and Mathur (2019), the Bonferroni correction was an adjustment to P values when several dependent or independent statistical tests were performed simultaneously on a single data set. The study considered an inferential statistical test like regression analysis to determine if there was a statistically significant difference between the means in two unrelated groups. The study will perform a Bonferroni correction by dividing the critical P value (α) by the number of comparisons made. For example, six hypotheses were being tested, so the new critical P value would be $\alpha/6$. The study's statistical power was then

calculated based on this modified P value. The study used the Bonferroni test to reduce the probability of getting false-positive results or type I errors when multiple pairwise tests were performed on a single data set.

Threats to Validity

The study assesses the threats to external validity using secondary data and considers testing reactivity. For example, the study considers several threats to external validity that tested reactivity in the IPUMS Health Surveys data. This threat was subject to error because of undisguised observation or observer effect. Since the participants in the study know they were taking a survey or under observation, they may act differently than they usually would. The study considers whether the "observer" effect impacted the research because of possible changes in the participants' behavior, subjecting the findings to error. The study then looks at the interaction effects of participant selection and how experimental variables possibly threatened the study's external validity. The treatment may affect some participants more because the group composition was primarily military. The group's composition was activity duty men and women and veterans aged 18 years and older.

Also, the study analyzes the specificity of variables that could potentially jeopardize external validity because poorly operationalized variables make it difficult to identify the setting and procedures to which can generalize the variables. According to Siedlecki (2020), sample generalization cannot represent the population beyond the sample to the larger population. The external validity issue would be a significant study limitation. Further, the study looks at the reactive effects of experimental arrangements

and multiple-treatment interference to determine if there were threats to external validity because some of the participants from the surveys could have received more than one treatment, such as yoga or Ta-Chi, and the effects of how previous treatments may have influenced subsequent ones. Threats to multiple treatment interferences can occur when interventions such as mindfulness meditation, yoga, or Tai Chi apply to the same participants. The effect of the prior treatment can affect or interact with later treatments, limiting generalizability.

The study considers several threats to internal validity: history, maturation, testing, instrumentation, statistical regression, experimental mortality, selection-bias interaction, and researcher bias. For example, history can jeopardize the internal validity of the study because certain events that could have occurred during the survey, other than the intended reason for the survey, could interfere with the observer's intent of the survey, thus changing the conditions of the study and affecting its outcome. The changes could have occurred before the start of the survey being administered to the participants, thus obscuring the actual intent of the survey. In a study on internal validity threats, Flannelly et al. (2018) state that *history* specifically encompasses specific events that study participants experience during an experiment, but that was not part of the experiment itself, therefore, being considered extraneous variables. According to Krishnan (2019), the design of extraneous variables was poor at distinguishing the effects of an intervention from those due to uncontrolled extraneous variables.

Maturation was another threat that can jeopardize the study's internal validity because of natural changes in the participants, like age and maturity, during the

intervention. Maturation occurs when people change, grow, or develop throughout the study in ways that influence the results (Urban & van Eeden-Moorefield, 2018). These changes could account for the outcomes. The study cannot determine, especially if the intervention caused the effect or was due to the natural change or maturation of the participants. Questionnaire data comes from IPUMS Health Surveys and interviews, so the selection group was preselected. The time between administering the surveys and questionnaires to the participants can cause confounding results. The study can conclude that the treatment (surveys and questionnaires) influenced the results, which could be an inaccurate conclusion.

Likewise, testing was an internal threat to validity because participants cannot take repeat tests. For example, when taking tests multiple times, participants can become sensitized and used to the test, influencing how the participants take the test a second time (Flannelly et al., 2018). Repeatedly taking a test could negatively affect the study's outcomes. Also, instrumentation threatens the study's internal validity because changes in the observer's behavior may influence the behaviors of the subjects they were tracking, thus producing changes in outcomes. The study used secondary data and did not know the observer's behaviors when the surveys and questionnaires during the administration of the tests. Instrumentation occurs typically when changes in the measurement system during an experiment may be responsible for an observed effect (Petursdottir & Carr, 2018).

Similarly, statistical regression threatens the study's internal validity because of extreme scores or characteristics. Some participants who took IPUMS Health surveys or

answered questionnaires may score high on some measures and, if retested, score low despite experimental intervention. Flannelly et al. (2018) stated that when looking at statistical regression, researchers should note that it was the tendency for individuals to score extremely high or extremely low relative to the mean or average, which shows a regression toward the mean.

Additionally, experimental mortality threatens a study's internal validity if the participants fail to complete the health surveys and questionnaires or if the experiment lasts longer than intended, causing potential loss of participants. The loss of respondents in an observer's measurement can produce artifactual effects significantly if the loss systematically correlates with other study variables. For example, if the experiment (survey or questionnaire) study period lasts long, the participants may withdraw from the study. A loss of respondents to measurement can produce artifactual effects (Matthay & Glymour, 2020) and the loss of participants before the completion of the study.

Moreover, selection-bias interaction threatens the study's internal validity because the creators of secondary data, *IPUMS Health Surveys*, could result from self-selection. The selection of participants may not be random, as was commonly seen in observational and cross-sectional studies. Also, the association between exposure and health outcome could be different for those who complete a study than those in the target population. This kind of bias by a researcher can affect the results of the study, leading to confounding outcomes, errors in interpreting if the intervention, mindfulness meditation, caused the effect, or if the participants who completed the study did not compare with those who were in the target population (Sovacool & Sorrell, 2018). Lastly, the researcher's bias,

like selection bias, was a threat to the study's internal validity because the researcher behaves differently toward one group over the other and may have beliefs or expectations that could influence the research design or data collection process (Urban & van Eeden-Moorefield, 2018).

The study addresses the threats to internal validity by countering the threats by using a large sample size. The population size of the subjects in the study was over 59,000 military personnel and veterans. A large sample size ensures that the average values will be more accurate. More extensive studies provide more robust, reliable results because they have smaller error margins and lower deviation standards. Researchers can control the risk of false-negative reports or false-positive findings (Lakens, 2022). Another way the study addresses threats to internal validity was by manipulating the independent variables in the study, which is experimental manipulation. For example, applying an intervention, such as mindfulness meditation, determines cause and effect. The study can analyze the variables and look for various cause-and-effect relationships that the theory can produce and can help the study recognize potential momentary changes in the population under study to see if there were any notable differences (Dang et al., 2020).

Ethical Procedures

The original researchers of this data, IPUMS Health Surveys, offered health survey data at no cost for research and educational purposes to this study from two leading sources of self-reported health and healthcare information, *The National Health Interview Survey (NHIS)* and the *Medical Expenditure Panel Survey (MEPS)*. IPUMS

Health Surveys harmonized NHIS and MEPS data, allowing users to create customized data extracts for analysis. IPUMS Health provided annual NHIS microdata from 1963 to the present. The data covered general health status, the distribution of acute and chronic illness, functional limitations, access to medical services, insurance coverage, and health behaviors. The Medical Expenditure Panel Survey (MEPS) harmonized MEPS data from 1996 to now. MEPS provided nationally representative, longitudinal data covering health status, medical conditions, health care utilization, and expenditures for the US civilian, non-institutionalized population. Some of the study's limitations include using secondary data, which may not address the specific research questions or contain detailed data required for research. Although the variables were adequate, there needs to be more control over the data collection process. For example, the data should be sizeable to reflect a sample size that does not reflect the bias of the IPUMS Health: Survey's collector's, thereby limiting the accessibility of information. Also, the data collected may not be representative of the broader population of overall military personnel. IPUMS Health Surveys requires the study to cite their database appropriately using the citation provided from their website.

Summary

This section reviewed and provided a rationale of the research design and methodology to include sampling procedures used by the original creators of the IPUMS Health Survey dataset. Also, the study discussed the operationalization of variables, a data analysis plan, threats to internal and external validity, and ethical procedures of the study. This study was a secondary analysis with a population of 59,957 US Armed Forces

active-duty and veteran men and women. The methodology the study used was a guide that measured the observations and structured interviews from secondary data provided by the IPUMS Health Surveys and observed health affects with the military population that produced objective data that could be expressed through statistics.

Further, the study explained the operationalization of the predictor variable if an individual *used mindfulness meditation in the past 12 months*. The outcome variables in the study included *health status, activity limitation from depression, anxiety, and emotional problems, and duration of limiting depression, anxiety, and emotional problems over time*, and control variables of *sex, race, and age*. The data analysis plan described the data collection process, the methods used, and how the study analyzed the data, including statistical tests that answered the research questions.

Lastly, the study discussed the threats to external and internal validity and described the study's ethical procedures. The goal of the study was to observe the military population and present actual data about the subjects without methodological errors and ensure access to the data and analyses meet ethical standards. Section 3 of the study will discuss the results and findings from the data analysis.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative research study was to examine if there was a relationship between mindfulness meditation use over 12 months, health status, activity limitation from depression, anxiety, and emotional problems, and duration of limiting depression, anxiety, and emotional problems over time while controlling for sex, age, and race among the U.S. Armed Forces. I used the 2017-2021 census and survey data from the Integrated Public Use Microdata Series (IPUMS): Health Surveys: National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS) database to examine the relationship between these variables. Also, this section described the data collection methods for the 2017-2021 census and survey data. I presented the results and findings from data analysis using SPSS, Ordinal logistic regression, the chi-square test, and one-way ANOVA. The IPUMS Health Surveys: NHIS was globally integrated data across time and space and comprised data on the health, healthcare access, and health behaviors of civilians and non-institutionalized US populations. The survey data was also harmonized for researchers to create custom NHIS data extracts for analysis (Blewitt et al., 2019). Additionally, Section 3 discussed baseline descriptive and demographic characteristics of the IPUMS Health Surveys dataset, including any discrepancies found. The study also estimated the statistical assumptions and reported the statistical analysis of the findings to the research questions and hypotheses in the study. Evaluating statistical assumptions and writing statistical analyses will produce a comprehensive report of the research questions and hypotheses included (Kim & Mueller, 2019). The tables and

figures in the study illustrated the results and findings from the data analysis using SPSS. Also, I used an experimental quantitative research design that analyzed secondary data collected on US Armed Forces members who answered the survey questions through IPUMS Health Surveys regarding their health status, activity limitation from depression, anxiety, and emotional problems, and duration of limiting depression, anxiety, and emotional problems over time. I attempted to answer three research questions with corresponding hypotheses in this section. The research questions were created to determine the relationship between the variables while controlling for sex, age, and race:

RQ1: What is the relationship between using mindfulness meditation in the past 12 months, health status while controlling for sex, age, race, and the US Armed Forces?

H_{01} – There is no relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the US Armed Forces.

H_{a1} – There is a relationship between using mindfulness meditation in the past 12 months and health status while controlling for sex, race, age, and the US Armed Forces.

RQ2. What is the relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems while controlling for sex, age, race, and the US Armed Forces?

H_{02} – There is no relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and

emotional problems while controlling for sex, age, race, and the US

Armed Forces.

H_{a2} – There is a relationship between using mindfulness meditation in the past 12 months and activity limitation from depression, anxiety, and emotional problems while controlling for sex, age, race, and the US Armed Forces.

RQ3. What is the relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, and the US Armed Forces?

H_{03} – There is no relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race and the US Armed Forces.

H_{a3} – There is a relationship between using mindfulness meditation in the past 12 months and the duration of limiting depression, anxiety, and emotional problems in terms of time while controlling for sex, age, race, and the US Armed Forces.

The first research question added a moderating variable, *health status*. The dependent ordinal variable had categories that were ordered and ranked and was the variable being observed and measured. The second moderating variable, *race*, was also a covariate and an interval-ratio variable measured continuously. In the study, both variables were used to account for the variable *race* because of its potential influence on the relationship between mindfulness meditation use and health status. Also, I wanted to

explore whether *health status* influenced the relationship between mindfulness meditation and race.

The researchers of IPUMS Health Surveys asked survey questions about *health status* and *self-reported race* from the participants, who responded based on their health status and race assessment. The respondents answered survey questions based on the condition of their health status and self-reported race to determine whether using mindfulness meditation for a period affected their relationship between health status and race.

Accessing the Data Set for Secondary Analysis

For this research study, the data used was collected on US Armed Forces members from a nationally representative combined dataset from 2017-2021 NHIS (IPUMS) Health Surveys provided access to data from several national health surveys: NHIS, MEPS, and National Health and Nutrition Examination Survey (NHANES). The harmonized, integrated data from this variety of population health surveys were conducted by various government agencies such as the Centers for Disease Control and Prevention (CDC), the Agency for Healthcare Research and Quality (AHRQ), and the National Center for Health Statistics (NCHS) (Blewitt et al., 2019). The study used the IPUMS Health Surveys to obtain the following variables: used mindfulness meditation *past 12 months*, *health status*, *activity limitation from depression*, *anxiety*, *emotional problems*, *duration of limiting depression*, *anxiety*, and *emotional problems: time, age*,

sex, and *race* of US Armed Forces members and to answer the research questions in the study.

After IRB approval, the study examined the 2017-2021 IPUMS Health Surveys dataset, which included 59,957 (respondents) ($n = 59,957$) that answered survey questions. The response rate was 20%, obtained from a minimum sample of 2,309 respondents (CheckMarket, 2022). The collected data represented the military population targeted for the study, which included the variables necessary to answer the research questions. Although the creators of IPUMS Health Surveys performed a data cleanse of the survey data by applying consistent editing and processing rules to ensure the accuracy and completeness of the data, significant discrepancies were found related to some of the cases in the dataset being empty or respondents did not respond at all. For example, some of the responses to the cases indicated NIU (not in the universe); because of non-responses, responses to these cases were hidden; however, actual reported survey data through SPSS was included.

This research analyzed and interpreted the data appropriately to draw valid and reliable conclusions. Data discrepancies were found in this study, which implied a potential problem or limitation in the current analysis that must be addressed. The results obtained from the present analysis may have needed to be completed, accurate, or fully representative of the underlying population. The decision to conduct further analysis was based on the research questions, the data's nature, and the results' significance. Therefore, further analysis was necessary to address this.

The collected individual surveys were from IPUMS Health Surveys that related to *mindfulness meditation used in the past 12 months*, *health status*, *activity limitation from depression*, *anxiety*, *emotional problems*, *duration of limiting depression*, *anxiety*, *emotional problems: time*, as well as demographic data such as *age*, *sex*, and *race* of US Armed Forces members. The sample's baseline and demographic characteristics were presented to understand the military population better, the relationship between using mindfulness meditation and their health status, and any activity limitations. The interpretation of the study results was simplified by presenting these characteristics. For example, in RQ1, this study tried to find the health status of military members in the IPUMS Health Surveys dataset that answered how they felt about their current health status. Many of the cases in the dataset were reported as NIU or did not have a score that described the variable's distribution. I performed several statistical analyses to resolve this issue, such as a crosstab in SPSS. Like the variable, *health status*, all the remaining variables had missing scores. I performed data cleaning, recoded the variables, and hid the incomplete data (cases), and filtered out the data with scores in the dataset. This function was performed separately for all six variables in this research.

Further, using SPSS, I performed a descriptive and inferential data analysis of the IPUMS Health Surveys dataset to ensure the accuracy of the data and that the military population was adequately represented in the findings. I obtained the frequencies and percentages for the categorical predictor variable, *used mindfulness meditation, past 12 months*, the outcome ordinal variables, *health status*, *activity limitation from depression*, *anxiety*, and *emotional problem: time*, and the continuous variable, *duration of limiting*

depression, anxiety, and emotional problems: time, and control variables, *sex, race*, and *age*, that have levels of measurement that were nominal and ratio, respectively. Further, the data analysis included the continuous variable's mean, standard deviation, minimum and maximum scores, *and duration limiting depression from depression, anxiety, and emotional problems.*

Results

Descriptive Statistics

After data cleaning, in Table 2, I displayed the frequencies and percentages of the descriptive and demographic characteristics of the US Armed Forces population sampled in the study. The results showed that among the 59,957 total cases, 50.6% (21,716) of the study participants were male, and 49.4% (21,174) were female. The US Armed Forces members' ages had responses ranging from 18 years old to 49 years old, with a mean average age of 38.8 years (SD = 0.792). Demographically, 80.2% (34,377) of the participants were White, while Black/African American participants comprised 12.0% (5,165), followed by American Indian and Alaskan Native at 1.4% (599), and Asian at 6.4% (2,749). Also, 90.6% (54,347) of participants responded *no* to having served in the US Armed Forces, Reserves, or National Guard, while 9.4% (5,610) served in the US Armed Forces, Reserves, or National Guard.

The descriptive statistics regarding the predictor variables were also included in Table 2. Responses to the variable *health status* showed Likert-type responses with the highest response rate of 37.1% (6,484) of military respondents who had an excellent health status, followed by very good at 31.3% (5,479), good at 22.6% (3,947), fair at 7.0

(1,231), followed by a poor health status at 2.0% (350). Finally, Table 2 included the remaining two variable responses of 15.7% (1,534) of military respondents that answered they did mention having activity limitation from depression, anxiety, and emotional problems. In contrast, 84.37% (8,266) did not mention having activity limitations from depression, anxiety, and emotional problems. Likewise, the response rate for the duration of limiting depression, anxiety, and emotional problems over time was days at 0.1% (1), weeks at 0.3% (4), months at 2.2% (31), and years at 97.5% (1,397).

Table 2

Frequency and Percentages for all Variables

Variable	Number	Frequency %
Sex		
Male	21716	50.6%
Female	21174	49.4%
Age		
18-34	16171	27.0%
35-49	14559	24.3%
50+	29227	48.7%
Race/Ethnicity		
White	34377	80.2%
Black/African American	5165	12.0%
Asian	2749	6.4%
American Indian/Alaskan Native	599	1.4%
Used Mindfulness Meditation, Past 12 mos.		
No	31089	95.0%
Yes	1645	5.0%
	350	2.0%

Variable	Number	Frequency %
Health Status		
Excellent	6484	37.1%
Very Good	5479	31.3%
Good	3947	22.6%
Fair	1231	7.0%
Poor		
Activity Limitation from Depression, Anxiety, and Emotional Problems		
Not Mentioned	8266	84.3%
Mentioned	1534	15.7%
Duration of Limiting Depression, Anxiety, and Emotional Problem: Time		
Days	1	0.1%
Weeks	4	0.3%
Months	31	2.2%
Years	1397	97.5%

Statistical Analysis

I utilized several statistical analysis tests: Ordinal logistic regression, chi-square test, and one-way analysis of variance (ANOVA). The first statistical analysis in this research study was performed using ordinal logistic regression for RQ1. Ordinal logistic regression provided valuable insights into the relationship between the categorical nominal independent variable and the ordinal dependent variable, considering the ordered nature of the dependent variable. The second statistical analysis I performed in this research study was the chi-square test of independence for RQ2. The chi-square test was an appropriate statistical test that analyzed the relationship between the two nominal variables, used mindfulness meditation for the past 12 months, and activity limitation from depression, anxiety, and emotional problems. I used the chi-square test to determine

whether the two variables had a significant association or dependence. The last statistical analysis that was performed in this study was ANOVA. The statistical test, ANOVA, allowed me to assess whether significant differences in the means of the outcome variable across different predictor variable categories existed (Wilcox, 2022).

To address RQ1, I selected *Analyze, Regression*, and then *Ordinal* to open the dialog box. Next, I moved the dependent ordinal variable that I wanted to predict, *health status*, to the *Dependent* box, and selected the nominal categorical independent variable, *used mindfulness meditation, past 12 months*, the variable I wanted to use to predict the dependent variable into the *independent* box. Since I had multiple control variables, *sex*, *age*, and *race*, I selected the variables from the list and moved them into the *independent* box along with the independent variable. Using ordinal logistic regression analysis allowed me to control these variables' effects while examining the relationship between my main variables of interest. Next, I selected the button to open the *Ordinal Regression: Output* statistic dialog box. I selected *Goodness of fit statistics*, *summary of statistics*, and *parameter estimates* to retrieve basic descriptive statistics to obtain extra information about the regression model. I finally selected, *Continue* and the *OK* button to run the ordinal logistic regression analysis. The output included the model fitting information (Table 3), goodness-of-fit (Table 4), pseudo-R-square (Table 5), and parameter estimates (Table 6).

Next, I analyzed the model fitting information (Table 3) from the ordinal logistic statistic, which included the -2 Log Likelihood, chi-Square statistic, degrees of freedom, and the corresponding significance level. The Intercept Only model yielded a -2 Log

Likelihood value of 4349.166. The model served as a baseline model without the predictor variable and as a reference point against which the fit of the Final model could be compared. However, the *Final* model comprised the predictor variable, *used mindfulness meditation, past 12 months*, and control variables *age*, *sex*, and *race*, which achieved a statistically significant fit with a -2 Log Likelihood value of 1270.853. The values equaled the reported value, indicating a significantly better fit to the data than the Intercept Only model. The decrease in the -2 Log Likelihood statistic indicated that the Final model described a substantial amount of variance in the outcome variable outside what could be accounted for by the Intercept Only model.

I also analyzed the Final model's Chi-square value, which was 3078.312, with 4 degrees of freedom. The corresponding *p*-value was denoted as .000, which indicated the statistical significance of the observed relationship between the predictor and outcome variables. Also, the findings suggested that the Final model provided a significantly better fit to the data than the Intercept Only model. Also, the predictor variable contributed significantly to the model's overall descriptive power. The Chi-Square statistic supported evidence of a significant association between the predictor and outcome variables in the final logistic regression model, thereby supporting the rejection of the null hypothesis. Further, the significant chi-Square value indicated that the independent variable, *used mindfulness meditation, past 12 months*, and potentially the control variables, *age*, *sex*, and *race*, contributed to explaining the variability in the dependent variable, health status beyond what would be expected by chance alone.

The significance of the Chi-Square value suggested that the predictor variable and control variables had a meaningful association with the outcome variable. The research considered the implied association between using mindfulness meditation in the past 12 months and health status among the US Armed Forces while controlling for age, sex, and race. The finding supported the idea that the predictor variable and the control variables performed a role in understanding the association between mindfulness meditation use and health status among the US Armed Forces. Also, controlling for age, sex, and race, the analysis recognized the potential influence of these factors on the association. Also, the analysis ensured an accurate analysis of the relationship between the predictor variable and the outcome variable. The model showed significant contributions of predictor and control variables to explain health status variability. The results supported the inclusion of these variables and emphasized their value in studying the relationship between mindfulness meditation use and health status among the US Armed Forces.

Table 3

Model Fitting Information for RQ1 and control variables

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	4349.166			
Final	1270.853	3078.312	4	.000

Next, the goodness-of-fit model (Table 4) was analyzed using the Chi-Square test statistics, which included two measures of goodness-of-fit, specifically Pearson Chi-square and deviance Chi-square statistic. The study used the model to gain valuable

insight into the adequacy of the model to explain the observed data and statistical significance of the fit. The Chi-square test compared the observed frequencies with the expected frequencies based on the model, and the Deviance measured the overall lack of fit between the observed and expected values. For example, the Pearson Chi-square statistic was 556.027, calculated by comparing the observed frequencies with the expected frequencies under the fitted model, with 224 degrees of freedom. The results indicated that the data may only partially capture the complexities reported in the dataset.

The associated p -value, indicated as *Sig.*, was reported as .000, indicating an extremely low probability, suggesting that the observed discrepancy is unlikely to be attributed to random chance. Since there was no significant difference between the observed and expected frequencies according to the Goodness-of-Fit model, the study will reject the null hypothesis and conclude that the model does not fit the observed data well. According to Andrade, 2019, if a Chi-square test yields a low p -value, below the average 0.05 significance level, there is an indication that the observed frequencies significantly deviate from the expected frequencies, providing evidence against the null hypothesis.

Likewise, the Deviance statistic reported a value of 560.586, which was also a goodness-of-fit measure. The statistic was calculated by comparing the observed frequencies with the predicted frequencies from the fitted model. Like the Pearson Chi-square, the Deviance test had degrees of freedom that equaled 224, which also indicated a significant lack of fit between the observed and expected values within the model. The associated p -value was also reported as .000, which suggested that the statistical

significance of the finding in this model does not fully account for the observed data. The results in Table 4 indicated that the model's goodness-of-fit, as indicated by the Pearson Chi-Square and Deviance statistics, could have been better. The significant values obtained for both measures indicated a discrepancy between the observed data and the model's predictions. The evidence showed that the model may have needed to adequately capture the complexities of the data that pertained to the variables in RQ1.

Table 4

Goodness-of-Fit Model for RQ1 and control variables

	Chi-Square	df	Sig.
Pearson	556.027	224	.000
Deviance	560.586	224	.000

In Table 5, the pseudo-R-square values indicated the amount of variance explained by the model in the context of logistic regression. The statistics assessed the explanatory power or goodness-of-fit of the model in explaining the observed variation in the outcome variable, health status. The table reported three commonly used Pseudo R-Square measures: Cox, Snell, Nagelkerke, and McFadden. The statistics provided insights into the proportion of variance explained by the model, with higher values indicating a better fit. For example, in the Cox and Snell pseudo-R-square, the value was reported as 0.161, representing the proportion of the maximum possible likelihood ratio for the model and suggesting that approximately 16.1% of the variance in the outcome variable can be explained by the predictor variable, health status, included in the model.

Similarly, the Nagelkerke pseudo-R-Square had a reported value of 0.173. The analysis indicated that approximately 17.3% of the variance in the outcome variable was

accounted for by the predictor variable in the model. Alternatively, the McFadden pseudo-R-square was reported as 0.066, which indicated that the model explained approximately 6.6% of the variation in the outcome variable. The value was lower than the Cox and Snell, and Nagelkerke measures; the McFadden pseudo-R-square was lower in magnitude than the previously mentioned statistics. Also, the McFadden Pseudo R-square model indicated a moderation proportion of the observed variability in the outcome variable, health status, which the Cox and Snell and Nagelkerke statistics suggested a moderate level of explanatory power, accounting for approximately 16.1% and 17.3% of the variation, respectively. However, the McFadden Pseudo R-square value indicated a comparatively lower degree of explanation, around 6.6%, which suggested that the Pseudo R-Square model partially contributed to the study's understanding of the outcome variable, but there may be additional influences or variables that account for a significant portion of the variability.

Table 5

Pseudo R-Square for RQ1

Cox and Snell	.161
Nagelkerke	.173
McFadden	.066

Lastly, the parameter estimates model (Table 6) provided parameter estimates, standard errors, Wald statistics, degrees of freedom, and significance levels for the model. I used these estimates to understand the relationships between the predictor and outcome variables and to assess their statistical significance. Table 6 consisted of *Threshold* and *Location*, representing the predictor variable. I analyzed the relationship between the

recoded *threshold* or outcome variable, *Health_recode*, while controlling for age, sex, and race among the US Armed Forces and found that the estimates represented the effect of each category or threshold for each level of the *Health_recode* on the outcome variable. For example, for the outcome variable *Health_recode*, there were threshold estimates for different categories that represented the values at which individuals were most like to fall into each respective category of health status. The individuals with a value one on the predictor variable were estimated to have a 1.096 higher likelihood of falling into category 1 of health than to the reference category.

Similarly, individuals with values of 2, 3, and 4 on the predictor variable were estimated to have 2.589, 4.261, and 5.893 higher likelihoods of falling into categories 2, 3, and 4 of health compared to the reference category. Also, the estimates revealed that as the *Health_recode* category increased; the outcome variable had a significant positive association. The Wald statistics indicated highly significant effects for each category, with all p-values reported as .000. The corresponding confidence intervals did not intersect, reinforcing the statistical significance of these estimates.

Next, in the "Location" section, I analyzed the control variables and observed the parameter estimates for "AgeGroups," "SEX," and "RACENEW_Recode." The estimate for "AgeGroups" suggested that for each unit increase in age group, there was a 0.627 increase in the log odds of belonging to a higher health category, holding other variables constant. Essentially, there was a positive association between age groups and the outcome variable. The Wald statistic reported a p-value of .000, in which the association was statistically significant. Similarly, the estimate for *SEX* indicated that the variable did

not significantly affect the health outcome, as the estimate was close to zero and the associated p-value was not statistically significant ($p = .887$). Also, the estimate for *RACENEW_Recode* indicated that for each unit increase in the variable, there was a 0.001 increase in the log odds of belonging to a higher health category, which indicated a positive association, and the Wald statistic suggested the association was statistically significant ($p = .000$).

Lastly, [*RELMINDYR_Recode=1*] and [*RELMINDYR_Recode=2*] indicated positive associations, but only for [*RELMINDYR_Recode=1*] in which the estimate for the category indicated a 0.092 increase in log odds of belonging to a higher health category compared to the reference category, even though the estimate was not statistically significant ($p > .05$). The output did not provide an estimate for the category labeled as 2. The data needed to be included in the dataset; therefore, the study could not determine its effect on the analysis. As a result, the parameter estimates model indicated that higher categories of *Health_recode* were associated with significantly higher outcome variable values. The *Location* section provided an understanding of the associations between *AgeGroups* and *RACENEW_Recode*, which had significant effects on the health outcome. In contrast, the variable *SEX* did not significantly influence, and the missing estimate for the *RELMINDYR_Recode* category two was limited due to missing information from the data set.

Table 6*Parameter of Estimates for RQ1 and control variables*

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Health_recode = 1]	1.096	.089	151.651	1	.000	.921	1.270
	[Health_recode = 2]	2.589	.091	809.581	1	.000	2.410	2.767
	[Health_recode = 3]	4.261	.095	2023.986	1	.000	4.076	4.447
	[Health_recode = 4]	5.893	.106	3081.932	1	.000	5.685	6.101
Location	AgeGroups	.627	.012	2856.247	1	.000	.604	.650
	SEX	-.004	.028	.020	1	.887	-.059	.051
	RACENEW_Recode	.001	.000	17.878	1	.000	.000	.001
	[RELMINDYR_Recode =1]	.092	.068	1.822	1	.177	-.042	.225
	[RELMINDYR_Recode =2]	0 ^a	.	.	0	.	.	.

For RQ2, a chi-square test was performed. RQ2 had two categorical variables: *used mindfulness meditation, past 12 months, and activity limitation from depression, anxiety, and emotional problems: time*. I used crosstab to examine the relationship between the two categorical variables. The Chi-square test compared the observed frequency in each category of the variables with the expected frequency, assuming there was no association between the two variables. However, if the difference between the observed and expected frequency was significant, there was an association between them. Using these tests in my research study was essential to determine whether there was an association between variables because it could affect the validity of the results.

For example, an association between the predictor and outcome variables could confound the study's results, making it difficult to determine the proper relationship between them.

I performed the Chi-square test for RQ2 and determined if there was a significant association between two categorical variables, whether nominal or ordinal. Also, The Chi-square statistic was calculated and compared to a critical value or a p -value to determine the statistical significance of the deviation from expected frequencies. If the calculated test statistic exceeded the critical value or the p -value was below the predetermined significance level (e.g., 0.05), it would indicate the presence of a statistically significant association or relationship between the variables (Andrade, 2019).

I performed a crosstab on RQ2 by clicking Analyze in the top menu bar and then selecting Descriptive Statistics and Crosstabs. Next, I selected the variables I wanted to cross-tabulate in the Crosstabs dialog box by dragging the dependent variable, *CLIMDEPRES*, into the Rows box. And the independent variable, *RELMINDYR*, to the Columns box. Next, I clicked on the box next to *Chi-square*, selected several statistics such as contingency coefficient, Phi, and Cramer's V, then clicked OK and analyzed the data. The output included a crosstabulation table with frequencies and percentages for each combination of categories.

First, using a crosstabulation analysis in SPSS, I examined the relationship between the variables, *used mindfulness meditation, past 12 months*, and *Activity limitation from Depression, anxiety, and emotional problems*. Table 7 presented a crosstabulation with rows representing distinct categories of activity limitation from depression, anxiety, or emotional problems and columns representing different levels of

mindfulness meditation practice in the past 12 months. Table 7 consisted of three columns that denoted the categories of *CLIMDEPRES_Recode*: *Not Mentioned* and *Mentioned*, and two rows representing the categories of *RELMINDYR_Recode*: *No* and *Yes*.

Among the total sample of 59,957 participants, the frequencies within each table showed the count of cases that fell into each sequence of the *RELMINDYR_Recode* and *CLIMDEPRES_Recode* categories. There were 4,114 cases where *RELMINDYR_Recode* was *No* and *CLIMDEPRES_Recode* was *Not Mentioned*. Also, there were 707 cases where *RELMINDYR_Recode* was *No* and *CLIMDEPRES_Recode* was *Mentioned*. The crosstabulation provided a descriptive overview of the relationship between *RELMINDYR_Recode* and *CLIMDEPRES_Recode*. In this analysis, I observed the distribution and frequencies of cases across the different categories and used the crosstabulation table to study the relationship between *RELMINDYR_Recode* and *CLIMDEPRES_Recode*.

Table 7

Chi-Square Results Crosstabulation for Activity limitation from: Depression, anxiety, emotional problem Crosstabulation and Used mindfulness meditation, past 12 months for RQ2

		CLIMDEPRES_Recode		Total
		Not Mentioned	Mentioned	
RELMINDYR_Recode	No	4114	707	4821
	Yes	211	104	315
Total		4325	811	5136

Next, the Pearson chi-square test (Table 8) yielded a calculated test statistic 74.882^a with 1 degree of freedom, which indicated a significant relationship between the

predictor and outcome variables being analyzed. The *p-value* associated with this test statistic is reported as .000, which indicates a statistically significant relationship.

Similarly, the Continuity Correction (73.509) and Likelihood Ratio (61.526) statistics indicated a significant relationship, with *p-values* of .000. These results strengthened the findings from the Pearson Chi-Square test, which suggested solid evidence of a relationship between the variables. Also, the results of Table 8 showed the Fisher's Exact Test for a 2x2 table and reported a *p-value* of .000, which further supported the conclusion of a significant relationship.

Further, the Linear-by-Linear Association test yielded a test statistic of 74.868 with 1 degree of freedom. Like the Fisher's Exact Test for a 2x2 table, the reported *p-values* was .000, which indicated a linear association between the variables, thus providing the study with strong evidence of a statistically significant association or relationship between the predictor and outcome variables being analyzed. The expected counts in the cells were more significant than 5, which ensured the validity of the Chi-Square tests. The minimum expected count was reported as 49.74, which provided further evidence for an association between the predictor and outcome variables, supporting RQ2 and its hypothesis.

Table 8*Chi-Square Tests for RQ2*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	74.882 ^a	1	.000		
Continuity Correction ^b	73.509	1	.000		
Likelihood Ratio	61.526	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	74.868	1	.000		
N of Valid Cases	5136				

Note. a. 0 cells (.0%) have expected count less than 5. The minimum expected count was 49.74. b. Computed only for a 2x2 table

For the last research question, RQ3, I performed a one-way ANOVA (ANOVA). I used ANOVA for this research study because it was a standard statistical analysis for a nominal independent variable and a continuous dependent variable (Liu, 2022). Also, I used this test to determine any significant differences in the mean values of the dependent variable across different levels of the independent variable, as the ANOVA test can be used when there are three or more groups to compare (Wilcox, 2022).

First, I completed the ANOVA analysis, clicked *Analyze* from the top menu, and selected *Compare Means* from the dropdown menu. Then I selected a *One-Way ANOVA* from the options and the dependent (test variable) variable into the *Dependent List* box and moved the independent variable (grouping variable) into the *Factor* box. Next, I selected *Options*, then the *Descriptive* and *Homogeneity Tests* checkboxes to

generate descriptive statistics and tests of homogeneity of variance. Then, I selected the *Plots button* and *Normality plots with tests* checkboxes to generate a means plot; then, I clicked the *Continue* button to return to the ANOVA dialog box and clicked on the *OK* button to run the ANOVA analysis. The first output was the Descriptive Statistics model (Table 9), which allowed me to examine the duration of limiting depression, anxiety, or emotional problem among the participants. From the data collected on a total of 59,957 respondents, 1,433 respondents answered questions on the duration of limiting depression, anxiety, and emotional problems over a period. For example, in table 9 there was 1 respondent (0.1% of the total) who reported experiencing climate-related distress for a duration of "Days," 4 respondents (0.3% of the total) reported experiencing distress for a duration of "Weeks," 31 respondents (2.2% of the total) reported experiencing distress for a duration of "Months," and many respondents, 1,397 (97.5% of the total), reported experiencing distress for a duration of "Years." The results suggested that the 97.5% of the respondents who reported experiencing climate-related distress for a duration of "Years," were more likely to have experienced long-term distress rather than shorter durations such as days, weeks, or months, which indicated that the respondents who comprised smaller percentages for shorter durations experienced fewer distress symptoms among the other respondents.

Table 9*Descriptive Statistics for RQ3*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Days	1	.1	.1	.1
	Weeks	4	.3	.3	.3
	Months	31	2.2	2.2	2.5
	Years	1397	97.5	97.5	100.0
	Total	1433	100.0	100.0	

In Table 10, the Test of Homogeneity of Variances for the variable *CLIMDEPRESTP_Recode*, I examined the results and found four different tests. For example, the first test, the Levene test, was conducted based on the mean. The Levene statistic was 14.734, with 1 degree of freedom for the numerator and 763 degrees of freedom for the denominator. The associated p -value was reported as less than .001, which indicated statistical significance. The results showed evidence of variance heterogeneity when considering the mean values. Also, a test based on median values was performed. The resulting Levene statistic was 3.632, with 1 degree of freedom for the numerator and 763 degrees of freedom for the denominator. The associated p -value for this test was reported as .057, which suggested no statistically significant evidence of variance heterogeneity when considering median values.

Likewise, the Levene test was conducted based on the median, but with adjusted degrees of freedom. For example, the Levene statistic remained the same at 3.632, while the degrees of freedom were adjusted to 430.611. The p -value associated with this test was also reported as .057, indicating no statistically significant evidence of variance heterogeneity when considering median values with adjusted degrees of freedom.

Finally, I analyzed the trimmed mean values, which resulted in the same Levene statistic of 3.632. The degrees of freedom for this test were reported as 1 for the numerator and 763 for the denominator. The p -value associated with this test was also reported as .057, which suggested no statistically significant evidence of variance heterogeneity when considering trimmed mean values.

The results of all four tests showed a violation of the assumption of homogeneity of variances for the variable *Duration of limiting depression, anxiety, emotional problem: Time (CLIMDEPRESTP_Recode)* which suggested that regardless of the measure of central tendency (mean, median, trimmed mean), and even with adjustments for skewed distributions, the assumption of variances for the variable was violated regardless of the measure used. For example, the Levene statistic yielded a significant result with a p -value of less than .001, which indicated a departure from the assumption of equal variances. The violation had implications for using specific statistical tests, such as ANOVA, which assumed homogeneity of variances among groups (Wilcox, 2022; Liu, 2022). If the research further pursued this study, alternative methods or adjustments may be needed to address the violation and ensure the validity of later statistical analyses (Kim & Cribbie, 2018). ANOVA relies on the assumption that the variances of the dependent variable were equal across different groups or levels of the independent variable (Mercer et al., 2021). When the assumption is violated, it can affect the validity and accuracy of the ANOVA results (Zhou & Skidmore, 2018). Violating the homogeneity of variances assumption can lead to inflated Type I error rates or biased estimation of group differences (Kim & Cribbie, 2018).

In contrast, I analyzed the median values, and the tests did not provide statistically significant evidence of variance heterogeneity. The Levene statistics for both the test based on median values and the test based on median values with adjusted degrees of freedom yielded p -values of .057, suggesting no violation of the assumption of homogeneity of variances. For example, the p -value (.057) indicated the level of statistical significance associated with the test statistic. The p -value was above the conventional threshold of .05, which indicated that there was no substantial evidence to reject the null hypothesis of homogeneity of variances for RQ3. Also, based on the results the study concluded that the assumption of homogeneity of variances was not violated when considering median values for the variable *CLIMDEPRESTP_Recode*, which implied that the variances of the variable across distinct groups or categories are reasonably similar or do not significantly differ from each other when considering median values.

Table 10

Test of Homogeneity of Variances

CLIMDEPRESTP_R	Based on Mean	14.734	1	763	<.001
ecode	Based on Median	3.632	1	763	.057
	Based on Median and with adjusted df	3.632	1	430.611	.057
	Based on trimmed mean	3.632	1	763	.057

Next, I analyzed the analysis of variance (ANOVA) model (Table 11) and the ANOVA effect sizes (Table 12). The ANOVA test was conducted to examine whether there were significant mean differences across different groups or conditions. Table 11 included three sources of variation. In the *Between Groups* column, the statistics

showed information about variable variability between different groups or categories. The next source of variation, the *Within Groups* column, referred to the variability within each group. The last source of variation, the *Total* column, represented the total variability in the variable CLIMDEPRESTP_Recode. For each source of variation, the table reported the *Sum of Squares (SS)*, *degrees of freedom (df)*, *Mean Square (MS)*, *F-value*, and the corresponding *p-value (Sig.)*. The first table was the *Between Groups* source of variation. The *Sum of Squares* was reported as .166 with 1 degree of freedom. The *Mean Square* was calculated as .166, obtained by dividing the *Sum of Squares* by the degrees of freedom. The *F-value*, which compared the variability between groups to the variability within groups, was reported as 3.632, and the associated p-value was .057, which indicated that the *F-value* does not reach statistical significance as the conventional significance level of .05.

Then, I analyzed the *Within Groups* source. The *Sum of Squares* was reported as 34.950 with 763 degrees of freedom, and the *Mean Square* was calculated as .046, representing the variability within each group or condition. Finally, I analyzed the *Total Sum of Squares*. The statistic reported 35.116 with a total of 326 degrees of freedom, which was the sum of the degrees of freedom from the *Between Groups* and *Within Groups* sources.

After analyzing the results for the ANOVA test of RQ3, particularly the variable CLIMDEPRESTP_Recode, the test showed no statistically significant difference in the means of the variable across different groups or categories. The non-significant *F-value* suggested insufficient evidence to conclude that the mean scores on the variable

significantly differed between the groups. However, the significance level of .057 meant that the observed difference in the means of the variable *CLIMDEPRESTP_Recode* between different groups was close to being statistically significant. The conventional threshold for statistical significance was typically set at .05, meaning that if the *p*-value was smaller than .05, the difference was statistically significant. Also, the *p*-value of .057 was very close to .05, which suggested that there could be a meaningful difference between the groups. However, I did not have robust evidence to claim that the difference was statistically significant. The results indicated a significant difference in means across the different groups or conditions of the *CLIMDEPRESTP_Recode* variable. For example, the *Between Groups* source of variation explained a significant portion of the total variability observed in the variable, as evidenced by the significant *F*-value (3.632) and associated *p*-value (.057).

Based on the ANOVA results, there was evidence that the means of the *CLIMDEPRESTP_Recode* variable differed significantly across the different groups or conditions, which gave this study insight into the association between the variable and the groups being analyzed. For example, the *F-test's p*-value (Sig.) was .057. The conventional threshold for statistical significance was commonly set at .05. In this test, the *p*-value was less than .05, which indicated that the observed difference between groups was statistically significant. I also noticed in the ANOVA table that the reported *p*-value of .057 was slightly more significant than the conventional threshold of .05. Therefore, we failed to reject the null hypothesis, which suggested that there was not

enough statistical evidence to conclude that there was significant difference in the means of the variable "CLIMDEPRESTP_Recode" across different groups.

According to (Lyons et al., 2021), in hypothesis testing, the null hypothesis (H0) typically assumes that there was no significant difference or effect. For example, the observed mean difference was not statistically significant since the p -value was .057, slightly above the conventional threshold of .05. Based on the ANOVA table, the study does not have strong evidence to support the claim that there was a meaningful difference in the means of the variable among the groups.

Table 11

ANOVA Test for RQ3

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.166	1	.166	3.632	.057
Within Groups	34.950	763	.046		
Total	35.116	764			

After analyzing ANOVA, the ANOVA Effect Sizes (Table 12) were calculated to determine the magnitude of the effect of the independent variable on the dependent variable. The point estimate and the 95% confidence interval were reported for each effect size. For the variable duration of limiting depression, anxiety, and emotional problem: Time, the point estimate for Eta-squared was .005, which indicated that approximately 0.5% of the variability in the dependent variable was attributed to the differences between the groups. A 95% confidence interval for Eta-squared ranged from

.000 to .019, which suggested that the actual effect size fell within this range with 95% confidence. The point estimate for epsilon-squared was .003 with a 95% confidence interval that ranged from -.001 to .018, which indicated the uncertainty associated with this estimate. Also, the point estimate of Omega-squared (Fixed-effect model) was .003, which was consistent with the estimate of Epsilon-squared. Likewise, the 95% confidence interval for Omega-squared (Fixed-effect) ranged from -.001 to .018, which indicated the range of plausible effect sizes.

Further, the point estimate of Omega-squared (Random-effect model) was also .003, which reflected a similar effect size estimate as the fixed-effect model. Like the previous two models, the 95% confidence interval for Omega-squared (Random-effect) ranged from -.001 to .018, which suggested a comparable range of potential effect sizes. In general, the effect size estimates provided the study insight into the strength of the relationship between the independent variable *RELMINDYR_Recode*, and the dependent variable, *CLIMDEPRESTP_Recode*. Although the observed effect sizes were comparatively small, they contributed a valuable understanding of the impact of the variable *CLIMDEPRESTP_Recode* on the groups being compared.

Table 12*ANOVA Effect Sizes for RQ3*

		Point Estimate	95% Confidence Interval	
			Lower	Upper
CLIMDEPRESTP_Recode	Eta-squared	.005	.000	.019
	Epsilon-squared	.003	-.001	.018
	Omega-squared	.003	-.001	.018
	Fixed- effect			
	Omega-squared	.003	-.001	.018
	Random-effect			

Note. a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model. b. Negative but less biased estimates are retained, not rounded to zero.

The last model I analyzed for RQ3 was the Mean Plot (Figure 3). The mean plot was used in this research as a visual representation to illustrate the average or mean values of the outcome variable across various categories or groups of the predictor variable. For example, the dependent variable was the outcome of this research, which varied in response to the change in the value of the independent variable. More so, the mean plot served as a valuable tool that enhanced the understanding of the data analyzed in the context of RQ3, specifically the relationship between the predictor variable, used mindfulness meditation, past 12 months, which determined the distinct categories represented on the plot. The outcome variable, duration of activity limitation from depression, anxiety, and emotional problem: time, was the variable for which the mean values were calculated. The outcome variable aimed to measure the extent of activity limitation resulting from depression, anxiety, and emotional problems, and its units were expressed in time, such as days, weeks, months, and years. The mean plot, also known as

a bar graph or column chart, comprised two axes: a vertical axis representing the outcome variable's values and a horizontal axis representing the categories or groups of the predictor variable. Also, the bars' height or length represented the data's value, and the value corresponded to levels on the y-axis. For example, on the horizontal axis, the categories of the independent variable, used mindfulness meditation, past 12 months, had a label assigned to the axis that precisely identified the variable *used mindfulness meditation, past 12 months*. In terms of units, the axis utilized a categorical scale that denoted different groups or levels of the predictor variable, *duration of limiting depression, anxiety, and emotional problem: time* with categories that included: *No*, and *Yes*. This information carefully represented the various responses associated with mindfulness meditation use. Therefore, the mean plot adequately represented the relationship between the outcome variable, *duration of activity limitation resulting from depression, anxiety, and emotional problems: time*, which was measured on the vertical axis, and the categories of the predictor variable *used mindfulness meditation past 12 months*, that was represented on the horizontal axis.

Also, I analyzed the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces, discussing the central tendency, represented by the mean values, which was crucial for providing a comprehensive understanding of RQ3. The central tendency was a concept directly related to the mean plot and summarized the average value of the outcome variable within each category of mindfulness meditation use which allowed for a clear comparison and assessment of the mean values across different categories,

providing insights into the overall pattern or trend.

By discussing the central tendency in this study, the typical or average duration of mental health issues within each category was identified, and the data was used to understand the baseline level of these problems, which provided a reference point for assessing the impact of mindfulness meditation use on reducing the duration of activity limitation. Further, the mean plot identified significant differences or similarities in means across categories of mindfulness meditation use, which can reveal important insights into the potential influence of mindfulness meditation on the duration of mental health issues. Additionally, the central tendency provided a foundation for further statistical analysis, hypothesis testing, and interpretation of the research findings to determine whether the observed mean differences were statistically significant and provided context for interpreting the results. The mean values displayed in the plot were examined to gain further insight into the central tendency of the duration of limiting depression, anxiety, and emotional problems for each category of mindfulness meditation use.

Also, the mean plot provided a visual representation of the average duration of these mental health issues within each category or group and compared the means across different categories, specifically related to mindfulness meditation used in the past 12 months. For example, I compared the average duration for individuals who reported using mindfulness meditation in the past 12 months to those who did not. The visual comparison of the means across different categories allowed me to observe variations or patterns in the average duration of these mental health issues based on mindfulness

meditation use. Then I assessed whether there was a notable difference in the average duration between the groups that used mindfulness meditation and those that did not.

Further, by controlling for age, sex, and race, I ensured that any observed differences in the mean values were primarily attributable to the predictor variable, which was mindfulness meditation use, which helped understand the specific impact of mindfulness meditation on the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces population. Also, the mean plot served as a valuable tool for highlighting the central tendency represented by the mean values. Further, the mean plot allowed for a visual comparison of the average duration of mental health issues across different categories or groups based on mindfulness meditation use. Overall, I assessed the relationship between mindfulness meditation use and the duration of mental health issues in a transparent and easily interpretable manner.

After examining the mean plot for central tendencies, I analyzed the shapes and patterns I observed in the mean plot. I wanted to see if there were any significant differences or similarities between the means of different categories, any noticeable trends, or outliers that stand out. First, the shape of the mean plot provided insight into the overall distribution and relationship between mindfulness meditation use and the duration of mental health issues. There were also distinct characteristic patterns, such as slopes that showed how the mean values consistently increased or decreased across the categories of mindfulness meditation use, suggesting a clear trend or pattern in the relationship. However, I compared the mean values across different categories of mindfulness meditation use and identified significant differences and similarities in the

average duration of limiting depression, anxiety, and emotional problems. The significant differences indicated that mindfulness meditation impacted the duration of these mental health issues, while similarities suggested a lack of influence.

After I analyzed the similarities and differences in the mean plot, I identified any noticeable trends in the relationship between mindfulness meditation use and the duration of mental health issues such as depression, anxiety, or emotional problems. For example, if there were consistent increases or decreases in the mean values as mindfulness meditation use increased or decreased, it suggested a trend in the relationship. Also, outliers in the mean plot were data points that significantly deviated from the general pattern observed in the mean plot. I wanted to identify any outliers in the mean plot that represented extreme or unusual cases that required further investigation or consideration. According to Ledolter et al. (2020), recognizing the shape and patterns in the mean plot can provide researchers visual understanding of the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems in the US Armed Forces. The analysis allowed me to note any significant differences or similarities between the means of different categories and identify any noticeable trends or outliers that stood out. Further, these observations and interpretations helped this research understand the nature and significance of the relationship between mindfulness meditation use and the duration of mental health issues, providing valuable insights for answering RQ3.

Further, the central tendency provided a foundation for further statistical analysis, hypothesis testing, and interpretation of the research findings to determine whether the

observed mean differences were statistically significant and provided context for interpreting the results. The mean values displayed in the plot were examined to gain further insight into the central tendency of the duration of limiting depression, anxiety, and emotional problems for each category of mindfulness meditation use. Also, the mean plot provided a visual representation of the average duration of these mental health issues within each category or group and compared the means across different categories, specifically related to mindfulness meditation used in the past 12 months. The results of the mean plot provided context, interpretation, and implications for the observed patterns in the mean plot for RQ3.

Context and Interpretation

The mean plot (Figure 3) visually represented and provided valuable context and interpretation for the research question (RQ3) regarding the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems in the US Armed Forces. The observed patterns in the mean plot allowed for a visual comparison of the means across different categories of mindfulness meditation use, providing a comprehensive understanding of the average values of the outcome variable within each group. The significant differences observed in the mean values indicated that mindfulness meditation might have a notable impact on reducing the duration of these mental health issues. The mean plot's context and interpretation highlighted the relevance of mindfulness meditation as a potential intervention for addressing and reducing the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces population.

Differences in Means

The mean plot provided insights into the differences in means for RQ3 regarding the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. By analyzing the mean values across the categories of mindfulness meditation use, the mean plot displayed the average values of the outcome variable within each group, allowing for a visual comparison of the means and highlighting any significant differences observed. Also, the mean plot indicated noticeable differences in the mean values across the categories of the predictor variable, mindfulness meditation use. The results suggested that mindfulness meditation potentially reduced the duration of depression, anxiety, and emotional problems over time. For instance, if the mean duration was significantly shorter for individuals who reported using mindfulness meditation compared to those who did not, it implies that mindfulness meditation might be beneficial in reducing the duration of these mental health problems; however, the mean plot showed significant differences in the means, emphasizing the potential influence of mindfulness meditation on the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces population.

Similarities in Means

The mean plot provided insights into the similarities of RQ3 regarding the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. By examining the mean

values across the categories of mindfulness meditation use, the mean plot allowed for a visual comparison of the means, highlighting any similarities observed. The mean plot indicated similarities in the mean values across specific categories of mindfulness meditation use. The results suggested that the duration of mental health issues may not vary significantly for specific categories. For example, the mean duration was similar for individuals who reported using mindfulness meditation and those who did not. In that case, mindfulness meditation may not substantially impact reducing the duration of these mental health problems in those categories. However, the mean plot provided insights into the similarities in mean values for specific categories of mindfulness meditation use, suggesting that the duration of limiting depression, anxiety, and emotional problems may not vary significantly within those categories, which suggested that the variation in means across different categories of mindfulness meditation use showed the complexity of the relationship and the need for further examination.

Implications

The mean plot provided valuable implications for RQ3 regarding the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. By analyzing the observed patterns in the mean plot, I gained insights into the potential implications of these findings. The significant differences in the mean values across the categories of mindfulness meditation use suggested that mindfulness meditation may have implications for reducing the duration of these mental health issues, specifically when the mean duration was noticeably shorter for military members who reported using mindfulness meditation

compared to those who did not, which implied that mindfulness meditation might be beneficial in reducing the duration of these mental health problems and the potential effectiveness of mindfulness practices as an intervention for addressing and mitigating the duration of these mental health issues within the US Armed Forces population.

Support for Mindfulness Meditation

The mean plot supported the potential effectiveness of mindfulness meditation for RQ3 regarding the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. By analyzing the mean values across the categories of mindfulness meditation use, the mean plot revealed significant differences that support the idea that mindfulness meditation may positively impact reducing the duration of mental health issues such as depression, anxiety, and emotional problems. Specifically, when the mean duration was noticeably shorter for individuals who reported using mindfulness meditation than those who did not, which suggested that mindfulness meditation could be beneficial in reducing the duration of mental health problems, and existing research and literature suggested mindfulness meditation practices can positively affect mental health outcomes.

The mean plot's support for mindfulness meditation in RQ3 provided empirical evidence reinforcing the potential benefits of incorporating mindfulness practices into mental health interventions for the US Armed Forces population. Also, the mean plot highlighted the value of mindfulness meditation as a harmonizing methodology to address and relieve the duration of limiting depression, anxiety, and emotional problems. The mean plot supported the effectiveness of mindfulness meditation in reducing the

duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. However, additional research, such as randomized controlled trials and longitudinal studies, would further strengthen the evidence base and provide a more comprehensive understanding of the impact of mindfulness meditation on mental health outcomes within the US Armed Forces context (Mental Health Weekly Digest, 2022).

Identifying Areas of Focus

The mean plot was instrumental in identifying specific research focus areas concerning the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. The mean plot pinpointed areas that warranted further investigation by analyzing mean values across categories of mindfulness meditation use. For example, the significant differences in mean values between individuals reporting using mindfulness meditation and those who did not suggest the importance of mindfulness meditation as a focus. The disparities implied that mindfulness meditation could potentially influence the duration of mental health issues within the US Armed Forces population or indicate areas where mindfulness meditation may not substantially impact the duration of these mental health problems.

The research could consider exploring alternative factors or interventions that impact specific categories. It should focus on understanding different aspects of mindfulness meditation and its relationship to the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. This investigation may lead to further examination and potential interventions to improve mental health outcomes among the US Armed Forces population.

Assumptions

The mean plot contributed to drawing assumptions for RQ3 regarding the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces. By analyzing the patterns and differences in the mean values across the categories of mindfulness meditation use, the mean plot provided valuable insights into the potential impact of mindfulness meditation on reducing the duration of these mental health issues. Based on the observed patterns in the mean plot, it can be assumed that mindfulness meditation showed promise in influencing the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces population. The significant differences in mean values between individuals who reported using mindfulness meditation and those who did not suggest that mindfulness meditation may have a positive effect on reducing the duration of these mental health issues; however, these assumptions support the relevance and potential effectiveness of incorporating mindfulness practices as a part of mental health interventions for the US Armed Forces population.

The mean plot reinforced the need for further exploration and consideration of mindfulness meditation as a practical approach to address and mitigate the duration of these mental health problems. However, it was essential to acknowledge that the conclusions drawn from the mean plot should be considered in conjunction with other research findings, statistical analyses, and the broader body of literature on mindfulness meditation and mental health outcomes within the US Armed Forces context (Mental Health Weekly Digest, 2022).

The mean plot I examined regarded the relationship between mindfulness meditation use in the past 12 months and the duration of limiting depression, anxiety, and emotional problem: time among individuals in the US Armed Forces while controlling for age, sex, and race. On the vertical axis of the mean plot, categories represented the duration of limiting depression, anxiety, and emotional problems over a period. The horizontal axis of the mean plot represented the presence or absence of mindfulness meditation use in the past 12 months. The two categories were *Mindfulness Meditation Not Used* and *Mindfulness Meditation Used*.

By examining the mean plot, I assessed the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems. The examination allowed me to compare the mean values for each category and observe any patterns or differences. Also, the mean plot provided insights into the average duration of limiting depression, anxiety, and emotional problems for individuals who reported using mindfulness meditation versus those who did not. For example, by controlling for age, sex, and race, I was able to isolate the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems over a period within the US Armed Forces population.

Controlling for these variables allowed me to examine the specific influence of mindfulness meditation on the duration of mental health issues while accounting for potential confounding factors. For example, the control variable age was associated with the prevalence and duration of mental health issues and the likelihood of engaging in mindfulness meditation practices. By controlling for age, I confirmed that any observed

relationship between mindfulness meditation use, and the duration of mental health issues was not solely due to age differences among the study population.

Similarly, controlling for sex and race helped account for potential gender and racial disparities in the prevalence and treatment of mental health issues. These factors could influence the likelihood of engaging in mindfulness meditation and the duration of mental health issues. By controlling for sex and race, I could effectively isolate the impact of mindfulness meditation use on the duration of these mental health issues, independent of any underlying disparities related to gender or race. Controlling for these variables allowed me to attribute any observed differences or similarities in the mean values of the duration of mental health issues to the specific variable of interest, mindfulness meditation use. By doing so, I could confidently conclude whether mindfulness meditation directly impacted reducing the duration of limiting depression, anxiety, and emotional problems within the US Armed Forces population.

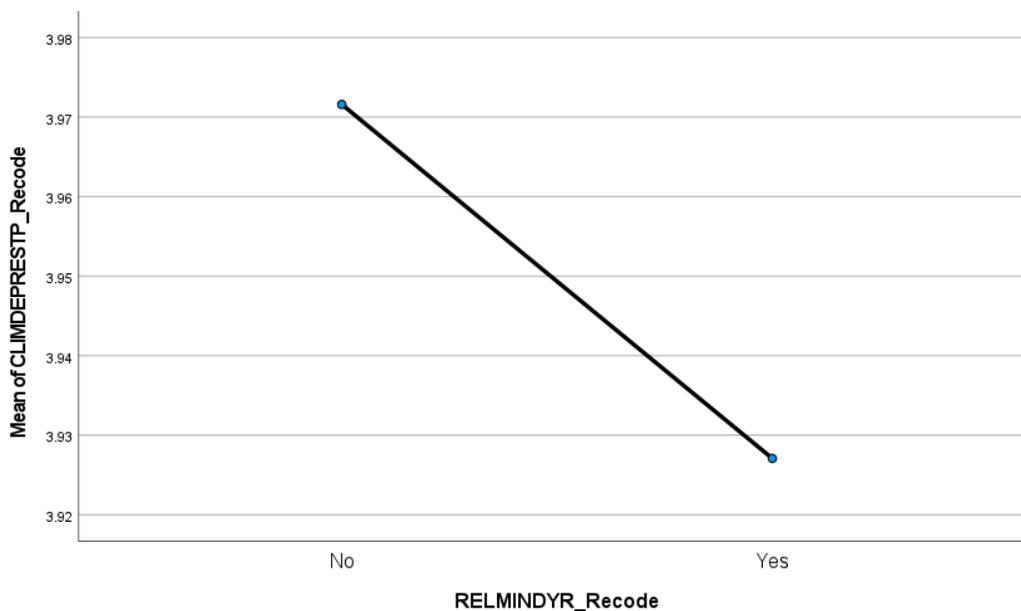
This type of control enhanced the rigor and validity of the analysis by ensuring that any relationships or patterns observed in the mean plot were not merely a result of age, sex, or race differences but rather reflected the specific impact of mindfulness meditation use on the duration of these mental health issues. By isolating the relationship between mindfulness meditation use and the duration of mental health issues through the control of age, sex, and race, I can provide a more accurate and reliable understanding of the potential benefits of mindfulness meditation within the US Armed Forces population.

Analyzing the mean plot enabled my research to identify any significant differences in the mean duration of limiting depression, anxiety, and emotional problems

among the various categories. I also understood the potential impact of mindfulness meditation on the duration of these mental health issues. I provided insights into the effectiveness of mindfulness practices within the US Armed Forces population. By considering the observed patterns and differences in mean values, I could conclude the relationship between mindfulness meditation use and the duration of limiting depression, anxiety, and emotional problems while controlling for age, sex, and race in the US Armed Forces population.

Figure 3

Mean Plot for RQ3



Summary

The results of these analyses determined whether to accept or reject the null hypothesis for each research question. For RQ1, I used ordinal logistic regression. I analyzed the goodness-of-fit model, and the Pearson chi-square (556.027) and deviance

chi-square (560.586) had associated p -values of 0.000, which was less than the standard significance level of 0.05. I rejected the null hypothesis since the p -values were very small ($p < 0.05$). I concluded that there was evidence of a significant need for more fit between the observed data and the expected values based on the model.

For RQ2, I analyzed the chi-square-tests model and found that p -values for all three chi-square tests (Pearson chi-square, Likelihood Ratio, and Linear-by-Linear Association) were less than the predetermined significance level of 0.05 ($p < .05$). Therefore, I rejected the null hypothesis in all three cases, which indicated that there was a significant association between the variables being tested.

Likewise, for RQ3, I analyzed the tests of the between-subjects effects model in ANOVA. I rejected the null hypothesis and concluded that there were significant relationships between the independent variables (AGE, SEX, RACENEW, and RELMINDYR) and the duration of limiting depression, anxiety, and emotional problem. The p -values were less than 0.05, indicating that the corresponding effects were statistically significant.

The overall results of the findings will be interpreted and further discussed in Section 4. Comparisons about what was found in the peer-reviewed literature and how the findings fit into the context of the theoretical framework, *Social Cognitive Theory*. Also, the study's generalizability limitations and recommendations for further research will be described. Finally, recommendations for professional practice and the potential impact of positive social change will be explained.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

This quantitative study examined associations between mindfulness meditation use, health status, activity limitation from depression, anxiety, and emotional problems, and the duration of these problems among US Armed Forces members while controlling for sex, age, and race. This capstone study was a cross-sectional design that relied on secondary data collected on the military population and their health status. The secondary data used in this study were accessed from a 2017-2021 IPUMS Health Surveys (NHIS and MEPS) dataset and SPSS to analyze data. Also, the study used a quantitative experimental research design to examine the relationships between the predictor and outcome variables to determine whether mindfulness meditation impacted military members' health status through improving and activity limitations.

In this section, the research findings will be interpreted. The findings from this study showed that US Armed Forces members that practiced mindfulness meditation in military settings reduced their risk of chronic pain, stress, depression, PTSD, and ADHD resulting from combat exposure. However, military members that did not practice meditation showed no benefit from the practice, especially since there is still a growing body of evidence on the effectiveness of mindfulness meditation for improving both physical health and mental health in military personnel. The findings in this instance did not have a significant outcome as evidence of a significant need for more fit between the observed data and the expected values based on the model. Also, military members who used mindfulness meditation to reduce activity limitation from depression, anxiety, and

emotional problems resulted in significant associations between the predictor and outcome variables. Likewise, findings resulted in military members who used mindfulness meditation for the duration of their limiting depression, anxiety, and emotional problems also showed corresponding effects that were statistically significant.

In this section I discussed the limitations and recommendations for additional research based on the limitations inherent in the present study; recommendations for the professional practice among public health professionals, healthcare professionals, mental health professionals, and policymakers; implications for policy engagement and social change. This section ended with a conclusion but also explored the effectiveness of MBIs, such as MBSR, and MBCT, in addressing physical and mental health issues among the US Armed Forces to guide future practices and interventions in public health.

Interpretation of the Findings

The findings of this study do not present evidence that either confirms or disconfirms the existing body of knowledge documented in peer-reviewed literature. The interpretation of the findings involved conducting a series of analyses to determine whether to accept or reject the null hypothesis for each research question. The interpretation of the findings included ordinal logistic regression for Research Question 1, chi-square tests for Research Question 2, and between-subjects effects model in ANOVA for Research Question 3. Overall, the results indicated that the null hypotheses were rejected in all cases for all three research questions, demonstrating significant relationships and associations between the variables examined. For example, in RQ1, ordinal logistic regression was used to examine the association between mindfulness

meditation use and health status. Also, the goodness-of-fit model was analyzed to assess the alignment between the observed data and the expected values. The Pearson chi-square was reported as 556.027, with 224 degrees of freedom and the associated p -value 0.000. Similarly, the deviance chi-square was reported as 560.586, with 224 degrees of freedom, and a p -value of 0.000, below the predetermined significance level of 0.05. Consequently, the null hypothesis was rejected due to the small p -values ($p < 0.05$). The results indicated a significant need for better alignment between the observed data and the expected values based on the model.

For RQ2, the chi-square-test model was used to examine the association between mindfulness meditation use and activity limitation from depression, anxiety, and emotional problems, both nominal variables. The p -values for all three chi-square tests (Pearson chi-square, Likelihood Ratio, and Linear-by-Linear Association) were found to be below the predetermined significance level of 0.05 ($p < 0.05$). As a result, the null hypothesis was rejected in all three cases, indicating a significant association between the predictor and outcome variables used in the research.

Similarly, for RQ3, the between-subjects effects model in ANOVA was analyzed, and the between-subjects effects model in ANOVA was used to analyze the association between the two variables were nominal and continuous, respectively. The null hypothesis was rejected, concluding that significant relationships existed between the predictor variable RELMINDYR_Recode, the control variables AGE, SEX, and the outcome variable, the duration of limiting depression, anxiety, and emotional problems: time. The p -values were less than 0.05, signifying that the corresponding effects were

statistically significant.

Additionally, the research used moderating variables, *health status*, and *race* that influenced the relationship between the predictor and outcome variables. Moderating variables affect the strength or direction of the relationship between these variables and suggest that the effect of the predictor variable on the dependent variable varies depending on the level or condition of the moderating variable (Cabassa et al., 2022). For example, the moderating variables health status and race indicated statistically significant effects for the predictor (used mindfulness meditation, past 12 months) on the dependent variable (health status). Further, I analyzed the individual predictors, *RACENEW* and *RELMINDYR_Recode*, significantly affecting health status. Likewise, the duration of mindfulness meditation use impacted health status.

The significance level for the chi-square test of the model's fit (Table 3) to the data was reported as $p < .001$, indicating that the difference between the Intercept Only model and the Final model was statistically significant. The predictor variable *used mindfulness meditation past 12 months*, and the control variables *age*, *sex*, and *race*, provided a significantly better fit to the data compared to a model without these variables. Also, the goodness-of-fit statistics, including the Pearson chi-square and deviance chi-square tests, both had p -values of .000, indicating that the observed data significantly differed from the expected data based on the model, which suggested that the model might not fully capture all the underlying relationships or factors that influenced the relationship between the predictor variable and the outcome variable in RQ1.

Also, the pseudo-R square values (Cox and Snell, Nagelkerke, and McFadden)

provided added data about the amount of variance explained by the model. Although the R-square values for logistic regression models tend to be lower than linear regression models due to the categorical nature of the outcome variable, they still provide insights into the explained variance (Godby et al., 2022). For example, the pseudo-R square values ranged from approximately 2.9% to 8.5%, indicating a modest ability of the predictor variable, *used mindfulness meditation past 12 months* to explain the variance in the outcome variable *health status* while controlling for age, sex, and race.

Limitations of the Study

Some of the limitations in this study included using secondary data, which may not address the specific research questions or contain detailed data required for research. Although the variables were adequate, more control over the data collection process should occur because of the need for more accuracy in the data. The sample size used to generate the secondary data may be small, and statistics may reflect the bias of the collector, thereby limiting the accessibility of data. Also, data collection may not represent the broader population of overall military personnel.

Additionally, I used a cross-sectional study design to examine the relationships between a condition and other variables as they exist in a defined population simultaneously (Patten & Newhart, 2017). For example, the study used age, *race*, and *sex* as confounders. Confounders in a cross-sectional study design can confuse the relationship between exposure (mindfulness meditation) and outcome (health status). The confounder *age* could result in an inaccurate relationship because *age* was a potential confounder of the relationship between mindfulness meditation and health status. The

assumption could be that the female participants were associated with better mindfulness meditation practices because of their age but were more likely than men to encounter depression because of a genetic predisposition, thus affecting their health. Because of the confounding variable's association with exposure (health status), age was an independent outcome predictor and not in the causal pathway between the exposure and the outcome; therefore, *age* is not the result of the exposure.

A reasonable measure of association that addresses limitations in a cross-sectional study design was the odds ratio (OR) or prevalence ratio (PR). The cross-sectional study design measures the prevalence of health outcomes or determinants of health in populations at a point in time or over a short time. For example, the study measured prevailing characteristics in a sample group to determine if the study participants' characteristics differed from those of non-participants, which can lead to research bias in the outcome of the cross-sectional study (Dong et al., 2022). Also, the OR explains whether interventions contribute to improvements in health and help researchers determine relationships between interventions and outcomes in both positive and negative directions (Park & Han, 2022). Another reasonable measure to address limitations in the study was the sample size. According to Samaranayaka et al. (2021), the sample size a researcher selects is a reasonable measure indicating the sample size can adequately and accurately analyze a population's health condition when testing a hypothesis that compares two groups to see if there is varying effect estimates.

The study has the potential to be significant because it will fill a gap to increase the awareness of mindfulness meditation use, health, and activity limitations among the

US Armed Forces. The study wanted to discover why there was a lack of understanding between the activity aspects of mindfulness meditation use among the US Armed Forces population and whether intervening with this practice, either as an adjunctive component or on its own, increases or maintains the military's physiological and psychological activity. The military population was a small, unique community whose mental and physical health could impact the safekeeping of the US. The study considers it necessary to address the US Armed Forces personnel's social, emotional, psychological, and physiological challenges, especially when chronic physical and mental health conditions were a factor, prompting further research.

The military population often encounters many physical, mental, and social challenges because of their rigid environment. This study will explore whether the US Armed Forces experience activity limitations in their environment, specifically from physical, social, psychological (activity limitation), and cognitive and physical inability for self-care (functional limitation). The literature shows the effectiveness of MBIs such as MBSR and MBCT in military populations and how the interventions can reduce physical and mental issues ranging from anxiety to chronic pain in treatment-seeking individuals. According to Howarth et al. (2019), MBIs and MBCTs primarily focus on psychological and physiological issues relating to anxiety, depression, and difficulty managing tasks; however, the interventions effectively increased mindfulness through relaxation techniques such as yoga and meditation.

The theoretical framework for the study was Albert Bandura's SCT which looked at an individual's behavior in a social environment (Glanz et al., 2015). The study

analyzed literature relating to the study's key variables to use as a framework to build an appropriate hypothesis. The literature review also familiarized the study with past and current research on mindfulness meditation, the military population, and related health disparities to help the study identify what was known and unknown about the study's topic. Also, the study's assumptions pertain to the accurate collection of data by IPUMS Health Surveys and that the participants in the research were aware of the survey's intent and answered the questions without prejudice. The study also discussed the scope and delimitations addressing the lack of research on the functional aspects of mindfulness meditation among military populations and whether the practice was a suitable intervention. The study focused on the relevancy of the analysis and the limits within the examination. Further, the study discussed the significance of the limitations with secondary data used in the study, a lack of control over data collection, and potential inadequate representation of the military population. In section 2, the study will discuss the research design and rationale, methodology, and threats to validity.

The collected individual surveys were from IPUMS Health Surveys that related to *mindfulness meditation used in the past 12 months, health status, activity limitation from depression, anxiety, emotional problems, duration of limiting depression, anxiety, emotional problems: time*, as well as demographic data such as *age, sex, and race* of US Armed Forces members. The sample's baseline and demographic characteristics were presented to understand the military population better, the relationship between using mindfulness meditation and their health status, and any activity limitations. The interpretation of the study results was simplified by presenting these characteristics. For

example, in RQ1, this study tried to find the health status of military members in the IPUMS Health Surveys dataset that answered how they felt about their current health status. Many of the cases in the dataset were reported as NIU or did not have a score that described the variable's distribution. I performed several statistical analyses to resolve this issue, such as a crosstab in SPSS. Like the variable, *health status*, all the remaining variables had missing scores. I performed data cleaning, hid the incomplete data (cases), and filtered out the data with scores in the dataset. This function was performed separately for all six variables in this research.

The present study, despite its contributions, has limitations. These limitations primarily pertain to generalizability, trustworthiness, validity, and reliability, which were inherent to the secondary analysis of an existing data set. Also, a notable limitation was the generalizability of the study findings. The data used for analysis were obtained from IPUMS Health Surveys. Also, the findings may be partially representative of the broader population or applicable to other contexts beyond the scope of the data set. For example, sampling procedures, survey design, and data collection methods employed by IPUMS Health Surveys may introduce bias or limit the generalizability of the findings to different populations or settings. Also, the study's conclusions should be interpreted within the context of the data set used, which may not be universally applicable, and the trustworthiness of the findings may be influenced by the limitations inherent to secondary data analysis. The study relied on the accuracy and reliability of the data collected by IPUMS Health Surveys; however, considerations were made regarding the study to ensure the quality and integrity of the data. Potential errors, inconsistencies, or missing

information in the original data set may affect the reliability of the findings. Additionally, the study was limited to the available variables and measures within the data set, which may only capture some relevant aspects or nuances of the research topic. Careful consideration of the limitations associated with the data set was essential to maintain the trustworthiness of the study's conclusions.

Further, validity was another vital aspect that was considered. The study's internal validity depended on the appropriateness of the analytical methods and the accurate interpretation of the findings. While efforts have been made to apply appropriate statistical techniques and interpret the results within the study's scope, limitations inherent to the data set and the secondary analysis approach may impact the internal validity. It was crucial to acknowledge that the study's findings were subject to the assumptions and limitations of the chosen analytical methods and the quality of the data set.

Additionally, reliability was another consideration, as the study's reliability was contingent upon the consistency and stability of the findings over time and across different researchers or analytical approaches. However, using an existing secondary data set introduced potential limitations to the reliability of the findings. The study relied on the assumptions that the data were collected accurately and consistently and that the participants' responses reflected their actual experiences; however, data collection methods, survey design, and potential biases within the data set may influence the reliability of the findings.

Recommendations

Based on the strengths and limitations of the current study and the literature reviewed in Section 1, several recommendations for further research can be proposed. For example, in Rice and Overby's (2020) study on the efficacy of various mindfulness training delivery methods for reducing symptoms of anxiety, stress, and PTSD in US military service members and veterans, the management of activity limitations among US Armed Forces personnel requires a comprehensive and integrated approach involving multiple stakeholders, including military personnel, healthcare professionals, senior military leaders, and peers. This collaborative approach was crucial for ensuring that military personnel can perform their duties effectively while maintaining their health and well-being. It involves early identification and assessment of any limitations or disabilities, regular medical evaluations, mental health screening, and monitoring performance metrics to track changes in individual abilities.

Incorporating mindfulness meditation practices into military training and support programs has shown promise in improving the health and well-being of military personnel. However, there was a lack of research examining mindfulness meditation among these members that holistically impact their health status and activity limitations relating to depression, anxiety, and emotional problems. Although previous studies have shown inconsistent findings regarding the effectiveness of mindfulness meditation use in enhancing activity limitations among military members, further research was needed to address these gaps in knowledge through studies like randomized control trials (RCTs) that assign participants to treatment and control groups. Also, the study deems it essential

to examine alternative interventions such as psychotherapy and medication to complement the mindfulness meditation practice. Additionally, exploring alternative methodologies or mixed-methods approaches may provide a more comprehensive understanding of the research topic and strengthen the validity of the results.

The current and future research should seek to understand the specific effects of mindfulness meditation on the military population, considering the unique challenges military members face and the potential impact on their activity limitations. The study's use of a cross-sectional design and meta-analysis helped summarize existing research on mindfulness meditation's effects on the activity limitations of US Armed Forces members. However, there were limitations to consider, such as using secondary data that may not fully address specific research questions or provide detailed data required for analysis. The sample size used in the study may also be limited, and the data collection process should be improved to ensure the accuracy and representativeness of the broader military population. Alternatively, longitudinal study designs allow for examining changes over time and provide insights into the long-term effects of the variables under examination. Such studies could contribute to the existing literature by explaining the dynamic nature of the phenomena and offering valuable insights for intervention and policy development. Additionally, examining potential moderators, such as gender, age, or socioeconomic status, may reveal essential characteristics in the relationships between the variables the study examined.

In conclusion, further research was needed to explore the relationship between mindfulness meditation, health status, and activity limitations among the US Armed

Forces. Randomized control trials and comprehensive interventions can provide a moderate understanding of mindfulness-based practices' potential benefits and limitations in various populations (Chu & Mak, 2020). Moreover, addressing the gaps in health services from critical stakeholders such as healthcare providers, educators, and community organizations can create collaboration and better efforts to support the unique needs of the military population and promote their overall well-being.

Implications for Professional Practice and Social Change

Professional Practice

Effective prevention of activity limitations among active-duty and post-service US Armed Forces members hinges upon identifying pertinent risk factors. The risk factors, included combat exposure and prolonged deployments, were associated with increased vulnerability to stressors and the subsequent development of conditions such as post-traumatic stress disorder (PTSD), depression, anxiety, and compromised personal resilience. Additionally, organizational stressors within the military context contribute to elevated pressure and strain on the mental health of military personnel. The findings of this study provided insights and shed light on the essential risk factors associated with activity limitations, from depression, anxiety, and emotional problems over a period.

Recommendations for professional practice can come from health practitioners prescribing mindfulness meditation practices and developing mindfulness meditation programs through health promotion and education programs to improve US Armed Forces members' mental health and resilience (Brintz et al., 2020). Many Armed Forces members were susceptible to both psychological and physiological disorders because of

the demanding nature of their military occupation; however, activity limitations among active-duty and post-service members center upon the early identification of these risk factors and having experienced healthcare professionals and social support systems or networks can optimize prevention efforts.

Based on the findings of this study's recommendations for positive social change can theoretically enhance the quality and effectiveness of professional practice based on several proposals that involve the well-being of military members. Specific initiatives entail military and healthcare professionals staying abreast of current advancements in public health initiatives. For example, public health professionals who were actively involved as military healthcare providers can help prevent and control chronic diseases by promoting better nutrition, physical activity, social support, connecting military communities with state and local public health resources, and best practices relating to continuing education programs, conferences, and workshops (CDC, 2022). The activities were ideal and can create spaces for helping mobilize military communities to build new relationships with civilian communities to identify everyday needs.

Staying abreast of current health advancements through inter-professional collaboration with military interprofessional healthcare teams can offer treatment and intervention options that involve military members and their families as part of a team to identify characteristics that encourage success and social support for finding healing for disorders resulting in better patient outcomes. Also, integrating research and evidence-based practices such as MBSR that combines mindfulness meditation and body awareness to enhance overall well-being and interventions to improve cognitive functions

such as attention, memory, and problem-solving skills that may be a result of combat-related injuries or difficulties with military members demonstrating psychological flexibility or attempting regular physical activities. Although the military environment can act as a catalyst for the development and progression of cognitive functioning (Inoue et al., 2021), there are available military resources that offer mental health assessments, evaluations, treatment and management, and accurate diagnoses that address the unique challenges military members encounter (CDC, 2022).

Also, professional practices should actively seek opportunities to integrate research findings and evidence-based interventions into their practice by building their body of knowledge, standardizing their practice by staying primed about the latest research in their respective fields, and ensuring that their practice aligns with the present state of knowledge, and promoting awareness and educational opportunities to meet the unique needs of the active-duty population and veteran populations (Richard-Eaglin et al.). The efforts can improve patient outcomes, better decision-making, and more efficient use of military resources.

Involving professionals from different disciplines to collaborate and address multi-faceted health issues related to the unique nature of military service and associating combat-related injuries, deployments, transitions between military and civilian life, physiological and psychological health issues, and challenging access to care. Approaching health issues from a multi-faceted standpoint ensures a broad scope of perspectives and experiences, enhancing the appropriateness and effectiveness of proposed recommendations. Additionally, professional support was crucial in fostering

the engagement of healthcare providers across various settings, enabling these frontline providers' active involvement and contributions of their valuable insights and expertise (Smigelsky et al., 2020). The key issues that military members encounter often extend beyond military service, and addressing these multi-faceted issues requires a comprehensive understanding of military culture and collaboration among military healthcare organizations and community healthcare professionals providing patient-centered care to meet the unique healthcare needs of military service members.

Further, interdisciplinary collaboration and teamwork were essential in promoting communication, creating platforms for collaboration on diverse health perspectives, and encouraging interdisciplinary education to understand diverse groups' economic, political, social, and cultural beliefs. The Extension for Community Healthcare Outcomes (ECHO) features an interprofessional team of specialists, including military healthcare providers, that train primary care clinicians in best practices to ensure the highest quality of care for their patients and deliver a uniform standard of care while expanding the capacity of military primary and specialty clinicians to make effective use of limited resources (Katzman et al., 2021). Creating these platforms for partnership can facilitate the integration of diverse perspectives and expertise leading to more comprehensive and holistic approaches to problem-solving and service delivery.

In addition to these recommendations for professional practice, it was essential to consider the theoretical framework for this study. Theoretically, the study used SCT as a guiding concept to explain causal factors of how individuals obtain knowledge, learn new behaviors, and develop new skills through observation, simulation, and social interaction

(Beauchamp et al., 2019). Methodologically, this study utilized secondary data provided by the IPUMS Health Surveys, which contributed to the study's use of quantitative methods to observe conditions that affect the health of military members and produce objective data that displays relevant statistics and numbers.

The implication of this theoretical concept includes the strengths and limitations of using MBIs such as MBCT, MBSR, and CBT. The study describes the efficacy MBIs have in enhancing mental, physical, and social health conditions within the military population (Roemer, 2023; Hoge, 2018); however, the statistical findings of the research were minor, showing the need for establishing a broader applicability of MBIs to account for the potential influence of participant characteristics, intervention variations, and contextual factors in different military populations and settings. Also, future research can consider alternative methodologies, such as examining behavior change and long-term outcomes in military individuals with mental health outcomes, in which longitudinal studies can benefit the current research study. Additionally, exploring observational learning by introducing peer support and group mindfulness practices to influence the acceptance and adherence to mindfulness practices within military populations.

Lastly, empirical research can provide innovative knowledge and understanding of testing hypotheses and theories through systematic data collection and analysis to evaluate the validity and reliability of existing theories or propose new ones. For example, empirical research can be instrumental in assisting military members with activity limitations and utilizing mindfulness meditation to improve their health status by using evidence-based interventions that demonstrate the effectiveness of mindfulness

meditation as an intervention for addressing activity limitations and enhancing the health status of military members (Vogt, 2011). Also, empirical research can provide insight into overcoming stigma and beliefs, modifying interventions to meet specific culturally sensitive needs and preferences of military members and barriers within the military population, and the implementation and integration of mindfulness meditation programs within military settings that lead to improved performance and reduced negative emotions (Pagnini et al., 2019).

Positive Social Change

In this research study, there was potential for positive social change at the individual, organizational, and societal/policy levels regarding individuals' well-being and quality of life within the military population and their activity limitations. Enhancing the well-being and quality of life of individuals within the military population by addressing their activity limitations sheds light on the challenges this unique population faces. Implementing effective interventions, such as MBIs, can positively impact military personnel's physical, mental, and emotional health outcomes, enhancing their well-being, quality of life, and resilience.

At the individual level, studies on US Armed Forces showed regular rates of psychiatric conditions, including PTSD, depression, anxiety, and substance use, among veterans deployed to combat theaters have high rates of physical health conditions such as chronic pain, psychiatric and physical health conditions (Goldberg et al., 2020); however, the adaptation of MBIs was a successful behavioral approach for activity limitations and implementing a mindfulness training program that obtains input from

military and community stakeholders that involve military and civilian healthcare providers, military members, and family members (Goldberg et al., 2020). Likewise, at the organizational level, implementing interventions informed by this research study can contribute to positive social change within military populations by addressing activity limitations and supporting the well-being of military personnel with interventions that improve readiness, retention, morale, and motivation within the US Armed Forces.

Further, at the societal and policy levels promoting healthier and supportive relationships among military members and their families can limit activity limitations experienced by military members, and implementing interventions informed by this study can help lessen the burden on families, enhance their overall well-being, and guide the development of programs and resources that specifically target the needs of military families, fostering positive social change within the military and family units. According to the National Academies of Sciences, Engineering, and Medicine (2019), some military family members were affected by the service members' psychological or physical difficulties, which can reverberate within families, generate costs for the DoD, and interfere with military combat commitments impacting readiness, retention, morale, and motivation. Also, disseminating the research study's findings to relevant stakeholders, policymakers, and organizations involved in military healthcare and support services can facilitate the translation of research into action, leading to the development of evidence-based programs, policies, and resources that specifically target the needs of military personnel and their families. The collaborative efforts between military and civilian healthcare providers, community stakeholders, and family members can contribute to the

successful implementation of interventions and policies that address activity limitations and improve the well-being of the military population.

Overall, the study highlights the potential for positive social change at multiple levels by addressing activity limitations among the military population. By leveraging the study's findings, interventions can be created; policies can be implemented to enhance the well-being and overall functioning of military personnel and their support systems, such as family members and outside supporters. Even so, ensuring that the study's implications for positive social change at the appropriate levels aligned with public health practices and policies was imperative.

Conclusion

Activity limitation can be prevented by implementing multi-faceted approaches addressing various factors influencing military members' well-being and functionality. The results of this study supported that US Armed Forces members who used various MBIs to relieve physical and mental health issues were influential. In section 1, the research also adopted Albert Bandura's 1986 SCT as the theoretical framework to illustrate how future research can examine the effects of SCT on an individual's self-efficacy beliefs, observational learning processes, and cognitive and emotional regulation, which were vital components of SCT. Also, incorporating recommendations for professional practice, such as fostering ongoing professional development, promoting interdisciplinary collaboration, and integrating research and evidence-based practices, can significantly improve performance, skill development, and overall professional growth.

The research also formulated hypotheses and used assumptions through accurate data collection by IPUMS Health Surveys and participants' awareness of the survey's intent and unbiased responses. The research acknowledged the gap in the knowledge on the operational aspects of mindfulness meditation use among military populations and the need to assess its appropriateness as an intervention. The scope and delimitations were outlined, addressing the examination's limitations and the significance of secondary data, potential data collection limitations, and potential inadequate representation of the military population.

Section 2 of the study focused on the research design, methodology, threats to validity, and ethical procedures. The study involved a secondary analysis of data obtained from the IPUMS Health Surveys, encompassing a population of 267,254 US Armed Forces active-duty and veteran individuals. The methodology employed quantitative methods to collect and analyze objective data through observations and structured interviews. Also, the operationalization of variables was explained, including the predictor variable of the past 12-month mindfulness meditation use and outcome variables encompassing health status, activity limitations from depression, anxiety, and emotional problems, duration of limiting depression, anxiety, and emotional problems, and control variables such as sex, race, and age. The data analysis plan detailed the collection process, methods, and statistical tests to address the research questions. External and internal validity threats were considered, focusing on ensuring methodological rigor, presenting accurate data, and upholding ethical standards.

Section 3 of the research presented the results and findings from the data analysis. The analysis involved ordinal logistic regression for Research Question 1, chi-square tests for Research Question 2, and tests of the between-subjects effects model in ANOVA for Research Question 3. The null hypotheses were rejected in all cases, indicating significant associations and relationships between the variables examined. Also, in section 4, I analyzed the overall findings and contextualized them within the existing literature. Also, the SCT framework explored methods through which mindfulness meditation influenced behavior change and psychological outcomes among military personnel. The limitation of generalizability was also recognized in this research, and recommendations for further research were provided.

Further, incorporating recommendations for professional practice, such as fostering ongoing professional development, promoting interdisciplinary collaboration, and integrating research and evidence-based practices, can significantly enhance the quality and effectiveness of professional practices. The recommendations were vital for staying apprised of current advancements, addressing complex challenges through diverse perspectives, and ensuring that practice aligns with the latest research and evidence.

Also, the potential for positive social change at the individual, organizational, and societal levels within the military population entails the implementation of effective interventions, like (MBIs), to influence the well-being and quality of life of military personnel by addressing activity limitations. Further, the study's findings can benefit and

inform stakeholders and policymakers of evidence-based programs and policies that specifically target the demands of military personnel, fostering positive social change.

References

- Andersen, D. T. (2022). Mindfulness meditation: Another context for the necessary and sufficient conditions. *Journal of Humanistic Psychology, 62*(3), 418–423.
<https://doi.org/10.1177/0022167819852812>
- Andrade, C. (2019). The P value and statistical significance: Misunderstandings, explanations, challenges, and alternatives. *Indian Journal of Psychological Medicine, 41*(3), 210–215. https://doi.org/10.4103/IJPSYM.IJPSYM_193_19
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Barr, N., & Kintzle, S. (2019). Can mindfulness help to predict veterans' mental health service utilization? *Social Work, 64*(4), 329–338.
<https://doi.org/10.1093/sw/swz026>
- Barroga, E., & Matanguihan, G. J. (2022). A practical guide to writing quantitative and qualitative research questions and hypotheses in scholarly articles. *Journal of Korean Medical Science, 37*(16), e121. <https://doi.org/10.3346/jkms.2022.37.e121>
- Beauchamp, M. R., Crawford, K. L., & Jackson, B. (2019). Social cognitive theory and physical activity: Mechanisms of behavior change, critique, and legacy. *Psychology of Sport & Exercise, 42*, 110–117.
<https://doi.org/10.1016/j.psychsport.2018.11.009>
- Blewett, L. A., Rivera: Drew, J. A., King, M. L., and Williams, K. C. W. (2019). IPUMS health surveys: National health interview survey, Version 6.4 [dataset].
<https://doi.org/10.18128/D070.V6.4>

- Bloomfield, J., & Fisher, M. J. (2019). Quantitative research design. *Journal of the Australasian Rehabilitation Nurses' Association (JARNA)*, 22(2), 27–30.
<https://doi.org/10.33235/jarna.22.2.27-30>
- Bonura, K. B., & Fountain, D. M. (2020). From “hooah” to “om”: Mindfulness practices for a military population. *Journal of Social, Behavioral & Health Sciences*, 14(1), 183–194. <https://doi.org/10.5590/JSBHS.2020.14.1.13>
- Brintz, C. E., Miller, S., Olmsted, K. R., Bartoszek, M., Cartwright, J., Kizakevich, P. N., Butler, M., Asefnia, N., Buben, A., & Gaylord, S. A. (2020). Adapting mindfulness training for military service members with chronic pain. *Military Medicine*, 185(3–4), 385–393. <https://doi.org/10.1093/milmed/usz312>
- Cabassa, L. J., Stefancic, A., Chen, J.-H., Park, M., Tuda, D., Hawes, M. R., & Guo, S. (2022). Impact of Moderating Demographic Variables on a Health Intervention for People with Serious Mental Illness. *Research on Social Work Practice*, 32(8), 952–962. <https://doi.org/10.1177/10497315221102403>
- Centers for Disease Control and Prevention. (2018). Use of yoga and meditation becoming more popular in US
https://www.cdc.gov/nchs/pressroom/nchs_press_releases/2018/201811_Yoga_Meditation.htm
- Centers for Disease Control and Prevention. (2022). Chronic diseases and military readiness. <https://www.cdc.gov/chronicdisease/resources/publications/factsheets/military-readiness.htm>
- Cerna, C., Demarzo, M., García, F. E., Aravena, V., & Wlodarczyk, A. (2021). Brief

mindfulness therapy and mental health in people exposed to a recent stressful event: A study of multiple cases with follow-up. *Journal of Contemporary Psychotherapy*, 51(2).

Chesin, M. S., Keilp, J. G., Kline, A., Stanley, B., Myers, C., Latorre, M., St. Hill, L. M., Miller, R. B., King, A. R., Boschulte, D. R., Rodriguez, K. M., Callahan, M., Sedita, M., & Interian, A. (2021). Attentional control may be modifiable with mindfulness-based cognitive therapy to prevent suicide. *Behaviour Research and Therapy*, 147. <https://doi.org/10.1016/j.brat.2021.103988>

Chu, S.T.W., and Mak, W.W.S. (2020). How mindfulness enhances meaning in life: A meta-analysis of correlational studies and randomized controlled trials. *Mindfulness* 11, 177–193. <https://doi.org/10.1007/s12671-019-01258-9>

CNET.Com. (2022). G*power. https://download.cnet.com/G-Power/3000-2054_4-10647044.html

Combs, M. A., Critchfield, E. A., & Soble, J. R. (2018). Relax while you rehabilitate: A pilot study integrating a novel, yoga-based mindfulness group intervention into a residential military brain injury rehabilitation program. *Rehabilitation Psychology*, 63(2), 182–193. <https://doi.org/10.1037/rep0000179>

Courie, A. F., Jones, B. H., & Canham-Chervak, M. (2023). Assessing community-based public health plans: An example from US Army injury prevention. *Journal of Public Health Management & Practice*, 29(1), E22–E28. <https://doi.org/10.1097/PHH.0000000000001615>

- Creswell, J. D., Lindsay, E. K., Villalba, D. K., and Chin, B. (2019). Mindfulness training and physical health: Mechanisms and outcomes. *Psychosom Med.* 81(3): 224–232. doi: 10.1097/PSY.0000000000000675
- Dang, J., King, K. M., Inzlicht, M. (2020). Why are self-report and behavioral measures weakly correlated? *Trends in Cognitive Sciences*, 24(4), 267-269.
<https://doi.org/10.1016/j.tics.2020.01.007>.
- Davies, C., & Fisher, M. (2018). Understanding research paradigms. *Journal of the Australasian Rehabilitation Nurses' Association (JARNA)*, 21(3), 21–25.117–124.
<https://doi.org/10.1007/s10879-020-09483-3>
- Dawkins, J. C., Hasking, P. A., & Boyes, M. E. (2021). Thoughts and beliefs about nonsuicidal self-injury: An application of social cognitive theory. *Journal of American College Health*, 69(4), 428–434.
<https://doi.org/10.1080/07448481.2019.1679817>
- Dong, L., Xie, Y., & Zou, X. (2022). Association between sleep duration and depression in US adults: A cross-sectional study. *Journal of Affective Disorders*, 296, 183–188. <https://doi.org/10.1016/j.jad.2021.09.075>
- Droit-Volet, S., Chaulet, M., Dutheil, F., & Dambrun, M. (2019). Mindfulness meditation, time judgment and time experience: Importance of the time scale considered (seconds or minutes). *PLoS ONE*, 14(10), 1–22.
<https://doi.org/10.1371/journal.pone.0223567>
- Eichler, M., Smith-Evans, K., Spanner, L., & Tam-Seto, L. (2021). Mind the gap: Sex, gender, and intersectionality in military-to-civilian transitions. *Journal of Military,*

Veteran & Family Health, 7, 19–36. <https://doi.org/10.3138/jmvfh-2021-0018>

- Fanning, J., Brooks, A. K., Hsieh, K. L., Kershner, K., Furlipa, J., Nicklas, B. J., & Rejeski, W. J. (2022). The effects of a pain management-focused mobile health behavior intervention on older adults' Self-efficacy, satisfaction with functioning, and quality of life: a randomized pilot trial. *International Journal of Behavioral Medicine*, 29(2), 240–246. <https://doi.org/10.1007/s12529-021-10003-3>
- Fischer, I. C., Shanahan, M. L., Hirsh, A. T., Stewart, J. C., & Rand, K. L. (2020). The relationship between meaning in life and post-traumatic stress symptoms in US military personnel: A meta-analysis. *Journal of Affective Disorders*, 277, 658–670. <https://doi.org/10.1016/j.jad.2020.08.063>
- Flannelly, K. J., Flannelly, L. T., & Jankowski, K. R. B. (2018). Threats to the internal validity of experimental and quasi-experimental research in healthcare. *Journal of Health Care Chaplaincy*, 24(3), 107–130. <https://doi.org/10.1080/08854726.2017.1421019>
- Flood, A., & Keegan, R. J. (2022). Cognitive Resilience to Psychological Stress in Military Personnel. *Frontiers in psychology*, 13, 809003. <https://doi.org/10.3389/fpsyg.2022.809003>
- Ganz, A., Yamaguchi, C., Koritzky, B. P. G., & Berger, S. E. (2021). Military culture and its impact on mental health and stigma. *Journal of Community Engagement & Scholarship*, 13(4), 1–13. <https://doi.org/10.54656/zzhp1245>
- Gawrysiak, M. J., Grasseti, S. N., Greeson, J. M., Shorey, R. C., Pohlig, R., & Baime, M. J. (2018). The many facets of mindfulness and the prediction of change following

- mindfulness-based stress reduction (MBSR). *Journal of Clinical Psychology*, 74(4), 523–535. <https://doi.org/10.1002/jclp.22521>
- Gill, A. A., Alford, B., Balmer, J., Lutz, E. A., Glogower, F. D., & Palm, C. K. (2022). Use of electronic cigarettes among U.S. Military service members – prevalence and associated risk factors. *Substance Abuse*, 43(1), 1300–1307. <https://doi.org/10.1080/08897077.2022.2095075>
- Glanz, K., Rimer, B. A., & Viswanath, K. (2015). Health behavior: Theory, research, and practice (5th ed.). Jossey-Bass.
- Goldberg, S. B., Riordan, K. M., Sun, S., Kearney, D. J., & Simpson, T. L. (2020). Efficacy and acceptability of mindfulness-based interventions for military veterans: A systematic review and meta-analysis. *Journal of Psychosomatic Research*, 138. <https://doi.org/10.1016/j.jpsychores.2020.110232>
- Goodarzi, G., Sadeghi, K., & Foroughi, A. (2020). The effectiveness of combining mindfulness and art-making on depression, anxiety and shame in sexual assault victims: A pilot study. *The Arts in Psychotherapy*, 71. <https://doi.org/10.1016/j.aip.2020.101705>
- Godby Vail, S., Dierst-Davies, R., Kogut, D., Degiorgi Winslow, L., Vargas, J., Koeppl, P., & Marshall-Aiyelawo, K. (2023). Behavioral health and treatment-seeking behaviors among deployed vs. non-deployed service members: How impactful is deployment on well-being? *Military Psychology*, 35(2), 107–118. <https://doi.org/10.1080/08995605.2022.2083468>
- Gray, M., Gills, J. L., Glenn, J. M., Vincenzo, J. L., Walter, C. S., Madero, E. N., Hall, A.,

Fuseya, N., & Bott, N. T. (2021). Cognitive decline negatively impacts physical function. *Experimental Gerontology, 143*.

<https://doi.org/10.1016/j.exger.2020.111164>

Herbert, M. S., Leung, D. W., Pittman, J. O. E., Floto, E., & Afari, N. (2018).

Race/ethnicity, psychological resilience, and social support among OEF/OIF combat veterans. *Psychiatry Research, 265*, 265–270.

<https://doi.org/10.1016/j.psychres.2018.04.052>

Hoge, E. A., Bui, E., Palitz, S. A., Schwarz, N. R., Owens, M. E., Johnston, J. M.,

Pollack, M. H., & Simon, N. M. (2018). The effect of mindfulness meditation training on biological acute stress responses in generalized anxiety disorder. *Psychiatry Research, 262*, 328–

332. <https://doi.org/10.1016/j.psychres.2017.01.006>

Huang, Y.-C. & Yeh, C.-B. (2019). Adults with attention-deficit/hyperactivity disorder might relate with poor resilience and psychological well-being in military personnel. *Journal of Medical Sciences, 39*(3), 155–156.

https://doi.org/10.4103/jmedsci.jmedsci_181_18

Ihme, K. R. M., & Sundstrom, P. (2021). The mindful shield: The effects of mindfulness training on resilience and leadership in military leaders. *Perspectives in*

Psychiatric Care, 57(2), 675–688. <https://doi.org/10.1111/ppc.12594>

Inoue, C., Shawler, E., Jordan, C.H., Jackson, C.A. (2022). Veteran and military mental health issues. StatPearls Publishing, Treasure Island (FL)

Jha, A. P., Denkova, E., Zanesco, A. P., Witkin, J. E., Rooks, J., & Rogers, S. L. (2019).

Does mindfulness training help working memory ‘work’ better? *Current Opinion in Psychology*, 28, 273–278. <https://doi.org/10.1016/j.copsyc.2019.02.012>

Kabat-Zinn, J. (1993). *Wherever You Go There You are* (10th ed.). Hyperion.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10, 144-156.

Kartha, A., Hoffman, J. M., Mankowski, T. V., Carlson, K. F., & Morasco, B. J. (2019). Prevalence of chronic pain and high-impact chronic pain in US veterans. *The Journal of Pain*, 20(12), 1352-1360.

Katzman, J., Tomedi, L., Swift, R., Castillo, E., Morrow, C., Lutz, L., Galloway, K. T., McCoy-Stafford, K., Klein, Z., Turner, G., Beckman, D. J., Terrell, J., Forde, S., Martin, C., & Morgan, S. (2021). Extension for Community Healthcare Outcomes (ECHO) Telementoring in the Military: Where We Are Now, Opportunities and Challenges. *Military Medicine*, 186(9/10), 236–241.

<https://doi.org/10.1093/milmed/usab010>

Kim, Y. J., & Cribbie, R. A. (2018). ANOVA and the variance homogeneity assumption: Exploring a better gatekeeper. *The British Journal of Mathematical and Statistical Psychology*, 71(1), 1–12. <https://doi.org/10.1111/bmsp.12103>

Kizakevich, P. N., Eckhoff, R., Brown, J., Tueller, S. J., Weimer, B., Bell, S., Weeks, A., Hourani, L. L., Spira, J. L., & King, L. A. (2018). PHIT for duty, a mobile application for stress reduction, sleep improvement, and alcohol moderation. *Military Medicine*, 183(suppl_1), 353–363.

<https://doi.org/10.1093/milmed/usx157>

- Krishnan, P. (2019). A review of the non-equivalent control group post-test-only design. *Nurse Researcher*, 26(2), 37–40. <https://doi.org/10.7748/nr.2018.e1582>
- Lakens, D. (2022). Sample size justification. *Methodology and Research Practice*, 8(1). <https://doi.org/10.1525/collabra.33267>
- Ledolter, J., Gramlich, O. W., & Kardon, R. H. (2020). Display of Data. *Investigative ophthalmology & visual science*, 61(6), 25. <https://doi.org/10.1167/iovs.61.6.25>
- Liu, X. S. (2022). Bias correction for eta squared in one-way ANOVA. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 18(1), 44–57. <https://doi.org/10.5964/meth.7745>
- Liu, Y., & Jiang, D. (2022). Multimorbidity patterns in US adults with subjective cognitive decline and their relationship with functional difficulties. *Journal of Aging & Health*, 34(6/8), 929–938. <https://doi.org/10.1177/08982643221080287>
- Lyons, K. D., Pierce, J. R., Jones, B. H., & Canham-Chervak, M. (2021). Longitudinal Changes In U.S. Army Physical Fitness Test Performance. *Medicine & Science in Sports & Exercise*, 53(8S), 8–9. <https://doi.org/10.1249/01.mss.0000759128.15989.95>
- Marciniak, R., Šumec, R., Vyhňálek, M., Bendíčková, K., Lázníčková, P., Forte, G., Jeleník, A., Římalová, V., Frič, J., Hort, J., & Sheardová, K. (2020). The effect of mindfulness-based stress reduction (MBSR) on depression, cognition, and immunity in mild cognitive impairment: A Pilot Feasibility Study. *Clinical interventions in aging*, 15, 1365–1381. <https://doi.org/10.2147/CIA.S249196>

- Matthay, E. C., & Glymour, M. M. (2020). A graphical catalog of threats to validity: Linking social science with epidemiology. *Epidemiology (Cambridge, Mass.)*, *31*(3), 376–384. <https://doi.org/10.1097/EDE.0000000000001161>
- Mental Health Weekly Digest. (2022). Veterans affairs salt lake city health care system: Researcher describes new findings in suicide, randomized controlled trial of a brief mindfulness-based intervention for suicidal ideation among veterans. *Mental Health Weekly Digest*, 518.
- Mercer, C. B., Cash, R. E., Rivard, M. K., Chrzan, K., Harper, S., Walrath, B., Carmichael, J. L., & Panchal, A. R. (2021). Comparison of Air Force, Army, and Navy emergency medical technician candidates' performance on the national registry cognitive examination. *Military Medicine*, *186*(11/12), e1221–e1226. <https://doi.org/10.1093/milmed/usaa526>
- Millegan, J., Denninger, J. W., Bui, E., Jakubovic, R. J., Ram, V., Bhakta, J., Hiller Lauby, M. D., Mehta, D. H., Sager, J. C., Fricchione, G., & Sylvia, L. G. (2021). A mind-body program for pain and stress management in active duty service members and veterans. *Psychological Services*, *18*(2), 186–194. <https://doi.org/10.1037/ser0000376>
- Maxwell, S. E. (2000). Sample Size and Multiple Regression Analysis. *Psychological Methods*, *5*(4), 434–458.
- National Center for Complementary and Integrative Health. (2022). Meditation and mindfulness: What you need to know. <https://www.nccih.nih.gov/health/meditation-and-mindfulness-what-you-need-to->

[know](#)

- Osborne, A. K., Wilson-Menzfeld, G., McGill, G., & Kiernan, M. D. (2022). Military service and alcohol use: a systematic narrative review. *Occupational medicine (Oxford, England)*, 72(5), 313–323. <https://doi.org/10.1093/occmed/kqac045>
- Pagnini, F., Phillips, D., Bercovitz, K., and Langer, E. (2019). Mindfulness and relaxation training for long duration spaceflight: Evidences from analog environments and military settings. <https://doi.org/10.1016/j.actaastro.2019.07.036>
- Park, S. H., & Han, K. (2022). How to clearly and accurately report odds ratio and hazard ratio in diagnostic research studies? *Korean Journal of Radiology*. <https://doi.org/10.3348/kjr.2022.0249>
- Patten, M. L., & Newhart, M. (2017). Understanding research methods: An overview of the essentials (10th ed.). Routledge. <https://doi.org/10.4324/9781315213033>
- Petursdottir, A. I., & Carr, J. E. (2018). Applying the taxonomy of validity threats from mainstream research design to single-case experiments in applied behavior analysis. *Behavior Analysis in Practice*, 11(3), 228–240. <https://doi.org/10.1007/s40617-018-00294-6>
- Rae, M., Fatahi, N., Homayoun, M. S., Ezatabadipor, H., & Shams, M. (2022). The effect of mindfulness-based cognitive therapy (MBCT) on self-esteem, self-concept, and social anxiety of people with social anxiety disorder. *ASEAN Journal of Psychiatry*, 23(5), 1–7. <https://doi.org/10.54615/2231-7805.4737>
- Ramel, W., Goldin, P. R., Carmona, P. E., & McQuaid, J. R. (2004). The effects of mindfulness meditation on cognitive processes and affect in patients with past

depression. *Cognitive Therapy & Research*, 28(4), 433–455.

<https://doi.org/10.1023/B:COTR.0000045557.15923.96>

Ramon, A. E., Guthrie, L., & Rochester, N. K. (2020). Role of masculinity in relationships between mindfulness, self-compassion, and well-being in military veterans. *Psychology of Men & Masculinities*, 21(3), 357–368.

<https://doi.org/10.1037/men0000240>

Rice, V. J., & Overby C. (2020). Which mindfulness meditation delivery method yields the greatest benefits? *Advances in Intelligent Systems and Computing*, vol 956. Springer, Cham.

Rice, V. J., & Schroeder, P. J. (2019). Resilience and mindfulness in active duty and veteran US military service members. *2019 Resilience Week (RWS), Resilience Week (RWS), 2019, 1*, 142–146. <https://doi.org/10.1109/RWS47064.2019.8972001>

Richard-Eaglin, A., Campbell, J. G., & Utley-Smith, Q. (2020). The aging veteran population: Promoting awareness to influence best practices. *Geriatric Nursing*, 41(4), 505–507. <https://doi.org/10.1016/j.gerinurse.2020.06.006>

Richmond, K., Zerbo, E., & Levounis, P. (2017). What is mindfulness? A history of mindfulness and meditation. In *Becoming mindful: Integrating mindfulness into your psychiatric practice*. (pp. 2–7). American Psychiatric Association Publishing.

Roemer, A., Sutton, A., Grimm, C., Kimber, S., & Medvedev, O. N. (2023). Mindfulness-based attention training in the Navy: A feasibility study. *Psychological Reports*, 332941231154442. <https://doi.org/10.1177/00332941231154442>

Ruggles, S., Flood, S., Goeken, R., Grover, J., Meyer, E., Pacas, J., and Sobek, M.

IPUMS USA: Version 10.0 [dataset]. Minneapolis, MN: IPUMS, 2020.

<https://doi.org/10.18128/D010.V10.0>

Salmoirago-Blotcher, E. (2022). A treatment in search of a disease? Challenges in mindfulness research and practice. *Explore, 18*(5), 509–514.

<https://doi.org/10.1016/j.explore.2021.05.005>

Saeed, S. A., Cunningham, K., & Bloch, R. M. (2019). Depression and anxiety disorders: benefits of exercise, yoga, and meditation. *American Family Physician, 99*(10), 620–627.

Samaranayaka, A., Cameron, C., & Turner, R. M. (2021). Sample size in health research. *New Zealand Medical Student Journal, 32*, 52–54.

Schäfer, T., & Schwarz, M. A. (2019). The Meaningfulness of effect sizes in psychological research: Differences between sub-disciplines and the impact of potential biases. *Frontiers in psychology, 10*, 813.

<https://doi.org/10.3389/fpsyg.2019.00813>

Segal, Z. V., Teasdale, J. D., & Williams, J. M. G. (2004). Mindfulness-based cognitive therapy: theoretical rationale and empirical status. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 45–65). The Guilford Press.

Shapero, B. G., Greenberg, J., Pedrelli, P., de Jong, M., & Desbordes, G. (2018).

Mindfulness-based interventions in psychiatry. *Focus (American Psychiatric Publishing), 16*(1), 32–39. <https://doi.org/10.1176/appi.focus.20170039>

Siedlecki, S. L. (2020). Understanding descriptive research designs and methods. *Clinical*

- Nurse Specialist*, 34(1), 8–12. <https://doi.org/10.1097/NUR.0000000000000493>
- Smigelsky, M. A., Nieuwsma, J. A., Meador, K., Vega, R. J., Henderson, B., & Jackson, G. L. (2020). Dynamic diffusion network: Advancing moral injury care and suicide prevention using an innovative model. *Healthcare (Amsterdam, Netherlands)*, 8(3), 100440. <https://doi.org/10.1016/j.hjdsi.2020.100440>
- Sovacool, B. K., Axsen, J., & Sorrell, S. (2018). Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. *Energy Research & Social Science*, 45, 12–42. <https://doi.org/10.1016/j.erss.2018.07.007>
- Sud, A., Ka Sing Paris Lai, Kai-Young Cheng, D., Chadwick Chung, Pico-Espinosa, O. J., Rice, D. B., Lai, K. S. P., Cheng, D. K.-Y., & Chung, C. (2021). Mind-body interventions for depressive symptoms in chronic pain: A systematic review of meta-analyses. *Pain Physician*, 24(1), 61–72. <https://doi.org/10.36076/ppj.2021.24.61-72>
- Sullivan, G. M., & Feinn, R. (2012). Using effect size-or why the p value is not enough. *Journal of graduate medical education*, 4(3), 279–282. <https://doi.org/10.4300/JGME-D-12-00156.1>
- Tang, R., Friston, K. J., & Tang, Y.-Y. (2020). Brief mindfulness meditation induces gray matter changes in a brain Hub. *Neural Plasticity*, 1–8. <https://doi.org/10.1155/2020/8830005>
- Teyhen, D. S., Capaldi, I. V. F., Drummond, S. P. A., Rhon, D. I., Barrett, A. S., Silvernail, J. L., & Boland, D. M. (2021). How sleep can help maximize human

potential: The role of leaders. *Journal of Science and Medicine in Sport*, 24(10), 988–994. <https://doi.org/10.1016/j.jsams.2021.08.012>

Urban, J. B., & van Eeden-Moorefield, B. M. (2018). Establishing validity for quantitative studies. In *Designing and proposing your research project*. (pp. 111–117). American Psychological Association. <https://doi.org/10.1037/0000049-009>

US department of Defense. (2022). Our forces. <https://www.defense.gov/About/our-forces/>

Vago, D. R., Gupta, R. S., & Lazar, S. W. (2019). Measuring cognitive outcomes in mindfulness-based intervention research: a reflection on confounding factors and methodological limitations. *Current opinion in psychology*, 28, 143–150. <https://doi.org/10.1016/j.copsyc.2018.12.015>.

Vogt, D. (2011). Mental Health-Related Beliefs as a Barrier to Service Use for Military Personnel and Veterans: A Review. *Psychiatric Services*, 62(2), 135–142. https://doi.org/10.1176/ps.62.2.pss6202_0135

Walsh, K. M., Saab, B. J., & Farb, N. A. (2019). Effects of a mindfulness meditation app on subjective well-being: Active randomized controlled trial and experience sampling study. *JMIR Mental Health*, 6(1), e10844. <https://doi.org/10.2196/10844>

Wallstreetmojo.com. (2022). Sample size formula. <https://www.wallstreetmojo.com/sample-size-formula/>

Wells, R. E., Kerr, C., Dossett, M. L., Danhauer, S. C., Sohl, S. J., Sachs, B. C., Feeley, J. W., Wolkin, J., Wall, R., Kaptchuk, T., Press, D. Z., Phillips, R. S., & Yeh, G. Y. (2019). Can adults with mild cognitive impairment build cognitive reserve and

learn mindfulness meditation? Qualitative theme analyses from a small pilot study. *Journal of Alzheimer's disease: JAD*, 70(3), 825–842.

<https://doi.org/10.3233/JAD-190191>

Wilcox, R. (2022). One-way and two-way ANOVA: Inferences about a robust, heteroscedastic measure of effect size. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 18(1), 58–73.

<https://doi.org/10.5964/meth.7769>

Williams, R. A., & Quiroz, C. (2020). *Ordinal regression models*. SAGE Publications Limited.

World Health Organization. (2022). WHO releases guidance on mental health care after trauma. <https://www.who.int/news/item/06-08-2013-who-releases-guidance-on-mental-health-care-after-trauma>

Yakobi, O., Smilek, D., & Danckert, J. (2021). The effects of mindfulness meditation on attention, executive control and working memory in healthy adults: A meta-analysis of randomized controlled trials. *Cognitive Therapy & Research*, 45(4), 543–560. <https://doi.org/10.1007/s10608-020-10177-2>

Zhang, C.-Q., & Baltzell, A. (2019). Towards a contextual approach to athletic performance enhancement: Reflections, perspectives, and applications. *Journal of Sport Psychology in Action*, 10(4), 195–198.

<https://doi.org/10.1080/21520704.2019.1643613>

Zhou, Y., & Skidmore, S. T. (2018). A Reassessment of ANOVA Reporting Practices: A

Review of Three APA Journals. *Journal of Methods and Measurement in the Social Sciences*, 8(1), 3–19. <https://doi.org/10.2458/v8i1.22019>