Theses and Dissertations   Graduate School

2016

Deployment Resilience among U.S. Airmen: A Secondary Analysis of Risk and Protective Factors using the 2013 Community Assessment Survey

Mark A. Dixon
Virginia Commonwealth University

Deployment Resilience among U.S. Airmen: A Secondary Analysis of Risk and Protective Factors using the 2013 Community Assessment Survey

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Social Work at Virginia Commonwealth University.

The views expressed in this study are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government.

by

Mark A. Dixon
PhD, Virginia Commonwealth University, Richmond, VA 2016
MSW, Washington University, St. Louis, MO 2004
BSW, Brigham Young University, Provo, UT 2002

Dissertation Chair: Joseph Walsh, PhD Professor,
School of Social Work

Virginia Commonwealth University
Richmond, Virginia
July 2016

Acknowledgement

Completion of a dissertation requires the help and assistance of many individuals, some of whom will be recognized here for their role.

First and foremost, I must thank my wife and best friend, Amanda, for her love, support, and encouragement throughout this entire process.

To my five children who have often been a wonderful source of motivation and inspiration and who have helped me maintain a sense of balance in my life.

To my parents, thank you for your words of encouragement and meaningful advice that has spanned a lifetime.

I would also like to thank Dr. Walsh for his quiet direction and guidance to help me complete this project in an efficient and professional fashion.

To the other members of my dissertation committee, Dr. Dattalo, Dr. Vrana, and Dr. Chartier, who each pushed me to think and perform at the boundaries of my capabilities—thank you.

I would be remise not to acknowledge the tremendous amount of time and effort of the research team who generated the 2013 Community Assessment Survey and for the U.S. Airmen who took the time to complete it, especially in light of their numerous competing demands and obligations.

Finally, I feel deeply indebted to the U.S. Air Force and the Air Force Institute of Technology who provided the opportunity and blessing for me to return to school to complete this project and degree, which would have remained an otherwise unattainable dream.

Table of Contents

List of Tables

List of Figures

Abstract

EFFECTS OF DEPLOYMENT AMONG U.S. AIRMEN: A SECONDARY ANALYSIS OF RISK AND RESILIENCE FACTORS USING THE 2013 COMMUNITY ASSESSMENT SURVEY

By Mark A. Dixon

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Social Work at Virginia Commonwealth University.

Virginia Commonwealth University, 2016

Major Director: Joseph Walsh, Professor, School of Social Work

Purpose: Since September 11, 2001 military personnel have experienced a pattern of frequent deployment and reintegration, known as the deployment cycle. Deployments present unique challenges and opportunities to military personnel with lasting effects. This study examines group differences based on risk and protective factors, which were grouped into four domains (physical, mental, social, and spiritual) according to the Comprehensive Airman Fitness model in use by the U.S. Air Force to teach and increase resilience. The groups represent various levels of exposure to deployment dangers, up to and including combat, and time, recent deployment within two years and past deployment more than two years ago.

Method: Secondary analysis was conducted with the 2013 Air Force Community Assessment Survey, a large, anonymous survey collected among U.S. Airmen. Discriminant analysis was utilized to determine and describe group differences.

Results: The null hypothesis of no difference between group centroids was rejected. The primary group difference existed between Airmen who experienced combat and all other Airmen. The result of the discriminant analysis demonstrates at least two, possibly three, distinct groups exist among Airmen related to deployment experiences. The discriminant analysis generated six functions. Health and PTSD demonstrated the highest discriminant ability, although social support systems also played a significant role. Recent deployers reported higher levels of resilience and hardiness compared to past deployers regardless of exposure to deployment danger and combat. Meanwhile, past deployers reported higher levels of spirituality across all groups.

Discussion: This study utilized aspects of resilience theory through the incorporation of time and a person-in-environment approach to the study of deployment and resilience. Implications related to social work practice include assessment of deployment frequency and the cumulative effects of deployment stressors. A specific policy recommendation is to ensure adequate leadership training in resilience promotion, as leadership represented an important component of resilience in this study. Finally, future research following this study could include qualitative analysis and studies utilizing more comprehensive scales among Airmen.

Chapter 1: Introduction

Importance Statement

The United States military ended conscription in 1973 and subsequently pursued a policy

of an all-volunteer force (AVF). This policy has several positive results: a relatively young work

force, increased levels of high school completion, increased continuity of military personnel,

higher rates of minorities and females, and signs of upward socioeconomic mobility (Rostker,

2006). For the past 40 years, the Department of Defense (DoD) has relied on incentives,

benefits, and patriotism as well as a newfound focus on family and career orientation to meet the

stringent standards of recruitment and the numerical requirements to staff a fully functional

military organization (Kelty, Kleykamp, & Segal, 2010). When conscription was in force the

military theoretically represented a cross section of the American male population in providing

the personnel needed to fill the ranks in times of conflict. The recent conflicts of Operation

Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) are the first time a sustained war

has been conducted by the AVF (Tanielian & Jaycox, 2008). The AVF of the DoD, consists of

three components: active duty members, the National Guard, and Reserve personnel. It was this

combined, "total force" which was involved in combat and military operations associated with

OEF and OIF (Weiss & Albright, 2014).

There are approximately 2.5 million military members currently serving in some capacity

and another 20 million who have served and who make up the group we call veterans (Hamaoka

et al., 2014). The current force makes up less than one percent of the population of the United States, which means a relative few are bearing the brunt of a long, protracted two front war which began shortly after September 11, 2001. Without the possibility of a draft to increase the troop levels, the AVF was exposed to increasingly long and frequent deployments resulting in an extremely high Ops Tempo (rate of deployment) required to fight a two front war.

During the course of the conflicts, deployments in many cases exceeded the limits set by the DoD of 12 months of deployment for 24 months of dwell time at home (Tanielian & Jaycox, 2008). Frequently, military members experienced multiple deployments, many of which were to combat zones. According to a 2010 report generated by the National Academy of Sciences, over 1.9 million personnel deployed in support of OEF and OIF (Institute of Medicine, 2010), with the US Army accounting for half the deployments (Baiocchi, 2013). The repeated exposure to combat and deployment stressors proved detrimental to many service members and their families. Among the group of deployers were 500,000 military parents who deployed at least twice since 2001, significantly impacting children by increasing their reported prevalence of anxiety (64%) and behavior problems at home (57%) (Department of Defense, 2010).

Deployment stressors such as combat, continuous exposure to indirect fire, separation from support systems, and the constant physical demands of the environment have differential effects on the rates of posttraumatic stress disorder (PTSD) (Litz, Steenkamp, & Nash, 2014). Between 4-22% of returning veterans suffer from PTSD (Hoge et al., 2004; Hoge, Terhakopian, Castro, Messer, & Engel, 2007; L. K. Richardson, Frueh, & Acierno, 2010; Sundin, Fear, Iversen, Rona, & Wessely, 2010). Some estimates suggest the rates of PTSD among military members to be about twice that of their civilian counterparts (Gates et al., 2012). In addition, those who experience PTSD manifest increased rates of cardiovascular and respiratory ailments,

autoimmune complications (Boscarino, 2004; Hoge et al., 2007), anxiety, depression, and substance abuse (Gates et al., 2012), as well as chronic pain and problems with traumatic brain injury (Lew et al., 2009). One estimate of the total economic cost of PTSD is 3 billion dollars per year among active duty personnel alone (Eibner, Ringel, Kilmer, Pacula, & Diaz, 2008).

However, the personal and societal complications do not end with separation from military service or the cessation of hostilities. Long after the war is over and military personnel return home the consequences of armed conflict continue in the form of personality adaptations and future flexibility (Elder, 1987). Prigerson, Maciejewski, & Rosenheck (2001) analyzed data from the National Comorbidity Survey and concluded that those service members who identify combat as their most significant trauma were most likely to have lifetime PTSD symptoms, delayed onset of symptoms, unemployment, and family related problems.   In other words the effects of armed conflict, including both fiscal and emotional impacts, continue long after the end of hostilities and operations. Bilmes and Stiglitz (2011) discussed the problem of "accrued liabilities" in regard to future expenditures based on present promises and obligations to beneficiaries. For example, the expenditures for disability payments and other benefits for World War II veterans peaked in 1982, almost 40 years after the end of hostilities (Bilmes & Stiglitz, 2011). Taken together, these data points suggest the emotional and financial toll of conflict is a long-term problem which must be addressed through viable and supportable solutions.

Current Treatments and Screening

Given the significant combat-related complications among the AVF and their families, comprehensive treatment and care is an essential step in helping to alleviate unnecessary suffering and stress, as well as potentially reduce expenditures. However, only 23% – 40% of

military members who screen positive for PTSD and other mental health conditions seek treatment after returning from deployment (M. C. Brown, Creel, Engel, Herrell, & Hoge, 2011; Hoge et al., 2004). There are several highly effective evidence-based-treatments available to social workers such as prolonged exposure therapy (PE), cognitive processing therapy (CPT), cognitive-behavioral conjoint therapy (CBCT), and eye movement desensitization and reprocessing (EMDR) (Boden et al., 2012; Burnam et al., 2008; Taft, Watkins, Stafford, Street, & Monson, 2011). Each of these treatment modalities are used to teach a set of corrective skills or to help reprocess patterns of cognition developed following experiences of trauma or adversity. The underlying assumption is that PTSD represents a failure to naturally recovery from the trauma or adversity, thus the additional skills taught through these treatment modalities help to overcome barriers of recovery (Resick, Monson, & Chard, 2008). As such, treatment is not intended to cure the problem but to allow individuals the opportunity to develop the skills to overcome the problem and progress towards health and recovery. This is an important distinction because at least one meta-analysis of PTSD treatments shows they were not empirically more effective than natural recovery, even though they appeared effective in reducing symptoms (Ehlers et al., 2010).

Additionally, screening procedures for many empirical studies of trauma treatment among service members utilize scales or measures which support a medical model of an underlying disorder (Ramchand, Karney, Osilla, Burns, & Calderone, 2008). Few trauma treatment protocols utilize a measure of resilience, such as the Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003) or the Resilience Scale (Wagnild & Young, 1993), to assess for capacity and areas of high functionality. Currently, a focus on maladaptive patterns and a deficit orientation predominates in PTSD treatment. Consequently, the focus of

treatment remains assessment of and intervention with individuals based on their symptoms of

disorder. Understanding areas such as pre-trauma history, level of stress during trauma, and the

post-trauma environment facilitates assessment of individual symptom development and

reintegration following deployment, yet these considerations can be easily overlooked based on

study methodology (Keane, Marshall, & Taft, 2006; Strong et al., 2014).

Resilience Research

Resilience offers a potentially powerful alternative explanation of deficit-oriented

treatments and models. The pioneering work of researchers like Emmy Werner, beginning in the

1960's, began to shift professional thinking away from pathology with new concepts and

understandings (Earvolino-Ramirez, 2007; Masten, 2001; Werner & Smith, 1992). Another key

step in the progression towards modern resilience research was the development of salutogenics,

the inverse of pathology, as it evaluates the factors which supports people to shift towards health

from disease or disorder (Antonovsky, 1979, 1993; VanBreda, 2001). Salutogenics can arguably

be seen as a precursor to the strengths perspective in social work by providing a language and

method of describing the full range of lived experiences through difficult times, a clear

component of the strengths perspective (Saleebey, 2011). In that sense, research began to look at

the factors which enable pathology while simultaneously addressing the protective factors which

support and promote good functioning and resilience (Rutter, 1987). Resilience helps to explain

certain response patterns to potentially traumatizing events and supports the salutogenic idea of

movement towards health (Bonanno & Mancini, 2012). For example, up to 90% of those

experiencing serious, life threatening illnesses report increased quality of life, optimism and

strength (Aspinwall & MacNamara, 2005). Despite exposure to combat, at least 80% of military

personnel don't develop PTSD, depression, or anxiety (Moore & Penk, 2011). A majority of

individuals subjected to significant stress or trauma engage in a healing process, possess

protective factors, or both, which prevents many of the negative outcomes associated with PTSD

(De Terte, Becker, & Stephens, 2009; Fikretoglu & McCreary, 2012).

One author found between the years of 2001 and 2010 a quadrupling of resilience studies

in MEDLINE and a tripling in PSYCHINFO (McGeary, 2011). Yet, this research is

overshadowed by nearly 20 to 1 compared to research in mental health on depression and anxiety

(Vaillant, 2003). A cohesive focus on resilience has proven elusive considering the number of

varying definitions—Meredith at al. (2011) found 122 definitions, which is by no means

exhaustive. Additionally, there are differences between the literature on adults and children.

Specifically, the child literature leans towards a distal focus on developmental processes, the

variability of resilience over time, and different stages of development (Wright & Masten, 2006).

However, in adult resilience research consists of assessing recovery from risk and sustained

progression towards positivity and quality of life (Zautra, Hall, & Murray, 2010). Finally, when

considering resilience important considerations include variation in the level of the severity of

the trauma or disruption and the timing of measurement (Masten, 2014). Both of issues

influence the obtained results and will be addressed in more detail later.

Comprehensive Airman Fitness

Throughout the American involvement in OEF and OIF leadership in the Department of

Defense and each military service increasingly recognized service members needed resources to

manage the frequency, physical stressors, and social disruptions of deployment. A RAND report

indicated that biological, psychological, and social factors have both a direct and indirect effect

on personal and performance related outcomes for returning veterans (Tanielian & Jaycox,

2008). Resilience seemed to be the missing element to help military personnel maintain

performance and decrease problematic reactions. Program development alone was not enough to address the broad level of needs across each branch of service, among service members, and within families. Rather, an organizational change in foucs was needed to make the shifts necessary to sustain the military fighting force—Total Force Fitness (TFF) was the model selected for this transition (Jonas et al., 2010). TFF is a model of holistic fitness for service members and their families, addressing mental, physical, social, and spiritual fitness (Mullen, 2010). Each military service (Air Force, Army, Navy, Marines) was subsequently required to develop and implement a program that met the intention and guidance outlined for TFF.

In order to meet the demands of TTF and the needs of Airmen, the U.S. Air Force implemented several successive resilience-based intervention models and trainings. A resilience training program called Landing Gear was put in place beginning in 2008. With only limited direction and guidance for presenters, and no additional provisions beyond a PowerPoint presentation, this intervention was quickly found to be insufficient to meet the needs of Airmen. Landing Gear was supplanted in 2010 by Airman Resilience Training (ART). This program too consisted of large group presentations with off-the-shelf slides. ART did provide a training manual and allowed for increased flexibility for the presenters compared to Landing Gear. However, an evaluation found ART to be insufficient in meeting Airmen's needs, due in part to the presentation style, insufficient variability, and limited focus on skill development (Gonzalez, Singh, Schell, & Weinick, 2014). Inconsistent support was found among the presenters and those who support planning and training across the sites evaluated. For these reasons the U.S. Air Force transitioned from ART to Comprehensive Airman Fitness (CAF) (Department of the Air Force, 2014).

CAF as a multi-level approach to resilience enhancement for individuals and organizations within the Air Force. The model consists of an underlying framework to augment resilience among Airmen and Air Force organizations by means of strength-based and prevention efforts. This framework promotes fitness across the four domains outlined in TFF: mental, physical, social, and spiritual. Fitness is defined as "the relationship between one's behaviors and attitudes and their positive or negative health outcomes that results in a state of complete mental, physical, social, and spiritual well-being and not merely the absence of disease or infirmity" (Department of the Air Force, 2014). Clearly, the goal of fitness is to move beyond simply not being unhealthy in order to become holistically fit and well. The intended result of fitness, as described above, is to attain a level of well-being, or a "state of being happy, healthy, or prosperous" (Department of the Air Force, 2014). These are subjective conditions and consequently difficult to measure directly. To achieve these goals, skill development is required at all levels of initial accession training, technical schooling, and semiannually for all other Airmen. There is a clear focus with the training upon individual skill development versus group or community resilience; however, by helping individuals there is also indirect impact on the environmental factors associated with resilience.

Evidence suggests resilience can be improved through training in the civilian sector (Rose et al., 2013; Waite & Richardson, 2004), among emergency response personnel (Varker & Devilly, 2012) and in military environments (Cacioppo et al., 2015; Foran, Adler, McGurk, & Bliese, 2012; Jarrett, 2008; Lester, McBride, Bliese, & Adler, 2011). As a training model for the development of comprehensive fitness, well-being, life balance, and resilience, CAF also provided a basic platform against which to measure holistic post-deployment resilience and outcomes. The ability to improve resilience through training suggests two things: 1) resilience is

a malleable characteristic or process and 2) what is focused on during the training will impact outcomes (Gonzalez et al., 2014). The CAF definition of resilience, "the ability to withstand, recover, and grow in the face of stressors and changing demands" (Department of the Air Force, 2014), is a helpful starting point to begin discussing characteristics of resilience to be included in this study.

Holistic Resilience

Some contend that resilience is primarily the absence of dysfunction or a stable course of functioning despite adversity or trauma (Bonanno, 2004). However, such an inflexible trajectory of behavior and response to change is not resilience but rather a potentially non-adaptive response to changing environments and can lead to later problems due to rigidity (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008). In a cross-sectional sample of civilians under constant stress of attack in Israel, a pattern of stability in functioning was labeled as resistance and a trajectory of initial poor functioning with rapid gain to pre-stress levels of functioning was classified as resilience (Hobfoll et al., 2009). Such reasoning seems to more accurately fit the concept of resilience as a matter of bouncing back from adversity (Tugade & Fredrickson, 2004). Characterizing resilience as a process, not an outcome, by which individuals, communities, and organizations adapt to changing circumstances over time encompasses a more holistic perspective of resilience. Linley and Joseph (2005) argue for a paradigm shift in research on trauma and loss to move beyond merely including resilience in a study, but to "seek to develop an understanding of reactions to adversity that explains the full range of reactions, from psychopathology, through resilience, to adversarial growth…models of human functioning should span the full range of human experience…a holistic perspective that also includes adversarial growth is required" (p. 263).

9

In a systematic review of the literature on adversarial growth—the growth associated with the struggle to overcome adversity—numerous constructs were found to be critical components of the variable (Linley & Joseph, 2004). These constructs were divided into the following categories: cognitive appraisal, personality, coping, religion, social support, affect, and psychological distress. It should be noted that adversarial growth, of which posttraumatic growth is one form, does not occur spontaneously or quickly in response to loss or trauma, but rather it is experienced longitudinally over the life course (T. Zoellner & Maercker, 2006). In discussing the Resilience Framework, Kumpfer (1999) reports on a set of internal characteristics and competencies (i.e. assets) necessary to address developmental tasks and environmental challenges: spirituality, cognitive, social/behavioral, physical, and emotional/affective. Based on her discussion and model, resilience can be conceived as a biopsychosocialspiritual process resulting from trauma, adversity, or stress. Greene (2002) suggested the ecological perspective is essential to understanding resilience within the non-deterministic context of person-in-environment interactions which creates a "holistic picture of life processes" (p. 17).

Clearly, a relationship exists with these identified variables and the model of CAF. Though Addressing resilience and reactions to trauma in a holistic manner is critical, but as in the child literature on resilience and as indicated in the research on trajectories of resilience and adversarial growth, the temporal component should also be considered in order to gain a more comprehensive understanding of the interactions of risk and protective factors in the processes and outcomes of resilience.

Risk and Protective Factors

One of the key tenets in resilience research is the presence or absence of factors known to protect or buffer against negative outcomes and those which, when present, increase the potential

for negative outcomes. Some have labeled risk factors and protective factors as two of the most basic terms associated with resilience theory (Greene, Cohen, Gonzalez, & Lee, 2009). Risk factors represent the set of individual characteristics, experiences, events, or environmental conditions which are the "markers, correlates, and…causes" associated with development of later difficulties (Fraser, Richman, & Galinsky, 1999, p. 131). These risk factors can be generalized or particular, cumulative or specific, chronic or temporary. In short, risk factors are multifaceted and multiple risk factors can influence individuals or groups over time. For example, among Vietnam veterans the influence of pre-combat trauma experiences and exposure was critical in understanding the development of chronic PTSD following experiences of combat and exposure to danger (D. W. King, King, Foy, Keane, & Fairbank, 1999). The authors suggested the war experience of veterans and other trauma-related history be considered on a cumulative level in research, policy, and practice. Additionally, it was noted in a group of returning veterans in Great Britain, the presence of several risk factors—subthreshold mental health symptoms, decreased perceptions of health, and alcohol misuse following deployment— were critical to later development of PTSD (Goodwin et al., 2012)

On the other hand, protective factors modify or moderate the risk factors of an individual or group to increase positive outcomes (Rutter, 1987). More specifically, protective factors represent attributes of individual disposition, environmental characteristics, biological tendencies, and positive events that reduce and minimize the expression of deviance or promote the development of prosocial behaviors (Garmezy, Masten, & Tellegen, 1984). Protective factors either moderate the effects of risk through resistance to the effects of the stressor or mediate between risk and other protective factors (Fraser et al., 1999; Masten, 2001). Protective factors tend to have their greatest impact under conditions of elevated risk (Masten, 2014).

Numerous protective factors have been identified among military populations including optimism (Bryan, Ray-Sannerud, Morrow, & Etienne, 2013), hardiness and social support (D. W. King et al., 1999), grit (Maddi, Matthews, Kelly, Villarreal, & White, 2012), coping, spirituality, and exercise (Ballenger-Browning & Johnson, 2010), unit cohesion (A. Kline et al., 2013), and leadership style in stressful situations (Bartone, 2006). Wooten (2013) suggested risk and protective factors are present before, during, and after deployment, which, when overlooked in treatment or service provision can result in poor outcomes and lower resilience among military members. Recognizing the need for military members to develop positive emotionality, good health, solid social support structures, and a sense of purpose promotes the CAF model and the construct of resilience in a holistic fashion.

Rationale for the Present Study

Since 9-11 deployments have been a continual part of the experience for military personnel, specifically Airmen for purposes of this study. If an Airmen is not preparing to deploy, spending time downrange, or reintegrating following a recent deployment, he or she works with those who are doing so. Trying to respond to a deployment order, preparing family and friends for your imminent departure, facing the stress of deployment, and later trying to effectively reintegrate has a range of positive and negative effects on individuals (Strong et al., 2014). This pattern is known as the deployment cycle and consists of three stages—pre-deployment, deployment, and post-deployment integration. Each of these stages are part of the deployment disruption continuum, namely a "disruptive period of vulnerability and risk for military members" (Wooten, 2013, p. 707). Each stage or part of the disruption continuum applies different stressors on Airmen while simultaneously providing opportunities for personal

and professional growth. Being able to balance awareness of the negative stressors of deployment and the potential for growth are some of the natural challenges facing Airmen.

In general, Airmen deploy for a period of 3-6 months, not counting any required pre-deployment training. "Ops Tempo" is a term frequently used by military personnel to reference the frequency of required deployments. Depending on the career field there are different prescribed rates of deployment eligibility based on "banding"—the process of assigning Airmen to rotating groups which determine their window of eligibility for deployment. Some fields such as Explosive Ordinance Disposal (EOD) were in high demand as improvised explosive devices (IED) became a weapon of choice for insurgents, al-Qaeda, and the Taliban and were highly exposed to danger during their deployments. Their Ops Tempo was tremendously high with a 1:1 dwell time to deployment ratio. Others career fields had ratios as high as 4:1, with less exposure to the dangers of deployment. Not everyone deploys during their window of eligibility, which creates differences in deployment frequency and experiences among Airmen. The range includes those who haven't deployed, those who deploy but don't experience exposure to danger, those who deploy and experience indirect exposure to danger through indirect small-arms fire or mortars, and finally those who actively engage in direct combat. Given the variability in deployment frequency and exposure to danger a variety of behavioral responses—positive and negative—develop throughout the deployment cycle (Adler, Britt, Castro, McGurk, & Bliese, 2011; Adler, Huffman, Bliese, & Castro, 2005).

Due to the exposure to danger experienced by some Airmen problems may emerge, such as PTSD or depression, which may require professional help. Receiving professional services when needed can help reduce, manage, and overcome the long-term negative effects of deployment among Airmen. However, within the profession of arms there are cultural elements

that suggest seeking help for problems is a sign of weakness. Military personnel frequently

perceive barriers to care when attempting to obtain professional support if they are struggling to

address personal issues (Hoge et al., 2004). Consequently, military personnel tend to wait to

seek treatment with two general effects: their functioning improves through natural recovery or

they find themselves in a more complicated personal and diagnostic situation, making

manageability much more difficult. Part of the reluctance to seek treatment stems from the

continual, often unspoken, admonition to "man up", the fear of an associated stigma, or to avoid

any potential impact on their career (Kim, Britt, Klocko, Riviere, & Adler, 2011). One way to

help dispel these thought patterns and avoidance strategies requires a clear understanding of the

personnel most at risk and providing prevention efforts which are consistent with and build upon

their military experiences (Bryan & Morrow, 2011). However, this presupposes knowledge of

the behaviors and reactions Airmen may experience and how they relate to some of the known

deleterious effects of deployment.

This study will address behavioral patterns of Airman across the spectrum of deployment

exposure to danger and recency of deployment. In an evaluation of the chronicity of PTSD

symptoms among young adults it was found that symptomatology dramatically drops over the

course of two years and tends to plateau after that into a pattern of chronic expression of

symptoms (Breslau, 2001). A study of PTSD typologies and group characteristics, conducted

among a representative sample of U.S. adults, found exposure to military combat, sexual assault,

and physical assault were ranked as the most traumatic experiences among the high symptom

group (Pietrzak et al., 2014). However, a noted limitation was the cross sectional design and

inability to add a temporal comparison among the groups. In an additional study of Vietnam

veterans it was found that combat exposure was the most powerful predictor of PTSD,

14

depression and anxiety, but not alcohol or drug abuse (Boscarino, 1995).   A literature review found exposure to combat, not the branch of military service, to be most related to PTSD development (Ramchand, Rudavsky, Grant, Tanielian, & Jaycox, 2015). Exposure to combat seems to have a particularly powerful, negative effect on military personnel.

No studies have been conducted among Airmen to distinguish patterns of behavior among those Airmen who have deployed within two years and those who have not deployed within that timeframe. Understanding the differential patterns of behavior among Airmen who have experienced various levels of exposure to danger during deployment and how that pattern changes over time may help improve resilience and prevention training efforts among Airmen. The use of the large scale Air Force Community Assessment Survey (CAS) to address this area of research is unique.

Research Questions and Hypotheses

The research question for this study is intended to provide additional insight into the response patterns of Airmen to various levels of exposure to danger during a military deployment and how these patterns are affected by the lapse of time since deployment. Some of the key variables to be examined in this study, which represent risk and protective factors, include resilience, hardiness, self-efficacy, PTSD, depression, spirituality, coping, social support, health, alcohol use, and suicidal behaviors.

Question: Which resilience related variables account for group differences among Airmen across levels of deployment exposure (i.e., deployed with no exposure, deployed with indirect exposure to harm, deployed with direct combat experience) and time (past deployers— greater than 2 years ago; and recent deployers—within past 2 years)?

Hypothesis 1: As levels of exposure to danger increase self-reported resilience and hardiness will decrease.

Hypothesis 2: Past deployers will report higher levels of resilience and hardiness compared to recent deployers.

Hypothesis 3: With increasing levels of deployment exposure, the difference between reported levels of resilience and hardiness among past deployers and recent deployers will become progressively larger.

Hypothesis 4: PTSD, depression, and self-efficacy will have strong descriptive power in explaining differences between recent and past deployers across deployment stressors.

Hypothesis 5: Spirituality and alcohol consumption will be weak predictors of group membership, but will exhibit a positive relationship with an Airman's level of deployment exposure, regardless of time since deployment.

Chapter 2: Literature Review

Military Culture

The culture of military service has at least one primary, organizing theme—the inevitability of and preparation for armed conflict—which is the impetus behind many endeavors within the military and necessitates a warrior mindset to be effective. The military culture is steeped in values, traditions, social norms, and regulations which direct many levels of conduct. The inculcation of these values is aggressive and begins during Basic Military Training and is supported through continued professional military education. In particular, the "training, socialization, and indoctrination" of military members creates values common across services, which act as standards of conduct for military personnel (Coll, Weiss, & Yarvis, 2011, p. 498). The military emphasizes the importance of values such as peacefulness, personal restraint, and obedience to lawful orders to maintain good order and discipline (DeGeorge, 1987). Additionally, most military personnel, including Airmen, consider themselves as part of the "profession of arms" and are proud of their unique and exceptional service to the country (Department of the Air Force, 2015). The warrior mindset of the profession of arms has immense protective and motivational power for the warrior in times of danger and stress, which is frequently carried with the service member during times of conflict and peace (Cantrell & Dean, 2007)

Rank Structure

The organization of the military includes a hierarchical command structure to provide organization and a well-established "chain of command" ensuring clarity of the origins of orders and authority. The rank structure in the U.S. military is similarly structured and ordered across all services. The most basic division between ranks is between the officers and the enlisted. Each service member clearly wears a rank insignia on his or her uniform. While each service has different rank titles they are all based on a particular pay grade—the pay grade ensures equal pay for equal rank with equal years of service regardless of gender, ethnicity, or job. The enlisted pay grades range from E1 – E9 while officer pay grades range from O1 – O10. Table 1 shows a list of the pay grades and the names of the associated ranks for each branch of the Department of Defense. As the pay grade increases so do expectations regarding performance, responsibility, and accountability.

Officers are considered the official leaders of units, as such, commanders are always officers. They are appointed to their grade in the military services through the President of the United States or in some cases the Secretary of Defense. The guidelines for appointment state "officers recommended for appointment will be mentally, physically, morally, and professionally qualified for appointment and meet age, citizenship, and other eligibility requirements" (Department of Defense, 2015). In today's modern military a college education is generally required to become an officer. That has not always been the case, in the past officers could be appointed without this requirement or could literally rise through the ranks. As a result, officers tend to be slightly older than their enlisted counterparts. There is a certain category of officer, Warrant Officer, which forms a corps of technical experts in a particular field (intelligence, flight, etc.) and are utilized in the Army, Navy, and Marine Corps. Since the Air Force does not

currently have any Warrant Officers no further references will be made in this document. The ranks of officers can generally be broken into three tiers or levels of leadership: 1) Company Grade, 2) Field Grade, and 3) General.

Table 1

Rank Name per Pay Grade and Branch of Service

Paygrade	Air Force	Army	Marine Corps	Navy
Junior Enlisted				
E-1	Airman Basic	Private (no insignia)	Private	Seaman Recruit
E-2	Airman	Private	Private First Class	Seaman Apprentice
E-3	Airman First Class	Private First Class	Lance Corporal	Seaman
E-4	Senior Airman	Corporal or Specialist	Corporal	Petty Officer Third Class
Noncommissioned Officers				
E-5	Staff Sergeant	Sergeant	Sergeant	Petty Officer Second Class
E-6	Technical Sergeant	Staff Sergeant	Staff Sergeant	Petty Officer First Class
Senior Noncommissioned Officers				
E-7	Master Sergeant or First Sergeant	Sergeant First Class	Gunnery Sergeant	Chief Petty Officer
E-8	Senior Master Sergeant	Master Sergeant or First Sergeant	Master Sergeant or First Sergeant	Senior Chief Petty Officer
E-9	Chief Master Sergeant	Sergeant Major	Master Gunnery Sergeant or Sergeant Major	Master Chief Petty Officer
Company Grade Officers				
O-1	Second Lieutenant	Second Lieutenant	Second Lieutenant	Ensign
O-2	First Lieutenant	First Lieutenant	First Lieutenant	Lieutenant Junior Grade
O-3	Captain	Captain	Captain	Lieutenant
Field Grade Officers				
O-4	Major	Major	Major	Lieutenant Commander
O-5	Lieutenant Colonel	Lieutenant Colonel	Lieutenant Colonel	Commander
O-6	Colonel	Colonel	Colonel	Captain
General Officers				
O-7	Brigadier General	Brigadier General	Brigadier General	Rear Admiral Lower Half
O-8	Major General	Major General	Major General	Rear Admiral Upper Half
O-9	Lieutenant General	Lieutenant General	Lieutenant General	Vice Admiral
O-10	General	General	General	Admiral

Enlisted personnel make up a bulk of the military and constitute approximately 80% of the total Active Duty military force with a ratio of one Officer to 4.7 enlisted personnel (Military One Source, 2013). The enlisted personnel of the U.S. military are those most skilled and proficient in the day-to-day operations of their unit and specialized area of training. They are

frequently the most exposed to some of the dangers of military service including combat, are less compensated than officers, and may work long hours, particularly in fields such as maintenance and police work. The enlisted force structure is divided into three general tiers with increasing levels of responsibility: 1) Junior enlisted, 2) Noncommissioned Officer (NCO), and 3) Senior Noncommissioned Officer (SNCO) (Department of the Air Force, 2009). Each military service has a similar tiered system of rank structure.

A necessary component of military organization is maintaining good order and discipline. The military rank structure, as discussed, provides a framework for an orderly, disciplined organization. In any discussion of military personnel this basic principle of rank structure and the hierarchical chain of command should be well understood and considered to appropriately contextualize the experiences of service members. For example, social workers should ensure that their feedback and interventions are consistent with organizational values and are realistic given the organizational structure.

Military Personnel

A key characteristic of personnel in the profession of arms is their specialized training and skills to carry out a task with precision and accuracy. Specialized skills are developed and honed through extensive training, education, application, and supervision over the course of years. It should be little wonder that these professionals are eager to utilize their skills and abilities to make a meaningful contribution (C. A. Castro & Adler, 2011b). This may surprise those not serving within the military and this eagerness to actively apply their skills could be mischaracterized as machoism or warmongering (Kolenda, 2001). Often, military personnel receive training at a young age and are forced to work through a variety of struggles and challenges throughout their time in the military, which can have lasting effects. Research found

that those who entered military service at an early age in the late 1940's and 1950's experienced more stable outcomes in relationships, employment, and overall health compared to non-veterans (Elder, 1986). Research has also suggested individual outcomes of those who appeared resilient contrast those who struggle following adversity in one major way—the timing of the experiences (Rutter, 1993). The age of enlistment, previous training, and timing of deployment experiences all serve to affect the long-term outcomes of service members. Castro and Adler (2011b) maintain that this professional training and accompanying expectation of danger affects how we need to assess military personnel in regards to PTSD. In short, military personnel have skills, aptitudes, experiences, and a timeline of events which are not shared with their civilian counterparts and makes working with military personnel a unique opportunity.

One of the most distinguishing features of the military is the total force approach. This refers to each military service's separation of an Active Duty component from a Reserve component. In the Air Force and Army the reserve component is made up of the Reserves and National Guard, while the Navy and Marine Corps only have the Reserves. For purposes of this project, a distinction was not be made regarding the Reserves and National Guard, though there are distinct differences. Future references to the Reserve components will include both groups unless otherwise indicated. Active Duty (AD) personnel are employed full-time through their branch of service and as the name implies are actively on duty. The Reserves on the other hand generally serve one weekend per month and an extended training period sometime throughout the year—frequently the summer. The Reserve components can be mobilized to active service and work in an integrative manner with AD units to complete missions overseas in an Area of Responsibility or in the Continental United States.

The Reserve components generally do not live close to large military facilities and do not have the same level of formal support provided to AD personnel experience. This is especially critical after a deployment when members of a Reserve unit may no longer be in close association with members of their unit with whom they have frequently developed a close support network. Additionally, Reserve component personnel have an additional stressor of having to leave their civilian careers due to deployment, which is not shared by the AD component. Reserve component personnel are statistically older than AD members (Military One Source, 2013), thus altering the composition of maturity, experience level, and development trajectory to consider post-deployment. Given the staggering burdens shouldered and contributions made by the Reserve components since 9-11; the perception of "weekend warriors" has clearly been dispelled. The service of the Reserve component is critical to the success of the U. S. military and the sacrifices made and resilience demonstrated by these personnel make a unique and substantial contribution.

Air Force Personnel

By definition, the term "Airman" or "Airmen" can refer to a pilot or plane crew, a group of those who design, produce or maintain aircraft, or to those who belong to the U.S. Air Force. More specifically, Airmen refers to "people who formally belong to the U.S. Air Force and employ or support some aspect of the U.S. Air Force's aerospace power capabilities" (Baier, 1999, p. 5). This description is fitting as it covers the broad range of activities completed by Airmen to effectively project air power, including air, space, and cyberspace. Each Airman is assigned to a specific Air Force Specialty, which designates their profession and area of specialization. Air Force Specialties are grouped together based on common requirements for knowledge, training, and skills, which are each designated with an alpha-numeric code of one's

profession. For example, social workers are identified through the specific Air Force Specialty

Code of 42S. Some of the broad Air Force Specialties include operations, logistics, support,

medical, legal, finance, acquisition, investigation, and special duty. Airmen fill every position

possible to support an entire military force and airfield overseas, as well as to operate permanent

facilities at home. The shear variety of tasks and duties of Airmen makes it difficult to

summarize or reduce the experience of Airmen to common core knowledges or competencies.

Perspectives are diverse and will differ between fighter pilots and medical personnel, security

forces and chaplain's assistants, combat controllers and avionics maintainers, and explosive

ordinance disposal and public health. Each specialty serves a specific and valuable purpose but

how one perceives their Air Force experience, the exposure to danger, and even frequency of

deployment will all be impacted by an Airman's Air Force Specialty.

Historically, the Air Force was formed from the Army's Air Corps in 1947 and an

association remains between the U.S. Army and the U.S. Air Force to this day. For example,

during OEF and OIF Airmen were used to supplement undermanned fields in the Army through

the Joint Expeditionary Tasking program (Walter et al., 2010). Thus, Airmen served alongside

Soldiers, providing them unique experiences that would not have been gained otherwise. In

these cases, knowing an Air Force Specialty can only serve as a rough proxy for general

experiences and at times may have limited utility to inform of the nature of their deployment and

military experiences.

In 2013, using the total force approach, the Air Force constituted the second largest

service with 21.4% of military personnel while the Army represented the largest service with

47.4% of all military personnel (Military One Source, 2013). Among the active duty services,

the Air Force has the highest ratio (4:1) between officers and enlisted personnel, the highest

percentage of females (18.9), second highest rate of minority enlisted personnel (29.0), but the lowest minority rate among officers (18.9), and the oldest average age of enlisted personnel (28.1 years). The diversity present among Air Force personnel belies the importance of considering a broad range of cultural backgrounds and experiences.

Resilience

Thoren and Persson (2015) suggest the term "resilience" was introduced into the scientific vernacular around 1910 through the physical sciences (physics, engineering, textiles, etc.). The original meaning of the term referred to the degree or manner in which an object would resume its natural state or shape following a stressor. At the time, the constructs of load (the weight being applied), stress (the pressure on the object), and strain (capacity to withstand the induced stress) were introduced to help evaluate some of the relevant attributes of resilience (Lazarus, 2007). The original goal was to gauge the capacity of an object, under various conditions, to bend rather than break under the stress resulting from application of external forces (Tugade & Fredrickson, 2004). Usage was gradually incorporated into biology and other natural sciences and broadened to include systemic functioning beyond just material or individual functioning or response. A basic and traditional conceptualization of resilience, in the mental health field, is an ability to "bounce back" and is reminiscent of the initial usage of resilience within the physical sciences (Simmons & Yoder, 2013). The original ideas of resilience are also preserved in a characterization of resilience as experiencing distress (i.e. bending) after a significant stressor without becoming mentally ill (i.e. breaking) (Warchal & Graham, 2011). Yet, this simplistic explanation of bouncing back to a pre-stressor or pre-trauma state of performance or bending without breaking did not seem to sufficiently explain the

complex manifestations of adaptation exhibited in social structures, human relations, and individual response (Norris et al., 2008).

Resilience was introduced into psychiatry, psychology, and social work in the 1970's. One of the early pioneers, Emmy Werner, conducted the Kauai Longitudinal Study which began in 1955 among of a cohort of children in poverty and adverse life conditions at birth and followed them through middle adulthood (Werner & Smith, 1982). Based on the prevailing psychopathologic model at the time most of these children were expected to have poor outcomes on nearly every measureable aspect of function, yet this didn't happen. There was a portion of participants which did have poor outcomes but over time most of the children acquired a family, a respectable job, and those in trouble as teenagers changed behavioral patterns (Werner & Smith, 1992). These findings suggested resilience represents a developmental skill acquired or enhanced over time through various life patterns, behavioral strategies, and coping methods employed to overcome adversity.

The term invulnerable child was used during the 1970's and early 1980's (Rutter, 1993), including in Werner's work, and seemed to indicate that some children will not only do well no matter the circumstances, but will exceed expectations and thrive. One author in nursing indicated that the invulnerable child is the one who thrives in a challenging environment because he or she recognizes the risk and is able to cope with it competently (Burke, 1980). However, she also noted most children under similar conditions will turn out satisfactorily and the invulnerable child may be paying a price that can only be recognized later in life. She indicated only one invulnerable child tends to exist per family. Some in the field of social work also viewed the vulnerable child as being resistant to the deleterious effects of an adverse environment, while simultaneously recognizing competence in childhood does not guarantee

competence in the future (Robinson & Fields, 1983). These authors identified some of the characteristics of the invulnerable child: good social skills, self-confidence, perception of control over the immediate environment, ability to detach from the stressors, and innate intellectual or creative abilities. Such characteristics used to identify the invulnerable child are now known under the broad terminology of protective factors.

A well-known psychiatrist and resilience pioneer, Michael Rutter, noted the term "invulnerability" proved insufficient and guided the field towards a more explanatory term— resilience. He expounded on four weaknesses in the prior terminology and the need to transition to our current verbiage (Rutter, 1993). First, invulnerability conjures images of absolute resistance to damage or effects from stress. This would be an overstated case as most people have limits to what they can actually endure without negative impacts or psychological effects. Second, the term indicates that individuals are invulnerable across all risk circumstances. More recent thought on resilience suggests resistance to risk is a developmentally constituted, multimodal (educational, behavioral, emotional) construct (Luthar, Cicchetti, & Becker, 2000). Thus, one can be emotionally resilient, while being socially or educationally deficient. Third, invulnerability implied an intrinsic characteristic while ignoring the critical importance of social support in resilience (Carver, 1998; S. Cohen & Wills, 1985). Finally, the term suggests an unchangeable characteristic over time, contradicting much of what is known about development resulting significant life events and over the life course (Hutchison, 2005; Yates, Egeland, & Sroufe, 2003). A broad range of risk and protective factors became the focus of attention as invulnerability gradually gave way to research on resilience. Additionally, more attention was paid to resilience in adults and the distal outcomes over time.

Rutter, along with others (Cicchetti & Tucker, 1994; Luthar, 1991; Masten, Best, &

Garmezy, 1990), began noticing that many children who were expected to perform poorly

actually thrived in their adverse environment. Thriving occurs when an individual attains higher

levels of functioning post-stressor due to the development of new skills, abilities, self-esteem,

and critical social contacts (Carver, 1998; Herrman et al., 2011). This does not minimize the

effects and seriousness of some situational and environment stressors; rather, it emphasizes the

manner in which development of new capacities can improve functioning and not simply return

an individual to homeostasis. Developmental researchers have found that a controlled level of

exposure to adverse or traumatic situations can actually have a positive impact on an individual's

ability to cope with future problems (Herrman et al., 2011). Protective factors ultimately do not

eliminate problems and came to be conceived as one end of a continuum with risk factors at the

other end (Rutter, 1987). Consequently, Rutter noted that understanding the underlying

mechanisms of these factors was more critical to understanding resilience and how to help others

improve than finding new broadly identified protective factors. He suggested a turn in emphasis

from evaluation of risk factors to understanding the process through which individuals negotiate

the interactions between risk and protective factors (Rutter, 1987). As a result of a process

perspective of resilience, resilience became viewed as developmental and malleable. Therefore,

resilience no longer represented a static trait of the individual and did not operate the same over

time or within changing environmental circumstances. Rutter (1987) presented four basic

processes related to resilience: 1) reducing the impact of risk, 2) minimizing negative chain

reactions, 3) bolstering and sustaining self-esteem and self-efficacy, and 4) developing new

opportunities in difficult situations. These processes were central to the development of

individual resilience under various circumstances and to the movement of health outcomes.

Aaron Antonovsky (1979) wrote a seminal book, *Health, stress, and coping,* introducing salutogenesis—the understanding of the process of movement towards health. His ideas were in opposition to the general pathological model that assumed people are generally healthy to begin with; however, when pathology is introduced malfunctions (dis-ease) occur within an otherwise healthy system. In that model the focus of intervention was naturally to remedy the malady in order to restore performance. Through salutogenesis he assumed humans to be frail, weak, and susceptible to illness, yet so many of us turned out curiously healthy. He wanted to know what prompts people to move towards the health-ease end of the spectrum compared to the dis-ease end of the health spectrum. Naturally, this led to a desire to better understand processes of health, health promotion, resistance to malady and resilience. He developed a model of how health is promoted through generalized resistance resources—similar to protective factors. When challenges to physical and psychological health occur, the generalize resistance resources were utilized by the individual to cope in a manner that promotes health; this process came to be known as Sense of Coherence (SOC). The three components of SOC are meaningfulness, manageability, and comprehensibility (Antonovsky, 1996).   A review of the literature of SOC has found that it is a "dynamic complex dispositional trait that reflects a variety of personality domains, and that it can help explain individuals' adaptive capacity" (Griffiths, Ryan, & Foster, 2011, p. 169). Similar to resilience, the dynamic nature of SOC, the multiplicity of factors involved with health and well-being, and the nature of the ability to adapt to situational ambiguity proved theoretically important.

 Both Rutter (1987, 1993) and Antonovsky (1979, 1996) proposed health, protective factors, risk factors, and resilience should be on a continuum rather than viewed as static characteristics. The non-static nature of resilience has additional theoretical explanations. The

transactional model of development emphasizes the "plastic" nature of the environment and the individual "as an active participant in its own growth" (Sameroff, 2009, p. 8). The individual adapts to both the fixed elements and the increasingly complex social-environment, while simultaneously initiating and responding to environmental influences. Egeland, Carlson, and Sroufe (1993) identified the transactional process as an influence on the individual who "actively participates in this process, bringing to new experience attitudes, expectations, and feelings derived from a history of interactions that, in turn, influence the manner in which environmental cues and stimuli are interpreted and organized" (p. 518). This transaction between the individual and the social-environment, via mutual adaptation, forms a recursive pattern through which the individual shapes the environment and the environment shapes the individual. Sameroff (2009) proposed that the genotype, environtype, and phenotype all form a transactional pattern of development. According to the transactional model, a non-static nature of development exists between genetic makeup, gene expression, and the environment which serves to organize future experience. This represents a dynamic person-in-environment perspective.

Another set of authors suggested development over the life course is a matter of developmental cascades:

> the cumulative consequences for development of the many interactions and transactions occurring in developing systems that result in spreading effects across levels, among domains at the same level, and across different systems or generations. Theoretically these effects may be direct and unidirectional, direct and bidirectional, or indirect through various pathways, but the consequences are not transient: developmental cascades alter the course of development (Masten & Cicchetti, 2010, p. 491).

The cumulative effects of response heterogeneity in coping processes and methods can alter developmental trajectories and lead to new life paths or "road of life" (Bowen & Martin, 2011). Resilience, in part, is related to the behavioral trajectory of an individual—trajectories are addressed in a later section. Given the developmental cascade perspective of long-term resilience, the timing of interventions can play an important role in short- and long-term outcomes. Certainly, this implies resilience and reactions to adversity are malleable processes and patterns of behavior which can be responsive to timely and appropriate interventions. It also suggests resilience research needs to take into account a multiplicity of variables.

Both Richardson (2002) and Masten (2007, 2014) suggest resilience research has gone through multiple stages. Both models similarly describe the first three stages. For this discussion, Masten's model was used as it is more expansive and better reflects current trends in resilience research. She proposed four waves of resilience research (see Table 2) which are not chronologically ordered, but accumulatively based on the knowledge discovered from previous waves of research. In an iterative manner new research should help to clarify and refine findings from previous stages of resilience research. Rutter (2006) indicates some modern researchers underappreciate discoveries of the past by ignoring that what was once the cutting edge of research and theory is currently considered intuitive. Models of holistic resilience seem to be the newest pattern of research by looking beyond simple outcomes to the complex genetic, social, emotion, and environmental interactions. In a critique of cognitive-emotive models of trauma and trauma research, sociocultural and ecological models of trauma and loss were proposed to be more useful in explaining the effects of trauma (Hobfoll, 2001; Hobfoll & de Jong, 2014). Accounting for disruption to life patterns and loss of resources proves to be another critical

aspect of resilience research and is characteristic of Wave IV research (Hobfoll, Vinokur, Pierce, & Lewandowski-Romps, 2012).

Table 2

Waves of Resilience Research

Resilience Research	Organizing Goal
Wave I	Identify risk and protective factors
Wave II	Understand the processes underlying resilience
Wave III	Develop resilience promoting interventions
Wave IV	Increase holistic systems oriented analysis

Trajectories of Response to Trauma and Hardship

In a widely cited review article regarding response to trauma among adults, Bonanno (2004) presented a compelling argument to support differing patterns—or trajectories—of response to trauma. He suggested four general patterns: resilience (little to no loss of functioning), recovery (return to baseline performance over time), delayed (distal loss of functioning), and chronic (substantial and sustained patterns of poor performance or loss of functioning). His article is not without reasonable critique (see Linley and Joseph (2005) and Litz (2005) for additional information); however, he clearly presented the need to focus on long-term processes and patterns in resilience and response to trauma. Though not the first to present this idea he has been one of the most influential.

One of the earliest conceptions of trajectories of resilience was from Flach (1989) who coined the term "bifurcation point" as a time of a stress in which change is rife within or around the individual. Bifurcation points remove individuals from a state of homeostasis to engage in a process of disruption, chaos, resilience, reintegration, and establishment to form a new homeostatic structure of functioning. He viewed the disruption associated with bifurcation points as a healthy part of development, occurring across the lifespan at particular and

31

predictable developmental junctures, as well as idiosyncratic moments of loss or trauma. This model influenced other researchers to develop a model of resilience that built on the concepts of homeostasis and disorganization. In their model, Richardson, Neiger, Jensen, and Kumpfer (1990) added the role of protective factors in moderating disruption. They also identified several types of reintegration (i.e. trajectories)—resilient, homeostatic, maladaptive, and dysfunctional. Both of these models are outcome based and do not explicitly incorporate the role of time within the integration process.

In an article addressing the strengths and resilience of women in responding to challenges, the component of time was incorporated into a model in which challenges disrupted homeostasis, but simultaneously provided the opportunity for development over the lifespan leading to thriving, recovery, or survival (O'Leary & Ickovics, 1995). The outcomes determined the name of the trajectory, but time became a critical component of the recovery process. In further development of their model, resilience was conceptualized as a return to homeostasis and differing trajectories were clarified for those who do not achieve pre-disruption levels of functioning over time (Carver, 1998). It became increasingly clear that theory and research supported trajectories of growth, of resistance to maladaptation, and of decreased functioning. Though the outcomes and patterns were well recognized, it wasn't until 2000 that the term trajectory was used to designate the longitudinal and development path of resilience and response to trauma (Luthar & Ciccetti, 2000). Currently, trajectories represent the best way to measure and understand resilience as one, among many, response to trauma and severe stress (Norris, Tracy, & Galea, 2009). There is a distinct relationship between trajectories of resilience and longitudinal development in explaining problems occurring from combat and deployment, such as PTSD.

Theoretical Considerations

When considered as a dynamic process of adaptation following an adversity that either increases or reduces vulnerability to future dysfunction (Norris et al., 2008), resilience fits well with current social work theory and perspectives. Theories are made up of concepts and constructs, while research can either test or build theory it is generally conducted with variables. Concepts are inherently abstract (Fletcher & Sarkar, 2013), a brief phrase or word indicative of the phenomena (Fawcett, 1999), or generalized traits or qualities of an object, person or event (Bhattacherjee, 2012). Concepts essentially serve as the basic building blocks of a theory. Constructs on the other hand are explicative of the concepts in question (Drake & Jonson-Reid, 2008), are those things we are interested in studying, and are frequently multidimensional (Bhattacherjee, 2012). However, it is not until a method of measurement is introduced and a construct becomes operationalized that it is truly considered a variable of interest in any study (Bhattacherjee, 2012; Drake & Jonson-Reid, 2008). Research is therefore a systematically, rigorous process of evaluating and testing hypotheses generated from the relationships of concepts and constructs (Fawcett, 1999). Theory is a critical component of any research project in social work and serves as a guide to developing empirically testable hypotheses (Marsh, 2004). There is a clear relationship between theory and research insomuch that the theory will ultimately guide how we approach and make decisions about the variables within a study.

Theory can be conceived as a set of explanations which describe our current knowledge in an organized and systematic fashion (Payne, 2014). This depiction fits many circumstances when discussing theory; however, in research it leaves out a critical component. Theory is not only intended to organize and explain, but is also used to predict future findings (P. Miller, 2011; Royse, 1995). For purposes of this study theory served three general purposes: 1) guided the

hypotheses of the project, 2) organized the groupings of variables to be used in the data analysis, and 3) helped to explain or interpret the findings in a meaningful way. Two theories that social workers regularly utilize integrate well with resilience and our discussion thus far: crisis theory and resilience theory.

Crisis theory has several key components that give support to the underlying expectations of this project. The theory suggests individual members, and systems, are in a state of equilibrium (or steady state) prior to the presence of a stressor which then leads to disequilibrium and an active state of crisis (Payne, 2014). Crisis can exist along multiple dimensions and aspects of a person's life: development aberrations, situational trauma, existential regret, and environmental catastrophes (James & Gilliland, 2001). The purpose of any intervention, according to crisis theory becomes restoring a level of equilibrium through activation of coping skills or development of new coping strategies (Brandon, 1970). Once initial resolution of a crisis is obtained, theory suggests trans-crisis points exist which are potent, discrete periods of distress (i.e. anniversaries, familiar sites, etc.) which can again induce disequilibrium unless adequately prepared for in advance (James & Gilliland, 2001). This theory provides important insight to help understand how patterns of disorganization may exist immediately after a trauma or crisis but will diminish over time as a steady state is gradually resumed.

Resilience theory has emerged as a tool drawing on multiple other theories and constructs. The theory suggests resilience encompasses the strengths people and systems enact which enables them to overcome adversity (VanBreda, 2001). VanBreda's research was the first comprehensive review of the theories which contribute to the understanding of resilience. Since then, others have suggested resilience has its roots in "developmental theory and is an emerging theory in its own right…is also grounded in an ecological context and builds on the strengths

perspective. These multifaceted ideas and concepts allow for a multisystemic view of resilient behavior across the life course" (Greene, 2012, p. 15). Richardson (2002) incorporated the trajectories of outcomes and the central role of disruption to the resilience process. Additionally, the level of adversity one experiences over the life course has been integrated into resilience to suggest moderate levels of adversity generate the highest levels of resilience while too little or too much adversity will yield less optimal levels of functioning (Seery, 2011). Resilience theory contributes to our understanding of risk and protective factors, the initial disruption and loss of functioning, and the gradual integration of experience into new life patterns.

Protective Factors

In resilience research, protective factors serve a critical role as they help to identify some of the key aspects along which resilience occurs. Protective factors denote "conditions that buffer, interrupt, or prevent problems" (Greene, 2012). Some of the conditions include individual dispositional patterns, environmental circumstances, biological predispositions, and positive experiences (Garmezy et al., 1984). Protective factors are developmentally important throughout the life course and as such are not in a static state of effectiveness but rather continually changing with the individual circumstances. The ability to remain flexible in developing and applying protective factors is what allows the process of resilience to occur (Dyer & McGuinness, 1996). Protective factors are most effective and of critical importance to resilience when risk is high (Masten, 2014). The following discussions of hardiness, spirituality, and social support provide a sample of important protective factors for this study.

Hardiness

Hardiness is a critical aspect of measuring and assessing well-being and resilience in military populations; however, it was initially developed as a measurement of health outcomes

for medical patients. In a conceptual analysis of resilience in the military Simmons and Yoder (2013) found that four psychological attributes of resilience were consistently present in the literature relating to service members: adaptive coping, personal control, hardiness, and social support. The term was originally conceived with three components: 1) commitment or a sense of purpose and meaning in living one's life; 2) control or a perceived ability to independently influence surrounding events; 3) challenge or a perspective of change as an opportunity for growth and development (Kobasa, 1979; Kobasa, Maddi, & Kahn, 1982). Hardiness is considered one of the significant pathways to resilience (Maddi, 2005), an individual resilience resource (Bartone, Hystad, Eid, & Brevik, 2012) and a form of existential courage in adapting to and overcoming challenges to health and functioning (Maddi, 2004).

The most common measure of hardiness used at this time is one of several versions of the Dispositional Resilience Scale. The 45-item instrument was modified from a previous scale and employed in a study following a military aircraft disaster (Bartone, Ursano, Wright, & Ingraham, 1989). Through further study with military personnel the most current version, a 15-item scale (Bartone, 1995), has been developed and is frequently used to study military personnel (Dolan & Adler, 2006; Lynda A. King, King, Fairbank, Keane, & Adams, 1998; Maddi et al., 2012; Sutker, Davis, Uddo, & Ditta, 1995). The scale includes five questions for each component of hardiness and has a mix of positively and negatively worded items.

A well know evaluation of veterans of the Vietnam War, conducted by King, King, Fairbank, Keane, and Adams (1998) used data from the Nation Vietnam Veterans Readjustment Study. The authors tested a model involving war zone stressors, stressful life events, hardiness, social support (structural and functional) and PTSD among male and female veterans. They found hardiness had a negative, indirect effect upon PTSD through functional support,

36

accounting for 67% of the variance among women and 80% among men. A global perspective

of hardiness was used in that study, comprising of commitment, control, and challenge.

However, others found commitment to be the most critical component for veterans traumatized

in war (Sutker et al., 1995). Hardiness was the most salient predictor of PTSD compared to war

zone stressors, post-deployment stressors and social support. Conversely, combat emerged as a

meaningful variable by indirectly predicting PTSD. The authors suggested higher levels of

combat exposure may sensitize veterans to stressors later in life.

Spirituality

Another critical component of the Comprehensive Airman Fitness model of resilience is

spirituality, which can include the role of religious practices. In the wake of the terrorist attacks

of September 11, 2001, 90% of the respondents of a national survey reported using prayer,

religion, or spirituality at least a little bit in their personal responses to those events (Schuster et

al., 2001).   Trauma tends to invoke numerous types of responses from individuals including

existential questions related to environmental safety, the meaning of life, and personal value in a

world that seems to have changed due to the trauma (Janoff-Bulman, 1992). These questions can

be resolved for some through spirituality or religious practices. Spirituality is defined as "a

universal and fundamental human quality involving the search for a sense of meaning, purpose,

morality, well-being, and profundity in relationships with ourselves, others, and ultimately

reality," while religion represents a systematic "pattern of values, beliefs, symbols, behaviors,

and experiences…oriented toward spiritual concerns, shared by a community, and transmitted

over time in traditions" (Canda & Furman, 2010, p. 59). Spirituality represents a process of

personal renewal and meaning, while religion and religious practices facilitate spirituality in a

social environment. Resilience theory suggests individuals have a framework of internal moral

principles guiding behaviors and actions which then provides motivational energy and the

capacity to "flourish when living within one's moral framework" (G. E. Richardson, 2002, p.

317). This internal moral framework can be of a spiritual or religious origin, but more

importantly than how one obtains this framework it denotes an internalization of meaning and

standards. Spirituality and religious practice thus become a tool to developing resilience-related

characteristics and behaviors, especially following a trauma related event (Farley, 2007). Both

spirituality and religious practice represent potentially significant contributions to resilience

among veterans.

Wansink and Wansink (2013) found combat intensity to be a significant factor in

religious experiences for WWII veterans. They identified increased rates of prayer for those

with the most intense combat experiences as well as a 21% increase in church attendance if

combat was seen as a negative experience. Some suppose this increase of religiosity may be the

result of a spiritual struggle resulting from "negative religious cognitions about the self, God, and

the world" (Wortmann, Park, & Edmondson, 2011, p. 443), which stimulates their search for

meaning. Among Vietnam combat veterans, spiritual distress (i.e. anger, guilt, lack of meaning

or purpose in life, despair, and religious doubt) was positively associated with depression and

PTSD, while lower levels of spiritual distress were found among those with PTSD who attended

religious services and found faith to be an important part of their life (Berg, 2011).

While religious attitudes and spirituality can be profoundly healing, there can be

detrimental results when negative attributions of self and guilt result from religious coping

(Bjorck & Thurman, 2007; B. L. Green, Lindy, & Grace, 1988). For example, Ogden et al.

(2011) identified two religious factors among veterans, "seeking spiritual support" and "religious

strain". Seeking spiritual support was positively related with posttraumatic growth while

religious strain, or negative religious coping, was positively associated with increased symptoms of PTSD. In military research, pretreatment spirituality was found to be the most significant predictor of posttreatment severity of PTSD outcomes, even when controlling for combat severity (Currier, Holland, & Drescher, 2015).

Given these studies and the current focus in the military on Total Force Fitness, spiritual fitness has emerged as a critical aspect of military prevention and fitness efforts. Spiritual fitness represents a comprehensive spiritual program with multiple components: 1) spiritual beliefs, 2) spiritual values, 3) spiritual practices, 4) core beliefs (purpose and meaning), 5) self-awareness (reflection and introspection), 6) transcendence (relationships beyond the self), and 7) exceptional spiritual experiences (Hufford, Fritts, & Rhodes, 2010). The characteristics associated with spiritual fitness also serve as a protection to moral injury that is frequently seen among combat veterans who engage in or witness events contrary to their internalized moral framework (Worthington & Langberg, 2012). Spiritual fitness, as measured by spirituality and religious participation, can facilitate the healing and resilience related processes necessary for growth and prevention of long-term problems. A research project on resilience conducted by the RAND Corporation on behalf of the U.S. Air Force suggests spiritual fitness efforts can be targeted at individual, unit, family, and community levels to increase efficacy and improvement of the supporting mechanisms for the individual (Yeung & Martin, 2013). The relationship between spirituality and resilience has proven to be an important aspect of resilience among combat exposed Airmen.

Social Support

Social support is recognized as playing a buffering role from negative effects of stress or trauma within general populations (S. Cohen & Wills, 1985). A study of veterans indicated post-

deployment social support may be more important that unit cohesion during the time of deployment in predicting mental health outcomes such as PTSD (L. A. King, King, Vogt, Knight, & Samper, 2006). This suggests that timing may be an important factor in social support, not simply its presence or absence. In a study of combat exposed Vietnam veterans and non-combat exposed veterans social support was significantly negatively associated with PTSD, depression, and anxiety, with a smaller negative statistical effect on alcohol consumption (Boscarino, 1995). Those categorized with low social support were 80% more likely to experience PTSD than veterans with average social support and 180% more likely than veterans with high social support. These findings remained consistent even after controlling for levels of combat. Ozer, Best, Lipsey, and Weiss (2008) conducted a meta-analysis of predictors of PTSD; they found low social support to be a strong predictor when the index trauma was combat compared to other traumatic experiences. In particular, unit support was significantly negatively associated with symptoms of PTSD among veterans from OEF and OIF and post-deployment social support showed an even more robust effect (Pietrzak, Goldstein, Malley, Rivers, & Southwick, 2010). Whitesell and Owens (2012) found limited evidence of the impact of social support on outcomes of PTSD; however, their sample consisted primarily of the Reserve components who may have differing experiences and expectations of social support as the active duty force. Recognizable social support, both in and outside the military, seems to serve as a significant protective factor in dealing with trauma, especially that from combat.

Risk Factors

In contrast to the protective factors previously presented, risk factors represent characteristics of a group, individual, or condition which serve to predict levels of negative outcomes (Wright & Masten, 2006) and increase the probability of problem onset from the risk

characteristics (Fraser et al., 1999). Deployment stressors and experiences can become group

and individual risk factors for Airmen following deployment. In a report to congress in 2009,

RAND Corporation researcher Terri Tanielian identified depression and PTSD as two of the

significant outcomes of combat trauma, which also have an influence on suicide and substance

use, particularly alcohol. In line with her conceptualization of some of the risk factors affecting

veterans, this study included the variables of depression, PTSD, and suicide behaviors.

Depression

Depression is not simply an emotional state, but a condition with biological and

psychosocial factors which buffer or increase the likelihood of expression (Southwick,

Vythilingam, & Charney, 2005). The buffering factors are on a continuum as are stress

resilience characteristics including optimism, spirituality, social support, exercise, stress

inoculation, cognitive flexibility, and a propensity to reappraise stressful events. Depression can

be indicative of low resilience or the overwhelming of resilient coping capacities (L. A. Zoellner

& Feeny, 2014). Resilience can also be seen as a protective factor of depression. When the

relationship between childhood trauma (particularly abuse), combat severity and depression was

examined using the CD-RISC, resilience was found to be the mediating variable (Youssef et al.,

2013). Additionally, among Airmen seeking services in a mental health clinic, optimism was

found to buffer against depression, hopelessness, and suicidal ideation (Bryan et al., 2013).

However, these same authors reported optimism did not moderate the relationship with PTSD.

In a study of elite pararescuemen in the U.S. Air Force, depression rates were

approximately 1.6% regardless of service component (i.e. Active Duty, National Guard, Reserve)

and remained constant when controlling for demographic variables (Morrow et al., 2013). These

same pararescuemen had considerably higher levels of exposure to combat and post trauma

symptomatology. It has been reported that two thirds of those with PTSD who also experience

depression and symptoms tend to be symptomatically more severe compared to those with

depression or PTSD only (Karney, Ramchand, Osilla, Caldarone, & Burns, 2008). One study

completed through Veterans Affairs' clinics found those who screened positive for PTSD and

major depressive disorder were more likely to experience physical health problems, social

isolation, and suicidal ideations compared to those with depression alone (D. G. Campbell et al.,

2007). Depression is a critical factor in evaluating resilience in military members, is highly

related to PTSD, and is a known risk factor for suicide among military personnel and civilians.

PTSD

Posttraumatic stress disorder (PTSD) is among the most recognizable problems

associated with trauma, particularly in relation to violence or combat. The roots of PTSD are

generally assumed to lie within the individual, a cognitive problem, through intrusive and

disturbing memories or an emotive problem through to hyperarousal and numbing (Brewin &

Holmes, 2003). Many theories of PTSD and trauma exist to explain these patterns. However,

there is an emerging theoretical strain suggesting that a social-ecological framework best

addresses the patterns seen in resilience and PTSD (Folke, 2006; Hobfoll & de Jong, 2014). In

particular, social support, role and life disruption, and community level factors related to loss

play a more important role than cognitive-emotive variables (Hobfoll & de Jong, 2014). Given

the previous discussion on holistic resilience and this conceptualization of the origins of PTSD,

the importance to evaluate the full spectrum of risk and protective factors seems clear.

The median time for remission from PTSD based on the National Comorbidity Survey

was found to be 24.9 months from the time of the event (Breslau, 2001). The rate of remission

from PTSD decreases after two years post trauma suggesting that the time of greatest

malleability of symptomatology may be within the first two years following a trauma. A meta-analysis was conducted regarding the salience of risk factors for PTSD (Brewin, Andrews, & Valentine, 2000). They found trauma severity, the lack of social support following trauma, and adverse childhood events (other than abuse) presented a significantly stronger effect in studies of military personnel than their civilian counterparts.

The timing of measurement is essential to understanding responses to trauma, such as resilience and PTSD (Rutter, 2006). Rutter proposed individuals who experience current adversity and appear to not handle it well may be in a "steeling" process which ultimately strengthens them against negative outcomes to adversity in the future. They learn the necessary coping skills to manage disruption. Others may initially appear to handle a severe stressor, but have actually become sensitized to future adversity, thus making a poor outcome more likely in the future. This may be related to the delayed trajectory suggested by Bonanno (2004). Elder and Clipp (1989) found veterans who engaged in heavy combat became more resilient over time, measured in decades, compared to those not engaged in heavy combat. Heavy combatants initially looked worse but steadily improved, as a group, over time. However, in a meta-analysis of PTSD screening, Gates et al. (2012) determined rates of PTSD increase over time as well. It should be noted the authors suggested an alternative interest can exist in some military members to manifest PTSD in order to receive compensation and screeners differ on levels of sensitivity.

Hoge et al. (2004) found within 3 - 4 months after returning from deployment, 11 - 17% of the combat Soldiers and Marines from OEF and OIF experienced PTSD, depression, or anxiety. For all groups within their study, there was a link between engagement in combat, exposure to combat related experiences, and PTSD. They found a positive linear relationship existed between the number of firefights and the rates of PTSD. Rates of PTSD were associated

with being wounded or injured during deployment with an odds ratio of 2.49 in Afghanistan and

3.27 in Iraq. In considering the effect of time on individual rates of PTSD and resilience, a

longitudinal study may be ideal for examining these issues. Bonanno et al. (2012) utilized the

Millennial Cohort Study of military personnel who began service in 2000 and will follow them

for 21 years. The research team found five trajectories of response were evident in the data

among single and multiple deployers, with similar rates on each trajectory for each group. A

vast majority of the sample, 83.1% for single deployers and 84.9% for multiple deployers,

exhibited a stable trajectory of few if any symptoms of PTSD over time. It was unclear if similar

rates and patterns exist for depression, anxiety, and substance abuse.

Suicide

Suicide among veterans and military personnel is becoming a national tragedy as the rate

has become critically high. By the year 2010 suicides among veterans reached 22 per day which

is over twice the national average for those in the same demographic groups (Lazar, 2014). The

extent of the problem necessitates increased attention to this complex problem among military

personnel and specific efforts to determine effective mediating factors, such as resilience

(Youssef et al., 2013). Suicide is the act of killing oneself but there are a spectrum of cognitions

and behaviors associated with suicide such as ideations, planning, and attempts (some of which

are completed) (Naifeh, Cox, Goldenberg, & Nock, 2014).

In popular culture the unfortunate term "successful suicide" rather than completed

suicide has been used and drifted into the professional vernacular (Runeson, Tidemalm, Dahlin,

Lichtenstein, & Långström, 2010). This terminology should be soundly disavowed, as a suicide

represents a failure or breakdown at one or more levels: 1) the social systems to recognize or

prevent such a tragedy, 2) social networks to adequately support the individual, or 3) the

individual to reach out, accept, or recognize the support and services available. A suicide is not "successful" under these conditions and seems to disregard the inherent value of the individual and respect for life social workers claim (National Association of Social Workers, 1996).

Naifeh, Cox, Goldenberg, and Nock (2014) presented a model of risk and protective factors related to suicidal behaviors. Risk factors fall under the categories of mental disorders, psychological factors (e.g. impulsivity, rigidity, impaired executive functioning), previous suicidal behaviors, demographic factors, family history, stressful life experiences, and situational factors. The specified protective factors are psychological factors (e.g. hardiness, resilience, well-being, hope, and gratitude), social support, and mental health treatment. Their model is consistent with previously mentioned research and theory. Among returning veterans from OEF and OIF, mental health disorders such an anxiety disorders (including PTSD), mood disorders (including depression and adjustment disorders), and substance abuse resulted in significantly higher levels of suicidal behaviors (Bachynski et al., 2012). Additionally, these authors found male gender, age (< 25), lower rank, being married, and deployment were all demographic factors associated with higher levels of suicide.

A study among OEF and OIF veterans found risk and protective factors to be the most statistically significant influences upon suicidal ideation (Pietrzak, Goldstein, Malley, Rivers, Johnson, & Southwick, 2010). They reported an odds ratio for suicidal ideation related to the risk factors of PTSD (13.58), depression (19.52), and alcohol problems (3.18), while protective factors or resilience (comprised of hardiness, spirituality, and leadership), unit support, and post-deployment social support were negatively associated with suicidal ideations. History of childhood trauma contributes to suicidal ideation for some individuals who are at higher risk of both SI and depression (Youssef et al., 2013). A study using data from the National

45

Epidemiologic Survey on Alcohol and Related Conditions found that suicide attempts among

those with PTSD clustered around the symptoms of physical reactivity to trauma reminders, a

sense of a foreshortened future, and inability to recall part of the trauma experience (Selaman,

Chartrand, Bolton, & Sareen, 2014). However, in another study of OEF and OIF veterans the

PTSD symptom cluster of avoidance was more highly associated with current suicidal ideation

(Lemaire & Graham, 2011). A literature review of resilience to suicide found that both

resilience factors and risk factors could be "bipolar" by providing differing levels of buffering

against suicide (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011). Higher levels of positivity

and a sense of autonomy buffered against suicide while perfectionism and hopelessness

amplified the risk. Finally, in a study of U.S. Airmen using 2006 CAS data it was found that

depression, alcohol use, social support and work satisfaction may all be critical keys in

prevention of suicide behaviors (Langhinrichsen-Rohling, Snarr, Slep, Heyman, & Foran, 2011).

In summary, understanding how risk and protective factors differentially affect suicidal

behaviors seems to be an important goal of research among military members, as a complex set

of psychological, social, historical, and personal circumstances affect a range of suicide

behaviors. The effects appear particularly pronounced among military members as their suicide

rate has reached staggering rates.

Related Constructs

As brought up in the CAF model, well-being represents the central purpose of the

program and an important component of resilience to adversity. Well-being as described through

the CAF is a subjective condition of happiness, health, or prosperity (Department of the Air

Force, 2014). Some authors further emphasize well-being as a positive psychological state of

functioning which incorporates six dimensions: 1) self-acceptance, 2) positive relations with

others, 3) autonomy, 4) environmental mastery, 5) purpose of life, and 6) personal growth (Ryff & Singer, 1996). These authors further suggested mental health consists of developing and internalizing the characteristics of well-being, not simply lacking deleterious effects. Their model represents an application of salutogenics in resilience research. Similarly, CAF presupposes fitness as a state of health as suggested by salutogenics, not merely the absence of illness or dysfunction. There is also some clear overlap between well-being and the three components of hardiness described previously, thus lending further support to the use of a model of fitness and well-being to study resilience. Resilience is more than simply a lack of problems following a period of stress and difficulty (C. A. Castro & Adler, 2011a; Norris et al., 2009), but rather the attainment of a sense of well-being, or wellness, despite adversity (Saleebey, 2009; Tusaie & Dyer, 2004). The concept of wellness, defined as "a multidimensional state of being describing the existence of positive physical, mental, social, and spiritual fitness in an individual as exemplified by quality of life and a sense of well-being" (Department of the Air Force, 2014), is thus a manifestation of well-being, much like resilience. Resilience and well-being are subjective conditions based on an individual's perception of their current condition, or outcome, rather than a predetermined level of attributes. The operationalization of resilience will be discussed in the next chapter on methodology.

Summary

Military members serve in a unique and fluid environment filled with high demands, uncompromising obligation, uncertainty, risk, family stressors, and at times separation. Despite this, the military offers a host of intangible and supportive compensations, such as education, training opportunities, high quality medical care, and available services, which help to sustain and build the service member, their family, and the surrounding community. Consequently,

service members and their families enjoy a sense of community, purpose, courage, and levels of personal growth not previously experienced. It is difficult to understand and adequately explain the experience of a military service member without addressing a holistic perspective of the entire person and the environment. Though some suffer emotionally or physically from their military service, many also find growth, development, and a sense of pride that cannot be attained in any other way. For this reason a study of military members and deployment—frequently the most stressful part of military service—must include the possibility of negative outcomes as well as development of resilience and other strengths.

Just as combat has a range of mild to severe negative sequelae over time ranging from combat and operational stress reactions to acute stress disorder to PTSD, so does resilience. This phenomena is best summarized by the late Lieutenant Colonel David E. Cabrera (U.S. Army), "psychological response to war exposures occurs across the full spectrum of duration and severity on the basis of characteristics of the exposure and the individual and the nature of the community to which he or she returns" (Cabrera & Benedek, 2014, pp. 113-114). When considered along such broad continuums resilience can be seen as a process linking adaptive capacities to trajectories of positive outcomes (Norris et al., 2008), increasing capacity to meet changing demands (Tugade & Fredrickson, 2004), or interacting with developmental processes between risk and protective factors (Maeseele, Verleye, Stevens, & Speckhard, 2008). Building on the previously mentioned CAF definition of resilience and the professional literature reviewed, the definition of resilience used in this study is the process of developing a combination of holistic, protective resources to increase the ability to withstand, recover, and grow over time in the face of anticipated demands and past stressors. The literature supports the use of time, a holistic factors, and various levels of stressors in research with service members.

Chapter 3: Methodology

This investigation is intended to provide information helpful to Commanders, researchers, policy makers, and other interested personnel in gaining a holistic view of the effects of deployment on risk and resilience factors for today's Airmen. Comprehensive Airmen Fitness (CAF) has been employed across the Air Force to increase resilience and prevent negative sequelae related to deployment and military service. CAF was not intended to become a one-size-fit-all program, thus understanding some of the patterns of risk and protective factors among Airmen, using CAF as a guide, may prove useful for those who implement prevention or treatment programs to improve targeted interventions for those most at risk. The following sections were written to describe the origin of the data and methodology utilized to reach the results and conclusions.

Survey Research

A survey is a frequently employed research method using questionnaires to gather data about behavioral, preferential, social, or cognitive patterns among individuals (Bhattacherjee, 2012). Krosnick, Lavrakas and Kim (2014) suggest four key components of good survey research: 1) it delineates a specific population to be described and examined, 2) it draws a representative sample, 3) the data collection is accomplished through asking questions, and 4) statistics are calculated related to the sampling process. This type of research is effective among populations either too large or too disperse to conduct other forms of research. It is an

economical form of research, especially in the case of generating large data sets. The use of

large samples is effective in detecting small effects that would otherwise be obscured in smaller

samples. However, survey research is subject to multiple biases such as non-response, sampling,

social desirability, recall, and spurious relationships (Bhattacherjee, 2012). These biases can be

systematic or random, but both affect the results by decreasing the accurate representation of the

population they were designed to describe.

Secondary Analysis

This study relied exclusively on secondary data obtained from the U.S. Air Force

Community Assessment Survey (CAS).   The decision to use secondary data was multifaceted

and areas such as ethics, benefits and drawbacks were considered in selecting this type of

research. Secondary data are data sets available to those outside of the original research team

(Pienta, O'Rourke, & Franks, 2011). Other authors indicate that the term "secondary data" and

"secondary data analysis" are imprecise, as it does not delineate when the data becomes

secondary versus primary (Cheng & Phillips, 2014). They further suggested "secondary analysis

of existing data" as the most appropriate term by implying the data is being used in a fashion, or

to answer a question, other than originally intended—even if accomplished by the original team

of researchers. For purposes of this project, secondary analysis referred to use of existing data to

answer research questions not previously analyzed with a particular dataset.

The National Association of Social Workers (NASW) Code of Ethics applies to social

workers regardless of whether their practice setting is clinical, research, policy, or teaching. The

NASW Code of Ethics (1.07a) indicates "social workers should not solicit private information

from clients unless it is essential to providing services or conducting social work evaluation or

research" (National Association of Social Workers, 1996). Secondary analysis is an ethical

method to conduct research through existing data, limiting the exposure of private information to additional participants. All research methodologies impose some level of risk to participants, require time from participants, and are intrusive in some manner, thus sensitivity to participant risk is an ethical duty of social workers. Large data sets are also virtually impossible to be adequately analyzed by a single research team, which leaves a wealth of information to be gleaned (Dunn, Arslanian-Engoren, DeKoekkoek, Jadack, & Scott, 2015). Many authors collect data beyond the minimum necessary to answer the original question providing opportunities for additional research with the same data (D. A. Campbell, 2007). This methodology provides opportunities to conduct nuanced analysis of previous findings via advanced statistical methods (Vartanian, 2011).

Data sharing, through secondary analysis, provides an effective manner to maximize resource utilization through reuse of the original data, benefitting both the scientific community and the public (Pienta et al., 2011). Utilizing existing data represents a low cost alternative to the traditional path of developing a full project proposal in order to solicit funding (Cheng & Phillips, 2014). Consequently, more time can be spent on analysis than primary data collection and makes full use of data available from hard to sample populations. Conducting secondary analysis also allows a researcher to gain a "bird's eye view" of population characteristics, adequacy of measured variables, need to oversample some populations, and other necessary insights necessary to improve collection of primary data in the future (Kiecolt & Nathan, 1985; Smith et al., 2011). Secondary analysis can prove useful in replicating important or complicated findings without having to gather another dataset (Greenhoot & Dowsett, 2012).

Despite some of the discussed benefits, secondary analysis has limitations that must also be considered prior to utilization. First, the data was collected for a different purpose and may

not contain the necessary set of variables to answer the intended research questions. For this reason, Vartanian (2011) suggests the researcher determine whether the dependent and independent variables are present before selecting a dataset. Lacking the necessary variables can lead to underspecified or theoretically weak models. In cases when a model of the relevant concepts and necessary constructs cannot be operationalized into variables from the existing data, then secondary analysis might be an inappropriate method to answer the research question (Pienta et al., 2011). Next, some data may neglect some populations of interest, such as women or minority groups (Coyer & Gallo, 2005). In this case, a researcher must search for another dataset, collect primary data, or modify the existing question for use with a different population. In other words, a dataset might only offer insight into larger populations when the researcher may be interested in the specifics of a subpopulation (Vartanian, 2011). A secondary researcher may have concerns related to data quality, such as accuracy of data entry, with little way of assessing the impact (Kiecolt & Nathan, 1985). Finally, the literature for secondary analysis has not developed as rapidly and is not as robust as the primary data collection literature, leaving few frameworks to guide those seeking to conduct quality secondary analysis (Smith et al., 2011).

An analytic framework is an intellectual tool which gives order, relevance, and meaning to essential components of a complex process or phenomena (Gilbert & Terrell, 2013). Secondary analysis can be considered a complex process, which necessitates adherence to an analytic framework ensuring steps are taken to adequately address the research process throughout this project. Vartanian (2011) presented a clear and concise method to evaluate the feasibility of using a particular data set for social workers, but stopped short of providing an analytic framework. Additionally, Campbell (2007) proposes a clear process exists to select an appropriate data set for secondary analysis. First, a researcher must determine their area of

interest and formulate a question to be asked. The next step is to determine if an existing data

source can reasonably be used to answer the question and if the data is of sufficient quality. If

the answer to both questions is yes, then the researcher proceeds to obtain and analyze the data in

a different way or by asking different questions from the original study. However, this too stops

short of a full analytic framework necessary to take full advantage of secondary analysis.

Table 3

Framework for Successful Secondary Analysis with Large Datasets

Steps	Practical Advice
1. Designate the research topic and question	Start with a thorough literature review Confirm clinical or policy relevance exists Ensure the research question contains sound a priori reasoning Flexibly adapt your question to characteristics of the dataset
2. Select a dataset	Increase the novelty of the research: •Select a novel dataset for use in your field •Link datasets together to gain a fresh perspective Factor in complexity of the dataset Factor in cost and time to acquire the dataset Consider selecting a dataset your mentor has used previously
3. Get to know the dataset	Learn the answers to the following questions: •Why does the database exist? •Who reports the data? •What are the incentives for accurate reporting? •How are the data audited, if at all? •Can you link your dataset to other large datasets? Read everything available about the database Certify if the measures have been validated in other sources Personally analyze the dataset to get a close feel for the data
4. Structure analysis and presentation of findings in a clinically meaningful manner	Think carefully about the clinical implications of findings Be cautious when interpreting statistical significance •Large samples can yield statistically significant associations which are clinically or practically irrelevant Consult with a statistician for complex datasets and analyses Think carefully about how to effectively portray the data

Adapted from Smith et al. (2011)

Smith et al. (2011) provided a four-step framework to conduct secondary analysis, especially with large data sets in family medicine (see Table 3). Radey (2010) developed another framework for social workers conducting secondary analysis; however, Smith et al. (2011) presented a more comprehensive explanation of the process and their model was utilized for this project. By following these steps, this project will take on a question-driven, deductive pattern to test a hypothesis rather than inductively developing a model based on exploration of the data (Cheng & Phillips, 2014). Additionally, adhering to an established framework for secondary analysis may increase the production of meaningful and relevant results, rendering the stated outcomes of the study more likely.

The 2013 CAS Dataset

The CAS has been collected every 2-3 years since 1989, most recently in 2006, 2008, 2011, 2013, and 2015 and has served as a tool to obtain a large-scale perspective of holistic well-being across the Air Force. The 2013 CAS is the 11th iteration and was conducted from April to August 2013. It was anticipated to take military personnel between 30-45 minutes to complete. The reported aims were to gather information necessary to improve community capacity initiatives and increase operational readiness of Airmen and their families. The U.S. Air Force also indicated a goals was to attain a holistic perspective of well-being across the entire Air Force community. With an emphasis on resilience, the data collection team viewed resilience as bouncing back and thriving in the face of challenges and stressors. Based on the previous discussion of resilience, this seemed to be an appropriate conceptualization in line with the existing literature.

The dataset took into account the total force perspective, meaning that Active Duty members and spouses, Reserve members and spouses, Air National Guard members and spouses,

and civilian employees were included as survey respondents. However, since the research

question in this study did not directly relate to spouses or civilians, no further mention has been

made of their involvement with the CAS. The CAS is the only Air Force wide survey with

tailored responses to the individual respondent. For example, AD personnel had approximately

1,124 survey items while the Reserve components had 1,100 items.

The results of the 2013 CAS were compiled into a series of reports for the Headquarters

of all three U.S. Air Force components (active duty, Reserves, Air National Guard). These

reports consisted of key findings to leaders of these Air Force components. Ipsos also generated

aggregated data from each installations and organization with reported results including

individual item responses based on rank and other demographic variables when feasible. Finally,

reports were submitted comparing results from previous years of the CAS.

All participants were notified and encouraged, via email, to participate in the anonymous,

voluntary electronic survey. The contracting agency responsible for implementation of CAS,

Ipsos, had the duty to ensure confidentiality was maintained by designing the assessment to

prevent the Air Force, Commanders, or Ipsos from linking participant responses to personally

identifying information. This important step was intended to help encourage accurate responses

to sensitive questions on the survey, related to drug abuse and domestic violence, which could

have negative legal and career implications if the participant were to be identified.

The CAS oversampled several groups due to relatively small numbers, including females,

and historically low response rates, including junior enlisted personnel. Oversampling is the

deliberate recruitment of more individuals from a particular group than would be generated from

a naturally occurring random sample of the population (Drake & Jonson-Reid, 2008). The power

for statistical analysis of the oversampled groups became more effective due to the increased

sample size. Oversampling required a weighting strategy to be employed during the analysis to

ensure the sample was representative of the Air Force population. In general, weights prove

particularly useful in point estimates and descriptive analyses (Lee & Forthofer, 2006). The Air

Force required the use of a weighting strategy to be developed from population data to maximize

representativeness, particularly in relation to gender and rank. This project presented some basic

unweighted demographic information of the sample compared to the weighted sample, but all

subsequent analyses were conducted with weighted data.

The sampling strategy was divided by base or Wing, and 84 Air Force installations, 40

Reserve installations, and 89 Air National Guard Wings were included in this survey. For each

AD installation approximately 2,222 personnel were sampled. If an installation had fewer than

that number, the entire AD population on the base was sampled. The goal was to sample

160,000 AD personnel and 40,000 from both the Reserves and Air National Guard. The actual

sampling frame was 244,954 Airmen.

One of the prominent threats to sample representativeness and the introduction of bias

was non-response. Response rates measured the number of respondents who actually

participated in the survey compared to the total number of those eligible to participate. The

greater the difference in response rate from 100%, the greater the potential for the introduction of

systematic error, potentially resulting in an unrepresentative, non-random sample (Krosnick et

al., 2014). The primary problem of survey non-response concerns the degree to which the

resulting sample deviates from accurately representing the population from which it was

originally drawn (Drake & Jonson-Reid, 2008). The response rate for the 2013 CAS was lower

than anticipated: 24% among Active Duty personnel, 13% among Reservists, and 15% among

the Air National Guard with a total response rate of 21%. The response rate was calculated as mentioned above, but reduced the total sample size by the number of undeliverable emails.

The RAND Corporation completed a study, commissioned by the Air Force, to examine the low response rates among younger Airmen in large surveys, including the 2013 CAS (L. L. Miller & Aharoni, 2015). Among the Active Duty sample, the junior enlisted had the lowest response rate at 12%, followed by the junior officers at 24%. The same pattern was found among the Reserve components, albeit with a starker contrast, with the junior enlisted response rate of 5% and a junior officer response rate of 11%. The authors suggested the lower response rate could be a function of enlisted vs. officer disparities, less access to the internet for junior enlisted, workload, less time for and interest in survey topics, a less favorable view of the organization among younger personnel, and other unknown factors (L. L. Miller & Aharoni, 2015). Additionally, the authors indicated no minimum established response rate exists for results to be valid; a low response rate does not necessarily mean invalid or skewed results.

The 2013 CAS contains two types of missing data. First, the survey included skip patterns in the questionnaire, such that questions not pertinent to an individual were not presented. For example, if a respondent indicated they had not deployed then they would not be asked the specific questions related to deployment. This type of missing data was expected and no effort was made to complete this data by Ipsos. Second, Airmen were allowed to skip questions on the survey in an effort to encourage respondents to complete as much of the survey for which they felt comfortable. Many of the analyses from Ipsos to the Air Force included listwise deletion of cases, also known as complete case analysis (Donders, van der Heijden, Stijnen, & Moons, 2006). Their analysis plan allowed for imputation for multivariate analysis. The data provided from the Air Force for this study did not have imputed values. Most questions

had a response category of "Don't know/no answer", and such responses were considered missing information potentially amenable to imputation. The primary statistical tool used to answer the research question for this study was discriminant analysis, which utilizes complete case analysis. Current thought suggests multiple imputation or full-information maximum likelihood estimation may improve statistical results with missing data compared to complete case analysis or pairwise deletion (Newman, 2014). However, due to the missing data analysis, presented in Chapter 4, imputation was not utilized in this analysis. The primary reasons for this included the level of non-randomness in missing data and the introduction of additional levels of uncertainty from the imputation which could further influence representativeness of the sample.

Analysis Plan

To answer the proposed research question multiple scales and questions were utilized. The primary statistical method employed, as previously mentioned, was discriminant analysis (DA). One prominent author in this methodology suggested 10 – 12 variables are the most effective number of variables for use in DA, unless there is a justifiable reason to include more (Huberty & Olejnik, 2006). With over 1,000 questions available in the 2013 CAS, it became expedient to identify the most relevant variables, which simultaneously related to resilience and contributed to explaining group differences among deployers and non-deployers. Clearly an organized method of determining the most relevant variables became critical to this study.

The analytic procedures for this project consisted of several steps aimed at examining the data and identifying the most relevant resilience related variables among Airmen. Given the size of the data set available and the number of potential variables for selection into this study, a step-by-step process (see Figure 1) was conducted to complete the study. This analysis plan was similar to a plan proposed to by Huberty and Olejnik (2006) to reduce the amount of data

available and prepare for a discriminant analysis. While an exhaustive evaluation of each

procedure was beyond the scope of this study, understanding the general purposes of the analytic

technique, the implicit statistical assumptions, and the justification for the use of each procedure

was warranted. By clarifying these three topics, the fit between the proposed question and the

methodology used to answer the question can be evaluated by others.

Step1: Variable Selection	Step 2: Data Preparation	Step 3: Correlation	Step 4: Discriminant Analysis	Step 5: Interpretation
•Related to "4 domains of fitness" from CAF •CAF provided a structure from which to select potentially importnant variabes •Variables had face validity and theoretical importance	•Descriptive statistics •Missing data analysis •Normality •Outliers •Scedasticity •Linearity	•CD-RISC 10 •Retained variables were resilience related but not colinear	•Maximized group differences •Generated functions of group centroids •Provided information based on group membership	•Interpreted group differences across deployment status, time, and resilience related variables

Figure 1. Schematic Overview of Five Step Analysis Plan. Adapted from Huberty and Olejnik (2006)

Variable Selection

The first step was to ensure that variable selection was theoretically related to an

organized resilience framework and themes in the professional literature. CAF provided an

organized model to select variables related to the four domains of fitness: mental, physical,

social, and spiritual. Scales were chosen from the 2013 CAS which represented each of the four

domains mentioned. Not all of the scales initially selected were ultimately used in the final

analysis. Decisions to eliminate variables were based upon theoretical importance, redundancy,

and levels of missing data. In this section, only the final selection of variables are presented;

however, a detailed discussion about the retained variables, the deleted variables and the reasons

for such are presented in Chapter 4 as part of the results. The following information about each

of the retained variables is presented: the scale name, the operationalized construct, the number of items, the response range, the reliability coefficient (Cronbach's alpha), and the general topics, which were addressed within each scale and taken directly from questions within the scale. The following tables were used to organize the scales by their appropriate CAF domain and represent the organization of the final analysis.

For each scale a reliability coefficient (Cronbach's alpha) was calculated. Alpha measures the internal consistency of the scale by indicating how well the items correlate (DeVellis, 2012). The higher the coefficient the more the items presumably measure the same construct. Reliability represents "the degree to which measurements are free from error, making reliability inversely related to error" (Perron & Gillespie, 2015, p. 136). On the other hand, validity represents the accuracy of measuring the underlying construct (Randolph & Myers, 2013). One limitation of Cronbach's alpha is that it does not indicate the level of validity, only the consistency with which a given scale measures a particular construct. The only assessment of validity in this study was that of face validity. Establishing face validity is a subjective process consisting of evaluating whether the scale makes sense and appears to evaluate the proposed underlying construct (Drake & Jonson-Reid, 2008). In order to evaluate the overall validity of a measure, it is necessary, but not sufficient to establish face validity. Face validity is generally used to establish theoretical consistency not to determine the degree of validity of a measure and can be considered a weak method of establishing validity.

The mental fitness domain (see Table 4) represents the largest and most theoretically important domain and includes seven variables. It also contains the three of the four risk factors used within this study.

Table 4

Mental Fitness Scales

Scale Name	Construct	Items	Range	Cronbach's Alpha	General Topics
Connor-Davidson Resilience Scale 10 (CD-RISC-10)	Resilience	10	0 - 40	.927	• Adaptability • Coping and management of feelings • Confidence and goal orientation
Dispositional Resilience Scale	Hardiness	15	15 - 60	.818	• Commitment • Challenge • Control
Generalized Self-Efficacy (GSE)*	Self-efficacy	5	5 - 20	.894	• Resourcefulness • Problem solving • Coping abilities • Solution focused
Management and Coping of Stress**	Coping	2	2 - 14	.632	• Ability to cope with stress • Ability to manage responsibility
Center for Epidemiologic Studies Depression (CESD)***	Depression	6	6 - 24	.829	• Focus • Energy • Negative emotionality
Primary Care PTSD (PC-PTSD)	PTSD	4	4 - 8	.824	• Hyperarousal and nightmares • Avoidance • Detachment
Youth Risk Behavioral Survey (YRBS)****	Suicide Risk	5	1 - 17	.548	• Suicidal ideation and plans • Frequency of attempts • Results

* The GSE contained 5 of the original 10 items; one item was worded differently but was conceptually similar

** 2013 CAS specific measure

*** The Air Force removed one item from the CESD following a factor analysis of the 2011 CAS

**** The Air Force expanded the YBRS from 4 questions to 5, incorporating passive suicidal ideations; this question contained a skip pattern such that if question 1 was answered no then no other questions were presented

Health standards are a critical component of military service and as such was incorporated into the CAF model of wellness (see Table 5). Two scales of physical health were utilized, both of which came from Air Force specific questions contained within the 2013 CAS, and an alcohol related variable in the form of the Alcohol Use Disorders Identification Test (AUDIT).

Table 5

Physical Fitness Scales

Scale Name	Concept	Items	Range	Cronbach's Alpha	Areas Addressed
Overall Health*	Health	4	4 - 22	.759	• Pain • Sleep and energy • Health perception
Health Behaviors*	Prevention	2	2 - 16	.461	• Exercise • Diet
AUDIT**	Alcohol Use	10	0 - 40	.776	• Binge drinking • Frequency • Negative impacts

* 2013 CAS specific measure
** One question provided a different set of response options for the participant than the AUDIT and should not be directly compared to other studies using the AUDIT; however, there is a very close approximation.

Social support is a key aspect of resilience, total force fitness, and has been shown to be a factor in the course of PTSD for post-combat veterans (Possemato, McKenzie, McDevitt-Murphy, Williams, & Ouimette, 2014) . Three measures were used to represent this domain consisting of support found in the work place, with neighbors, and through leadership (see Table 6). These indicators applied to all Airmen and provide a broad perspective on social support.

Table 6

Social Fitness Scales

Scale Name	Concept	Items	Range	Cronbach's Alpha	Areas Addressed
Work Relations and Preparation*	Work Environment	5	5 - 28	.843	• Coworker, supervisor relations • Teamwork • Preparedness for crisis
Neighborhood Support*	Familiarity	3	3-18	.921	• Visit with neighbors • Help in time of need • Know names
Leadership Support*	Leader Involvement	3	3-18	.941	• Helps new members • Uses resources • Promotes teamwork

* 2013 CAS specific measure

The 2013 CAS provided a limited number of items related to conceptualizations of faith and spirituality (see Table 7). Though a theoretically important domain, it was the least developed of the four CAF domains in 2013 CAS. The measure had some limitations as it did not inquire about personal, private devotions compared to public participation in worship. The scale also did not address altruism and the degree to which spirituality or religiosity informed behavioral decisions and perceptions.

Table 7

Spiritual Fitness Scale

Scale Name	Concept	Items	Range	Cronbach's Alpha	Areas Addressed
Religious Involvement Scale*	Spirituality	4	4-22	.813	• Importance of faith • Religious service attendance • Use of spiritual leader

* 2013 CAS specific measure

Previous researchers utilized a range of measures in resilience and PTSD research, some of which were included in this analysis. A sample of the studies and some of the CAF related variables previously used and which are also used in this study follows. In a study of gender related preparedness for war stressors, the author assessed depression, alcohol dependence, other mental health conditions, social support, unit cohesion, PTSD, and previous deployments (A. Kline et al., 2013). Similarly this study addressed depression, coping with stress, PTSD, social support (unit, community, and work environment), deployment stressors, and alcohol use. Additionally, in a comprehensive review of the literature related to military resilience the author found physical health, positive attitude (i.e. attribution), and social factors to be critical to assessing and treating military personnel (Meredith et al., 2011). This study measured physical health through self-report of physical activity levels, healthy eating behavior, sleep patterns, and level of subjective overall health. Suicide in the military and among veterans continues to be a growing problem and a relevant factor when evaluating post-deployment adjustment and resilience (Wald, Taylor, Asmundson, Jang, & Stapleton, 2006). For these reasons, suicidal ideations and attempts were included in the analysis and represented the theoretical opposite of resilience. Finally, a strong theoretical relationship exists between spirituality, trauma and resilience (Farley, 2007) and has been seen to support parts of a model of seven resiliencies (i.e. morality, insight, relationships, and independence) (Wolin & Wolin, 1995).

Data Preparation

In line with the frame work of Smith et al. (2011) the third step in secondary analysis requires the researcher to get to know their data. One efficient method of doing so is to complete a thorough screening aimed at understanding the inherent strengths and limitations of the data in meeting the assumptions of the intended statistical analysis. Both Dattalo (2013) and

64

Tabachnick and Fidell (2014) provided criteria for screening data prior to analysis. Their criteria are similar and profitably supplement each other for increased clarity of appropriate prescreening techniques (see Table 8). This combined set of screening procedures ensured that the information necessary to evaluate the assumptions of the statistical analysis were properly obtained. Biases in the data can affect estimation of standard errors and increase Type I and Type II errors, leading to weakened results if not properly prescreened and accounted for prior to using a multivariate statistical method. Each of these criteria was addressed in the results of the study and violations were described. Any implementation of solutions to address discovered violations of the assumptions were reported.

Table 8

Data Prescreening Criteria for Analysis Using the General Linear Model

Criteria Assessed	Description
1. Univariate descriptive statistics	Determine if out of range values exist, verify realistic means and standard deviations—ensure accurate data entry
2. Missing data— MCAR, MAR, MNAR	Evaluate the amount and distribution of missing data—decide on strategies (mean substitution, FIML, imputation)
3. Normality—univariate and multivariate	Assess skewness and kurtosis of data—data transformation is necessary for analysis
4. Outliers—univariate and multivariate	Check degree to which outliers affect data through leverage, discrepancy, influence
5. Scedasticity—homo- and hetero-scedasticity	Associated with the assumption of normality—clarify the variability of scores between variables,
6. Linearity— multicollinearity and singularity	Verify intercorrelation between variables—calculate bivariate correlations and tolerance

Generated from Dattalo (2013) and Tabachnick and Fidell (2014)

The exploration of the nature of the missing data within the dependent variable (DV) and independent variables began by recoding each of them into dummy variables of missing (1) or not missing (0). This allowed a bivariate correlation of the relationship between missing and non-missing data to be conducted between all the variables. High correlations with the DV or between the IVs in regard to their missingness would violate the assumption of data missing completely at random (MCAR). Further, to evaluate missing data a statistical procedure was used to determine if the data missing MCAR assumption was supported. Little's MCAR tests the null hypothesis that data are missing MCAR, thus the hope was to not reject the null.

The use of parametric tests implies that the assumption of normal distribution is satisfied, so examination of this assumption was required. Univariate normality is a necessary, but not sufficient prerequisite for multivariate normality. SPSS does not provide a method to evaluate multivariate normality so several methods of evaluating univariate normality were utilized. The Kolmogorov-Smirnov tests the null hypothesis that the data are normally distributed among large samples ($N > 2000$). Despite the utility of this of test, large sample sizes, can show significant results with minor deviations from normality (de Vaus, 2002; Field, 2013). Additionally, skewness and kurtosis were examined as another frequently use method to verify normality. Kline (2011) suggested that skewness levels above an absolute value of 3.0 are extremely skewed and kurtosis between $10 - 20$ are problematic, while kurtosis greater than 20 is a serious problem. An additional test of normality is Box's M, which is used to test the assumption of equality of variance-covariance matrices. Finally, a chart was constructed containing the variance of each variable for each group. As variance is simply the standard deviation squared, this allows a comparison of variability of scores, which is related to central tendency. As a result, comparisons can be further extrapolated in relationship to the variability of scores

between groups and variables.   Based on these tests the preponderance of evidence may be useful in determining the viability of this assumption.

Cook's D was utilized to assess for outliers. Cook's D is the product of discrepancy (how in line a case is with other cases) and leverage (distance from the group centroid) thus producing a measure of influence (the effect of a case when deleted) (Tabachnick & Fidell, 2014). This statistic can be calculated using the equation $4/(n - k - 1)$ where n is the sample size and k is the number of independent variables. Resilience was used as the variable to calculate discrepancy and leverage. As the central theoretical construct and given that the variable must be continuous for this procedure, resilience made intuitive sense. Given the number of outliers found through Cook's D, it was impractical to conduct a case-by-case analysis of the outliers thus necessitating the use of group comparisons. Accordingly, group means and standard deviations were compared between outliers, non-outliers, and the complete-case sample on all variables, except for resilience. This permitted a direct evaluation of the variability of the outliers and the mean differences between these samples.

The assumption of homoscedasticity, the variability of responses in one variable being consistent at all values of another variable (Dattalo, 2013), is important to establishing the estimation of standard errors among the variables. However, as noted by Tabachnick and Fidell (2014) homoscedasticity is more critical to classification (i.e. predictive discriminant analysis), than to inference (i.e. descriptive discriminant analysis). In similar fashion to evaluating the outliers, the DV could not be used in the regression analysis to evaluate homoscedasticity. All variables were regressed on resilience for each level of the DV.

The assumption of linearity is to ensure that scales are not redundant (i.e. measuring the same concept) and the intercorrelation is not too high, which would indicate singularity.

67

Tabachnick and Fidell (2014) suggested a correlation of .9 or above would be a strong signal of singularity. An additional test was conducted to check the Variance Inflation Factor (VIF), which represents the inverse of tolerance, or $1/(1 - R^2)$. The VIF is an indicator of the degree to which the variance of regression statistics is affected by multicollinearity. Though regression was not a tool to be used in the analysis plan, this particular function was effective in checking that assumption. Each variable served as the DV in a regression analysis in order to calculate the VIF for each variable. A Variance Inflation Factor greater than 5.0 has been considered a threshold when multicollinearity presents a problem (Dattalo, 2013).

Correlation

The selected variables had a theoretical relationship to the Air Force definitions of resilience and wellness. However, correlation analysis was utilized to examine which variables had a statistical relationship to resilience among Airmen. Correlation has been defined simply as a relationship between two variables (Evans, 1996). The relationship is reported through a correlation coefficient which provides information on the strength, (i.e. magnitude), and direction (positive or negative) of the relationship (Randolph & Myers, 2013). Both aspects are inherent to correlation coefficients (Evans, 1996).

The most common correlation coefficient used in research is Pearson's product moment correlation coefficient, known as Pearson's *r* and frequently annotated as *r*. Pearson's *r* is a measure of bivariate relationships. Due to the frequent use of Pearson's *r* in a wide range of research studies, this correlation coefficient was utilized in this project and discussed in this section. Careful attention should be taken to ensure evaluation of correlation is not mistaken or interpreted for causality; the correlation being measured could be caused by a variable outside those used in the analysis (Evans, 1996; Field, 2013).

The strength of the relationship between variables is measured by the absolute value of *r,* not the sign, and can effectively be thought of as an effect size (Randolph & Myers, 2013). The value of *r* ranges from +1.0 to -1.0. Cohen (1992) presented a rubric to evaluate the strength of *r*. He suggested values less than .3 represented a small effect, values between .3 and .5 represented medium effects, and values at or above .5 represented large effects. Randolph and Myers (2013) suggested small effects, or in their term weak effects, were bounded on the lower end at .1 thus creating a range from .1 to .3 for weak effects.

Directionality is evaluated by the sign of *r*. If the direction is positive then the increase in one variable is associated with a corresponding increase in the other, while a negative sign indicates an increase in one variable is associated with a corresponding decrease in the value of the other. For example, an *r* of .40 and -.40 have the same strength, or magnitude; however, the negative value represents an inverse relationship as the variables covary in opposite directions. Pearson's *r* can be used to calculate the amount of variance accounted for within the relationship; this is known as the coefficient of determination, or r^2 (Evans, 1996). Similarly, to determine how much variance is unaccounted for in a model, the coefficient of nondetermination is calculated by $1 - r^2$.

In multivariate analysis the multiple correlation coefficient, *R*, is used to describe the relationship between a set of independent variables and a dependent variable. R^2 is known as the coefficient of multiple determination and is interpreted in a similar manner as r^2 in bivariate analysis and explains the variance accounted for in the model (Randolph & Myers, 2013). R^2 was reported as part of some of the statistical tests during the final analysis.

The key assumption in calculating Pearson's *r* is that of linearity. Linearity presupposes a linear relationship between two variables, while other relationships (e.g. curvilinear) are

ignored (Tabachnick & Fidell, 2014). It is rare in any of the social sciences to find linear

relationships; however, to use Pearson's *r* "the relationship need only be a reasonable

approximation of a straight line" (Evans, 1996, p. 130). Two conditions to be evaluated by

Pearson's *r* which can pose a problem to a multivariate analysis are multicollinearity and

singularity (Tabachnick & Fidell, 2014). Multicollinearity occurs when variables are highly

correlated with values above .80 (Dattalo, 2013). This condition suggests the variables contain

redundant information and one of the variables can safely be removed from the analysis without

significant loss of information (Tabachnick & Fidell, 2014). Singularity is a special case of

multicollinearity and occurs when *r* = 1 or -1, indicating a perfect positive or negative linear

relationship, respectively.   This is problematic for analysis as no variance exists within the set of

variables to be calculated or estimated.

By correlating all variables with resilience, as operationalized by the 10-item CD-RISC,

variables were evaluated based on their relationship to resilience. Those variables retained for

use in the final analysis had at least a weak relationship with resilience. A correlation less than

0.1 was presumed to have little to no relationship with resilience and thus not informative as a

resilience related variable for this study. The lowest threshold for the correlation was utilized to

ensure that only variables which were negligibly correlated with resilience were eliminated from

further analysis. Many of the variables considered for use in this study were composed from a

limited number of questions and functioned more like screeners that full scales of the construct

or they had not been validated among military populations. In particular, the 10-item CD-RISC

used in this study is a reduced scale from the original 25-item version. A factor analysis was

conducted from a group of predominantly Caucasian, female, college freshman respondents to

generate the reduced scale (Campbell-Sills & Stein, 2007). It is unclear how reflective this

reduced scale is of military personnel who do not share some of the same basic demographic traits and are a qualitatively different group compared to the sample used for the factor analysis. A conservative approach was taken to see which variables would correlate with resilience and the lowest threshold was consequently utilized.

This strategy was in keeping with the first part of the question by ensuring that each variable informed the phenomena of resilience. In a similar way Tucker, Sinclair and Thomas (2005) analyzed three components related to well-being in soldiers: depression, job satisfaction, and affective well-being. The important take-away point from their study was that variables need not be positively correlated to resilience or well-being to be informative of the general concept. Bivariate correlations were calculated with the remaining variables to assess for multicollinearity and singularity. This ensured redundant variance was not maintained in the final analysis (Tabachnick & Fidell, 2014) and statistical assumptions for discriminant analysis, absence of singularity and multicollinearity among variables, were maintained (Klecka, 1980).

Discriminant Analysis

Discriminant analysis (DA) has two essential purposes in research: to describe or predict group membership, the dependent variable, based on a set of predictors, the independent variables (Tabachnick & Fidell, 2014). DA can also help determine variables most capable of discriminating between naturally occurring and mutually exclusive groups (Poulsen & French, 2008). Another set of authors differentiates between the two purposes of DA by comparing descriptive discriminant analysis (DDA) and predictive discriminant analysis (PDA) (Huberty & Olejnik, 2006). DDA generates linear composites of variables, known as discriminant functions, which maximize group differences and serve to explain those differences. Researchers will sometimes perform DDA after completing a significant multivariate analysis of variance

(MANOVA). PDA on the other hand represents the ability to correctly classify cases into their respective group using the discriminant functions. Fisher (1936) uses the term discriminant function analysis (DFA) as "special interest attaches to certain linear functions of the measurements by which the populations are best discriminated" (p. 466). This terminology focuses particular attention on DDA while deemphasizing classification, or PDA, "as a separate activity in which either the discriminating variables or the canonical discriminant functions are used to predict the group to which a case most likely belong" (Klecka, 1980, p. 42). For purposes of this project, the term DA was used over DFA, as it is more comprehensive of both statistical procedures and more commonly used in the literature.

Huberty (1975) suggested DA can profitably be used to evaluate separation (distinguishing inter-group differences on centroids), discrimination (separation of groups based on a variable's contribution to separation), and estimation (obtaining statistical estimates of intergroup differences and relationships on variables used for classification). DA has also been described as a two-step process of evaluating the significance of the discriminant functions (variance accounted for by the model) followed by group classification (accuracy of predicting group membership) (Poulsen & French, 2008). DA maximizes between group differences to provide for classification and as such is considered MANOVA "turned around", and the primary question of DA is if a combination of predictors can reliably predict group membership (Tabachnick & Fidell, 2014). Compared to MANOVA, DA allows the researcher to better interpret the dimensions, or functions, along which groups differ (Tabachnick & Fidell, 2014). MANOVA and DA are considered complementary, but MANOVA focuses on which groups are different and DA focuses on the specific discriminating variables along which groups differ (Dattalo, 2013). DA can frequently be used in place of MANOVA (Huberty & Olejnik, 2006).

Though DA and MANOVA are clearly related, there are no post hoc tests for DA such as those frequently used in MANOVA.

Several assumptions and issues prove critical to the outcomes of DA. Sample size is an important issue as large differences in group sizes can itself affect the likelihood of group classification. There are methods of addressing differences by controlling for group size in an *a priori* manner (Tabachnick & Fidell, 2014). Additionally, the smallest group size should exceed the number of predictors used to establish group membership. DA can be robust against violations of normality from moderate skewness but not from outliers (Tabachnick & Fidell, 2014). Discriminating variables must be measured at the interval or ratio level, but cannot be a combination of other discriminating variables used in the analysis (Klecka, 1980). DA assumes relationships of linearity between combinations of variables; however, multicollinearity presents a significant problem and correlations between the variables should be low to moderate (Dattalo, 2013). Finally, heteroscedasticity can cause a significant problem in analysis and variable transformation may be necessary to achieve reliable results (Poulsen & French, 2008).

DA has previously been used in research among military personnel and veterans (Malloy, Fairbank, & Keane, 1983; Schwerin & Corcoran, 1998). For example, by testing the correlation and F scores for multiple variables among a group of Desert Storm veterans commitment, avoidance coping and family cohesion emerged as the best discriminating functions for PTSD (Sutker et al., 1995). Similar strategies of utilizing correlation and F scores were utilized in the completion of this study. The F scores were essentially used to examine overall mean differences between groups (Field, 2013), while Wilks' Lambda was used to evaluate the significance of differences between group means on each variable and the differences between group centroids which are generated from the discriminant functions. The discriminant functions

are a linear composite of the variables used to examine group separation (Huberty & Hussein, 2003). Wilks' Lambda is a test statistic, ranging from 0 to 1, of the size of the group differences and can also be seen as the unexplained variance within the variables or centroids. Thus, functions or variables with a higher Wilks' Lambda have less utility in explaining group differences compared to those with lower values. Additionally, some of the reported statistics include standardized canonical discriminant function coefficients, which provides the unique contribution of each variable to the discriminant function, and the structure coefficients, which represent the correlations most "substantively associated with the resultant grouping variable" (Huberty & Hussein, 2003, p. 186).

This study focused primarily on DDA; however, some PDA results were reported to supplement the findings. DDA is primarily useful in addressing two key concerns: 1) the number of constructs that characterize separation among the groups, and 2) identification of the latent constructs characteristic of group separation (Huberty & Olejnik, 2006). DA was used to answer the research question as it largely concerns the combination of risk and protective variables to explain differences between groups across a spectrum of deployment experiences. Due to the relatively low correlation of many of the variables with resilience it was decided to retain resilience in the final analysis. None of the variables were a composite of nor collinear with resilience, thus did the resilience variable (operationalized by the 10-item CD-RISC) continued to provide unique insight into the research question. The differences between the functions of these groups help to shed light on some of the most salient variables impacting high-risk deployers.

Interpretation

      Brown and Wicker (2000) suggest that sample size for a DA should be between a 10:1

and 20:1 ration of participants to discriminating variables and suggest large samples will

frequently generate statistically significant results. Given the sample size (n = 289,194) used in

this study, statistical significance was not solely relied upon to determine meaningful differences,

as virtually all tests of significance turned out to be statistically significant at the p = .001 level.

Thus, visual inspection of plotted group means and the centroids was utilized. Multiple charts

were generated to examine the pattern of group differences for each variable, which were

included in Chapter 4 or Appendix D. These charts were instrumental in further aiding the

exploration of both the nature and magnitude of group differences to establish the important and

relevant findings. Comparative results of test statistics, such as Wilks' Lambda, and the

standardized and structure coefficients were also used.

Dependent Variable

      The dependent variable, or grouping variable in DA, was generated through a composite

of four dichotomous, deployment related questions: 1) Since September 11, 2001, have you ever

been deployed greater than 30 days, 2) During your deployment: were you indirectly exposed to

combat (mortars, rockets, small arms, fire), 3) During your deployment: were you engaged in

direct combat where you discharged a weapon, and 4) Have you deployed in the past 24 months.

Response patterns were evaluated and groups were developed based on these responses for

which each Airman belonged to one and only one group (see Table 9). It was noted that some of

those who were in the combat groups (recent and past) experienced indirect exposure and some

did not. The decision to establish the groups as such was based upon considering a continuum of

deployment exposure to danger, of which combat constitutes the highest level. Primacy was

consequently afforded to combat exposure as the defining characteristic of group membership

regardless of indirect exposure.

Table 9

Response Patterns to Generate Dependent Variable

	Deployment Related Questions			
Deployment Group	Ever Deployed	Indirect Exposure	Combat Exposure	Deployed in past 24 months
No Deployment	No	--	--	--
Deployed with no exposure—recent	Yes	No	No	Yes
Deployed with indirect exposure to harm—recent	Yes	Yes	No	Yes
Deployed with direct combat experience—recent	Yes	Yes/No	Yes	Yes
Deployed with no exposure—past	Yes	No	No	No
Deployed with indirect exposure to harm—past	Yes	Yes	No	No
Deployed with direct combat experience—past	Yes	Yes/No	Yes	No

Deployment Related Variables

The 2013 CAS contained multiple deployment related questions, four of which were

addressed in the previous section, that prove meaningful and are addressed in the results section

of this project. Airmen were asked to total the amount of time deployed since September 11,

2001 in number of months. Additional questions asked respondents to identify how many times

they deployed in support of OIF, OEF, Operation New Dawn, or other deployments. There was

an additional inquiry into the most recent deployment operational environment. This question

however did not clarify if deployment was to a combat zone or in support of combat operations. One could have deployed to Iraq or Kuwait, but both may have been in support of OIF.

Airmen were asked in a variety of ways to identify how deployment impacted them. They were asked to clarify "how difficult was your most recent deployment for you?" In a related question Airmen were asked to rate how difficult the deployment was for their spouse or significant other and children. They were later asked to rate the impact of deployment on their family life, professional life, personal life, and health related behaviors. Respondents was also asked to identify the impact of deployment on their relationships with spouse and children during pre-deployment, deployment, and post-deployment. The impact of deployment on family life was an important component of the 2013 CAS.

Finally, additional questions related to deployment experiences were asked, such as "did you encounter dead bodies or see people killed or wounded" and "did you ever feel that you were in great danger of being killed". Airmen were asked if they were wounded, injured, assaulted or hurt in any other way during their deployment. Unfortunately, this was a dichotomous variable and consequently impossible to determine if a positive answer was the result of military sexual trauma, accidental injury, or combat related wound. Finally, respondents who deployed were asked "did you enter or closely inspect any destroyed military vehicles". This may sound somewhat innocuous, but to inspect or enter a destroyed military vehicle generally follows an act of violence, exposing Airmen to potential scenes of graphic destruction of personnel. Though important, these particular questions were not included as part of the dependent variable. It would have been difficult to establish mutually exclusive groups that represented a continuum of deployment experiences. In addition, there would likely have been more overlapping experiences, thus complicating the interpretation of group uniqueness.

Research Question and Hypotheses

The primary purpose of this study was to meaningfully and reliably address group differences across the spectrum of deployment experiences to improve our understanding of the patterns of resilience and vulnerability associated with deployment.

The research question and hypotheses are provided here to reorient the reader to the precise inquiry of this paper.

Question: Which resilience related variables account for group differences among Airmen across levels of deployment exposure (i.e., no deployment, deployed with no exposure to harm, deployed with indirect exposure to harm, deployed with direct combat experience) and time (past deployers—greater than 2 years ago; and recent deployers—within past 2 years)?

Hypothesis 1: As levels of exposure to danger increase self-reported resilience and hardiness will decrease.

Hypothesis 2: Past deployers will report higher levels of resilience and hardiness compared to recent deployers.

Hypothesis 3: With increasing levels of deployment exposure, the difference between reported levels of resilience and hardiness among past deployers and recent deployers will become progressively larger.

Hypothesis 4: PTSD, depression, and self-efficacy will have strong descriptive power in explaining differences between recent and past deployers across deployment stressors.

Hypothesis 5: Spirituality and alcohol consumption will be weak predictors of group membership, but will exhibit a positive relationship with an Airman's level of deployment exposure, regardless of time since deployment.

Chapter 4: Results

The purpose of this study was to describe the role resilience related variables had in explaining

group differences among Airmen based on deployment experiences and time since deployment.

This chapter provides an examination of the results obtained from the analysis of the research

question and hypotheses using 2013 CAS data. This chapter contains sections that directly

correspond to the first four steps of the analysis plan; the final step is presented in chapter five.

Step 1: Variable Selection

As discussed in relation to the analysis plan, the first step was to determine the variables

to be included in the analysis. In order to help determine which variables hold theoretical and

practical relevance, the Comprehensive Airmen Fitness (CAF) model was utilized as a guide for

variable selection and retention. As mentioned before, CAF consists of four separate domains of

fitness which, when taken together, were used as an approximation for holistic resilience. The

following is a list of the definitions of mental, physical, social, and spiritual fitness along with a

listing of their associated subcomponents found in Appendix 2 of Air Force Instruction 90-506:

Comprehensive Airman Fitness (2014).

- Mental Fitness: The ability to effectively cope with unique mental stressors and

challenges

• 1) Awareness, 2) Adaptability, 3) Decision Making, 4) Positive Thinking

- Physical Fitness: The ability to adopt and sustain healthy behaviors needed to enhance

health and well-being

  • 1) Endurance, 2) Recovery, 3) Nutrition, 4) Strength

- Social Fitness: The ability to engage in healthy social networks which promote overall

well-being and optimal performance

  • 1) Communication, 2) Connectedness, 3) Social Support, 4) Teamwork

- Spiritual Fitness: The ability to adhere to beliefs, principles, or values needed to

persevere and prevail in accomplishing missions

  • 1) Core Values, 2) Perseverance, 3) Perspective, 4) Purpose

The selected variables were utilized to represent each of the four categories of fitness.

The 2013 CAS was not designed to enhance understanding of CAF or holistic resilience but to

assess community well-being. As a result some of the components of fitness were more

represented than others. Some of the scales are specific to the CAS and are not found in the

professional literature, therefore reliability coefficient was reported for each scale.

Mental Fitness

Seven measures were used to assess the domain of mental fitness. Four constructs were

measured (resilience, hardiness, self-efficacy, and coping) which represented protective factors.

An additional three constructs (depression, PTSD, and suicide risk) representing risk factors

were inversely correlated to resilience as expected by theory. Each of the retained variables were

continuous, most did not have a skip pattern, and the scores were easily interpretable in that

higher scores represented higher levels of the construct being measured. Suicide was the one

scale with a skip pattern. The question asked was, "during the past 12 months, how often did

you have thoughts of ending your life." If the Airman answered never, then the remaining four questions of the scale were not presented in the electronic survey as they would not have applied.

Three variables were removed from the mental fitness section and not retained for the final analysis. The 2013 CAS contained two versions of the PC-PTSD, one assessed lifetime experiences of PTSD symptomology and the other was a deployment related version. The lifetime exposure version was selected due to a skip pattern of missing data in the deployment version, which, if retained in the analysis, would have excluded the entire non-deployment group due to listwise deletion. Next, a variable was calculated regarding self-help behaviors for mental health issues through self-help books, friends, journaling, exercise, etc. However, the variable simply measured the presence or absence of these behaviors while providing no additional insight into things such as perceived utility, frequency of use, or levels of improvement. It was removed from further consideration in the analysis due to limited theoretical coherence related to the research question and unclear interpretation of scores. Finally, a variable was calculated regarding disclosure of suicidal thoughts or intentions with others (i.e. family, chaplain, medical professional, etc.). Similar to the previous variable, Airmen were asked about the presence or absence of a behavior; the meaning and utility of the score was difficult to interpret and did not represent a continuous variable that added to our understanding of resilience.

Physical Fitness

The first scale used in the physical fitness domain was a self-report of an Airman's perceived current health in relation to levels of pain, sleep, energy, and overall health. Higher scores indicated the Airmen were either performing well in these areas or at least they were not experiencing difficulties with the basic health issues assessed. The second scale was a composite of two items which each indicate behaviors associated with good health: exercise and diet. It

was useful to separate the two scales in order to isolate whether perceptions of health or healthy behaviors were more useful in explaining group differences and has been noted as an important distinction (Tanielian, 2009).

A modified version of the Alcohol Use Disorders Identification Test (AUDIT) was considered to be an important variable for this study. Alcohol misuse has previously been found to be inversely related to resilience (K. T. Green, Beckham, Youssef, & Elbogen, 2014) and elevated levels of binge drinking have been shown to be associated with exposure to and recency of trauma (Kachadourian, Pilver, & Potenza, 2014). The AUDIT was included under physical fitness due to the physical effects of over-consumption which can have drastic health consequences and impacts on duty performance; however, the psycho-social effects of alcohol misuse should not be overlooked (Burnett-Zeigler et al., 2011).   The AUDIT, as presented in the 2013 CAS, had one question with different set of response options for the respondent than the official version used AUDIT. As such this scale should not be directly compared to other studies which also use the AUDIT; however, there is a very close approximation supporting retention of both the name and purpose in this study. Another alcohol related variable, which focused on patterns of drinking during the past 30 days, was removed from the analysis as it was not as comprehensive and did not seem to as clearly address patterns of problem drinking which could be detected from the AUDIT.

Social Fitness

The first measure used to represent social fitness was a combination of two subscales, measuring work relationships and workplace preparedness, which were combined in the 2013 CAS analysis plan. This variable measured a multifaceted perspective of relationships within the work environment and included coworkers and leadership. Neighborhood support, or the

82

proposed concept of familiarity, addressed the level of integration within the immediate neighborhood as a measure of social support. For military members, particularly among the active duty, relocation is a regular occurrence and establishment of social network in the neighborhood proved to be an important factor in this analysis. Importantly, this variable applied to all Airmen regardless of whether they lived in on-base housing, in an apartment or the "dorms", or in an off-base location. Finally, leadership support was also critical to a mobile population and this variable primarily focused on the ability of the leader to help integrate new members and families into the community in a helpful and supportive manner—the role of Commanders, leaders, and supervisors is tremendous in the day-to-day life of Airmen.

The 2013 CAS included numerous other scales related to social support. However, many of these scales had notable skip patterns related to either service component or family status. For example, a variable related to tangible support contained a question related to help with a child in an emergency. As a result, this scale had 63% of participants not answer this question which would have removed them from the final analysis. The rate of missing information was reduced to 28.4% when that question was removed, but the remaining two questions were not particularly relevant to the project at hand. Two other variables, community integration within an Air Force base and family support and coping, had similar problems with large amounts of missing data due to the nature of the questions. These variables were more suited to studies particularly targeted towards families or a particular Air Force component.

Spiritual Fitness

Of the four domains contained in CAF, spiritual fitness had the least to draw upon and only included four specific questions related to spirituality, faith, or religious participation. For this reason, only one scale was included in the final analysis to assess this domain.

Step 2: Prescreening and Statistical Assumptions

Descriptive and Deployment Characteristics

Getting to know the data is an essential part of utilizing large data sets in secondary analysis (Smith et al., 2011). The undertaking in examining the 2013 AFCAS data was to look at the actual sample and how it compared to the Air Force population. A summary of these statistics can be found in Table 10, which contains the statistics of the sample from the 2013 CAS, the weighted sample, the complete-case weighted sample, and the 2013 Air Force population parameters. The Total Force population of the U.S. Air Force was 503,194 in 2013 with 64.9% in the active duty component, 13.9% in the Air National Guard, and 21.0% in the Air Force Reserves. However, active duty personnel were overrepresented in the sample (76.5%) compared to the Air National Guard (12.9%) and the Reserves (10.6%). Gender differences were not substantial with 75.2% males in the sample but 80.0% in the Air Force population. The oversampling strategy among females appeared to have had an impact on response rates.

There were some large discrepancies between sample age and rank structure and the corresponding Air Force parameters. There were some clear contrasts when age was assessed, even though a perfect comparison was not achieved between the sample and the Air Force. The youngest Airmen, aged 18-25 years, comprise 31.2% of the Air Force but only 15.2% of the sample. Young age represents a critical vulnerability for deployment stressors and PTSD (Brewin et al., 2000), yet proportionally less information was collected from these Airmen than any other age group. Those who were 36 years and older, who do not share this same level of vulnerability, were over represented in the sample at 44.0%, compared to the make-up of the entire Air Force at 29.2%. A similar pattern of discrepancies existed based on rank, which has served as a proxy for age in military studies (Franklin, 2010). For example, the junior enlisted

84

Table 10

Demographic and Sample Characteristics

	2013 CAS Sample	Weighted Sample	Complete-Case, Weighted Sample*	2013 Air Force Population**
N	45,634	420,972	289,194	503,194
Component				
Active Duty	34,909 (76.5)	265,530 (63.1)	184,324 (63.7)	326,573 (64.9)
Reserves	4,822 (10.6)	67,542 (16.0)	45,966 (15.9)	70,913 (13.9)***
Air National Guard	5,903 (12.9)	87,900 (20.9)	58,905 (20.4)	105,708 (21.0)
Gender				
Male	34,318 (75.2)	335,709 (79.7)	230,190 (79.6)	402,724 (80.0)
Female	11,316 (24.8)	85,263 (20.3)	59,004 (20.4)	100,470 (20.0)
Age				
18-20	778 (1.7)	11,914 (2.8)	7,169 (2.5)	157,126 (31.2)
21-25	6,139 (13.5)	80,689 (19.2)	51,637 (17.9)	
26-35	18,583 (40.7)	171,775 (40.8)	116,963 (40.4)	199,119 (39.6)
36-45	14,350 (31.4)	103,665 (24.6)	75,005 (25.9)	
46-55	5,240 (11.5)	47,836 (11.4)	34,452 (11.9)	146,949 (29.2)
55+	512 (1.1)	4,868 (1.2)	3,907 (1.4)	
Missing	32 (0.1)	225 (0.1)	61 (0.0)	NA
Married				
Yes	32,263 (70.7)	274,902 (65.3)	192,504 (66.6)	288,331 (57.3)
No	13,371 (29.3)	146,070 (34.7)	96,690 (33.4)	214,863 (42.7)
Pay Grade****				
E1-E4	6,742 (14.8)	112,369 (26.7)	71,471 (24.7)	170,689 (33.9)
E5-E6	16,055 (35.2)	170,968 (40.6)	115,341 (39.9)	169,629 (33.7)
E7-E9	10,684 (23.4)	60,549 (14.4)	44,400 (15.4)	69,278 (13.8)
O1-O3	4,882 (10.7)	37,447 (8.9)	27,126 (9.4)	46,188 (9.2)
O4 or higher	7,271 (15.9)	39,639 (9.4)	30,857 (10.7)	47,398 (9.4)

* Complete cases were based upon variables utilized in the final analysis

**Information for population demographics came from the Defense Manpower Data Center and was contained in a 2013 Military One Source report. These may not represent the same data from which the weighting strategy was derived and were presented as a point of comparison.

***Thus number represents the Selected Reserve personnel and does not include the Individual Ready Reserve—no such component existed for the Air National Guard

****There were 12 Airmen with unknown ranks between the Air National Guard and Selected Reserve in the Air Force population data

comprised 14.8% of the sample, but 33.9% of the Air Force. Meanwhile, the senior enlisted and

Officers represent 32.4% of the Air Force but 50.0% of the sample. Despite such apparent

discrepancies, NCOs and those aged 26-35 were almost equally represented in the sample as

expected from the Air Force population. The discrepancies took place between the youngest and

oldest Airmen and the lowest and highest ranking Airmen.

As reported earlier, the Air Force utilized weighted data in all of its 2013 CAS reports.

The previous section presented the sample information, but from this point forward all discussion

involves the weighted sample or the complete-case, weighted sample. Among the weighted

sample 61.2% reported at least one deployment of 30 days or longer since September 11, 2001

(see Table 11 for sample specific deployment statistics). Of those who have deployed since 9-

11, 41.5% report experiencing a deployment within the past 2 years. Thus 21.2% of the total

sample was in a state of reintegration at the time this survey data was collected. Reintegration

represents a time of significant change, adjustment, and emergence of post-deployment problems

and resilience (Forgey & Young, 2014; Wooten, 2012). While it remained unclear how long

each deployment lasted for individual Airman, 55.0% of deployed Airmen reported deploying

for a total of 12 months or less. In relation to this study, 50.6% reported indirect exposure to

combat through rockets, mortars, or small arms fire. Meanwhile, 4.5% of Airmen reported

engaging in direct combat in which they discharged their weapon. Though this represents a

relatively small percentage of all deployers, those who engaged in combat represented the tip of

the spear for the Air Force and those exposed to the greatest amount of danger. Additionally,

those engaged in combat had the highest percentage of total length of deployments lasting more

than 24 months (see Table 12). Some will likely have experienced the most significant

challenges to reintegration and post-deployment adjustment (Adler et al., 2011; C. C. Castro,

2009; Hoge et al., 2004). Meanwhile, those without indirect or combat exposure were more

likely to deploy less than 12 months.

Table 11

Deployment Characteristics (Group Percentages in Parentheses)

	2013 CAS Sample	Weighted Sample	Complete-Case, Weighted Sample
Ever Deployed			
Yes	30,955 (67.8)	257,658 (61.2)	183,577 (63.5)
No	13,749 (30.1)	154,425 (36.7)	105,617 (36.5)
Missing	930 (2.0)	8,888 (2.1)	NA
Deployed in past 24 months			
Yes	12,365 (39.9)	106,874 (41.5)	76,417 (41.6)
No	18,412 (59.5)	149,255 (57.9)	107,160 (58.4)
Missing	178 (0.4)	1,530 (0.6)	NA
Time Deployed			
30 days-6 months	6,967 (22.5)	67,249 (26.1)	47,012 (25.6)
7-12 months	8,745 (28.3)	74,547 (28.9)	53,349 (29.1)
13-18 months	6,552 (21.2)	51,737 (20.1)	37,327 (20.3)
19-24 months	3,690 (11.9)	26,957 (10.5)	19,880 (10.8)
24+ months	4,830 (15.6)	35,690 (13.9)	26,009 (14.2)
Missing	171 (0.6)	1,478 (0.6)	NA
Indirect Exposure			
Yes	16,335 (52.8)	130,300 (50.6)	96,447 (52.6)
No	13,930 (45.0)	121,394 (47.1)	86,984 (47.4)
Missing	690 (2.2)	5,964 (2.3)	NA
Direct Combat			
Yes	1,447 (4.7)	11,548 (4.5)	8,450 (4.6)
No	28,884 (93.3)	240,902 (93.5)	175,040 (95.4)
Missing	624 (2.0)	5,209 (2.0)	NA

By 2013, 54.1% of deployed Airmen reported their most recent deployment was in

support of Operation Enduring Freedom (OEF), while only 16.3% reported their most recent

deployment was in support of Operation Iraqi Freedom (OIF). A total of 63.6% of deployed

Airmen served 1-2 tours in support of OEF, but 48.3% of deployed Airmen served 1-2 tours in

OIF. This overrepresentation of OEF makes sense as Troops were being drawn down from Iraq

and there was still a surge in Afghanistan prior to the 2013 CAS. At the time of the 2013 CAS,

96.2% of respondents were not deployed, 3.3% were deployed within the continental United

States, and .5% were deployed overseas.

Table 12

Total Length of Deployment(s) (Group Percentages in Parentheses)

Deployment Group	< 1 Month	1 – 12 Months	13 – 24 Months	> 24 Months
No Dep	105,617 (36.5)	--	--	--
Deployment				
Past	--	36,776 (72.5)	10,643 (21.0)	3,341 (6.6)
Recent	--	20,936 (58.7)	10,375 (29.0)	4,389 (12.3)
Indirect Exposure				
Past	--	27,615 (53.3)	17,603 (33.9)	6,645 (12.8)
Recent	--	12,948 (35.2)	15,358 (41.7)	8,497 (23.1)
Combat				
Past	--	1,438 (31.7)	1,820 (40.1)	1,278 (28.2)
Recent	--	647 (16.6)	1,408 (36.0)	1,858 (47.5)

Note. Percentages which don't add up to 100 are due to errors in rounding. Information is based on the complete-case, weighted sample.

Airmen were exposed to numerous other stressors that were not explicitly addressed in

this study. For example, 65.6% of deployed Airmen reported encountering dead bodies or saw

people killed or wounded. Additionally, 28.6% indicated they felt in great danger of being

killed. Another 13.9% of Airmen reported entering or closely inspecting destroyed military

vehicles. Finally, 6.4% of deployers reported being wounded, injured, assaulted, or otherwise

hurt at some point during the deployment. Unfortunately, it was not possible to parse out those

injured in relatively benign daily duties or activities to compare those injured during military

operations or through military sexual assault.

Additional stressors related to deployment were separation from family and reintegration with family, work, and patterns of non-deployed life. Family stressors ranked high on the list for Airmen as 51.1% reported having children and 65.3% indicated currently being married. When asked how deployment impacted family life, 48.3% indicated there was a negative impact, 38.9% reported a neutral impact, and only 11.3% reported a positive impact of deployment on family life. For those who deployed more than two years ago, 46.9% reported negative impacts on family life compared to 51.1% of those who deployed within the past two years. Meanwhile, the rate of those who reported positive impacts of deployment on family life remained fairly consistent between past deployers (11.5%) and recent deployers (11.3%). Additionally, 62.1% of those who deployed said their deployment was not at all or only slightly difficult for them, although they indicated that only 31.3% of their significant others had little to no difficulty over the course of the deployment. Conversely, only 6.4% of deployed Airmen reported very or extremely difficulty deployments, while they rated 23.4% of their significant others as experiencing a very or extremely difficult deployment.

Deployments also had an effect on Airmen's health behaviors (i.e. exercise, weight, and nutrition) and personal life (i.e. values and spirituality). Following deployment, 40.9% of Airmen reported positive impacts to their health behaviors, 37.1% experienced neutral impacts, and 20.5% reported negative impacts. For past deployers, 39.3% reported positive impacts to health compared to 43.8% of recent deployers who reported positive impacts. The effects of deployment on personal life were discerned as 21.4% indicated a negative effect on values and spirituality, while 46.3% experienced a neutral effect and 30.9% had a positive effect from deployment. The negative effect did not appear as dramatic among past deployers who reported 19.8% negative impacts compared to recent deployers who reported 23.9% negative impacts on

89

values and spirituality. The difference of perceived positive effects on values and spirituality

was not as pronounced between past deployers (31.8%) and recent deployers (29.8%).

Missing Data Analysis

The final analytic procedure of this study, discriminant analysis (DA), uses complete case

analysis which made examination of missing data critical as it affected the total number in the

final sample. There was no missing data within the DV and therefore no correlation of

missingness with the IVs. However, the correlation procedure generated correlations between

the IVs ranged from .046 to .984. Further analysis of missingness was warranted.

A minority of cases among the initial set of IVs had complete data (43.8%, n=184,514),

which would have greatly reduced the sample size in the final analysis. Additionally, 13.45% of

the values within the variables of interest were missing, and a visual analysis of the missing data

patterns suggested that monotonic patterns existed among the variables. The biggest offenders

with missing data were the community support variable (38.3%), suicidal behaviors (30.2%), the

AUDIT (29.6%), and neighborhood support (27.9%). When the community support variable

was removed from the analysis the degree of completeness increased to 68.7% (n=289,525)—an

improvement of nearly 25% in complete cases. However, removing the next 3 variables

improved the complete cases to 80.8% (n=340,533) but came with a tremendous loss of variables

that are theoretically important to the study. As such, only the community support variable was

removed from further analysis. This was done to maximize the available information through

complete cases without loss of theoretically critical variables.

The results of Little's MCAR were χ^2 (858, N = 398,339) = 21793.013, $p < .001$. The

preponderance of evidence indicated the missing data were not MCAR, so imputation presented

an untenable prospect. To impute data would have added additional bias to the analysis and was

not pursued. SPSS provided a way to estimate the means of variables with missing data using

pairwise deletion, listwise deletion, expectation maximization (EM), and regression. The

resultant means from these four strategies (see Table 13) did not differ markedly suggesting the

loss of data from listwise deletion may not outweigh the benefit of a data substitution method,

such as multiple imputation, which would have introduced additional uncertainty into the

analysis.   Additional screening and analysis procedures were utilized on the complete cases.

Table 13

Mean Estimation with Missing Data using Selected Estimation Methods

Concept	Listwise M (SD)	Pairwise M (SD)	EM M (SD)	Regression M (SD)
Resilience	32.39 (6.11)	32.11 (6.38)	32.02 (6.43)	32.06 (6.39)
Hardiness	45.12 (6.24)	44.63 (7.21)	44.46 (7.28)	44.52 (7.17)
Self-Efficacy	17.72 (2.29)	17.68 (2.33)	17.66 (2.33)	17.67 (2.33)
Coping	11.48 (1.81)	11.44 (1.84)	11.43 (1.85)	11.43 (1.85)
Depression	8.47 (3.19)	8.46 (3.19)	8.50 (3.21)	8.50 (3.21)
PTSD	4.43 (1.00)	4.42 (1.00)	4.43 (1.00)	4.43 (1.00)
Suicide	1.43 (1.57)	1.43 (1.57)	1.45 (1.57)	1.45 (1.56)
Health	15.63 (3.12)	15.61 (3.13)	15.59 (3.14)	15.58 (3.14)
Health Behaviors	10.22 (2.27)	10.18 (2.29)	10.18 (2.29)	10.18 (2.29)
Alcohol Use	2.89 (3.15)	2.89 (3.17)	2.93 (3.18)	2.90 (3.12)
Working Conditions	21.09 (4.85)	20.95 (4.98)	20.95 (4.98)	20.96 (4.98)
Familiarity	11.84 (4.24)	11.84 (4.24)	11.75 (4.26)	11.81 (4.24)
Leader Involvement	12.54 (3.82)	12.54 (3.82)	12.46 (3.85)	12.51 (3.85)
Spirituality	13.33 (5.47)	13.32 (5.47)	13.21 (5.50)	13.26 (5.47)

Univariate and Multivariate Normality

All results from the Kolmogorov-Smirnov test were significant (see Table 14). It became

necessary to assess normality through skewness and kurtosis as well. Based on previously

discussed guidelines, both the alcohol use and suicide variables presented significant problems

related to normality. Additionally, visual inspections of the QQ normal plots (e.g. plotting

observed values against expected values of a normality curve) showed the alcohol use and

suicide variables had an obvious deviation for the normality expectation. Box's M equaled

36478.368, $F(630, 1378461248) = 57.875$, $p < .001$ and indicated the equality of variance-

covariance matrices could not be assumed with these data. However, discriminant analysis is

robust against non-normality, particularly when it results from skewness rather than outliers

(Tabachnick & Fidell, 2014). Due to the important practical and theoretical importance to the

model and the robustness of DA to violations of normality, the alcohol use and suicide variables

mentioned above were retained for further analysis.

Table 14

Normality Results

Concept	Skewness	Kurtosis	Kolmogorov-Smirnov*
Resilience	-.767	.813	.107
Hardiness	-.371	.316	.062
Self-Efficacy	-.795	.894	.212
Coping	-1.227	2.236	.244
Depression	1.967	4.429	.217
PTSD	2.395	4.800	.469
Suicide	3.741	14.017	.534
Health	-.371	-.080	.091
Health Behaviors	-.214	.164	.118
Alcohol Use	3.372	20.732	.190
Working Conditions	-.778	.269	.106
Familiarity	-.560	-.543	.141
Leader Involvement	-.792	.039	.161
Spirituality	-.038	-1.231	.094

* All results are significant at the $p < .001$ level

Several observations became readily apparent upon examining the levels of variance (see

Table 15). Past combat deployers had notably higher levels of variability in scores for coping,

depression, PTSD, suicide, health, and alcohol use. However, they also had the lowest, or among the lowest, levels of variability for self-efficacy, familiarity, and spirituality. Meanwhile the recent combat deployers had the highest levels of variability on hardiness, familiarity, and spirituality. It was also seen that past combat experience seemed to have a larger effect on variability among the risk factors compared to recent deployment.

Table 15

Variance Levels among Past and Recent Deployers across Deployment Danger

Independent Variables	Deployment Groups						
	No Deploy	Deploy —Past	Indirect —Past	Combat —Past	Deploy —Recent	Indirect —Recent	Combat —Recent
Resilience	36.277	38.487	37.399	39.813	36.422	39.015	38.967
Hardiness	40.338	36.353	37.521	44.147	37.621	38.958	46.837
Self-Efficacy	5.116	5.524	5.222	4.643	5.426	5.151	4.472
Coping	3.122	3.359	3.246	4.515	3.231	3.440	3.490
Depression	10.832	8.479	10.335	14.620	8.651	10.580	10.535
PTSD	.927	.742	1.177	2.308	.673	1.222	1.807
Suicide	2.676	2.036	2.764	3.973	1.639	2.518	2.683
Health	9.691	9.400	9.429	11.186	8.875	10.273	9.563
Health Behaviors	5.340	4.800	4.740	5.273	5.282	5.395	5.088
Alcohol Use	11.590	8.203	8.163	15.444	7.970	10.179	12.863
Working Conditions	21.824	25.033	24.379	31.579	22.238	24.222	29.447
Familiarity	18.472	17.143	17.510	15.693	18.581	17.116	18.912
Leader Involvement	13.694	14.791	14.255	17.206	14.226	16.067	16.564
Spirituality	30.058	30.172	29.608	27.840	29.762	29.236	31.105

Outliers

      SPSS found 18,037 outlier cases representing 6.24% of the complete-case sample. The

means and standard deviation of the outliers, non-outliers, and the complete-case, weighted

sample (refer to listwise means from Table 13) were compared in Table 16. The outliers had

lower means on all protective factors and higher means on all risk factors compared to non-

outliers. The standard deviations among the outliers were also larger than the non-outliers for

every variable. This makes sense as the outliers represent large deviations from the mean on

both the positive and negative end of the spectrum for each variable. As a result, it was not

assumed that outliers represented only a minor deviation in a negative direction, but were more

powerfully weighted in that direction.

Table 16

Comparison of Outliers, Non-outliers, and Complete-case sample

Concept	Outliers M (SD)	Non-Outliers M (SD)	Complete-Case Sample M (SD)
Resilience	27.80 (9.53)	32.70 (5.69)	32.39 (6.11)
Hardiness	40.06 (7.10)	45.46 (6.03)	45.13 (6.24)
Self-Efficacy	16.61 (3.09)	17.80 (2.21)	17.72 (2.29)
Coping	9.97 (2.51)	11.58 (1.71)	11.48 (1.81)
Depression	11.67 (5.03)	8.25 (2.90)	8.47 (3.19)
PTSD	5.23 (1.56)	4.37 (.93)	4.43 (1.00)
Suicide	2.65 (2.87)	1.35 (1.40)	1.43 (1.57)
Health	13.36 (3.63)	15.77 (3.02)	15.63 (3.12)
Health Behaviors	9.59 (2.92)	10.27 (2.21)	10.22 (2.27)
Alcohol Use	4.43 (6.10)	2.78 (2.81)	2.89 (3.15)
Working Conditions	17.76 (6.01)	21.32 (4.68)	21.09 (4.85)
Familiarity	10.39 (4.89)	11.94 (4.17)	11.84 (4.24)
Leader Involvement	10.32 (4.65)	12.70 (3.71)	12.54 (3.82)
Spirituality	12.47 (5.70)	13.40 (5.45)	13.33 (5.47)

Upon further scrutiny of the outliers, there appeared to be some additional differences. Outliers were more likely to be AD (68.0%) compared to non-outliers (63.4%). Females had a higher representation among outliers (24.2%) compared to non-outliers (20.2%). Outliers were also more likely have less than 5 years of service (33.7%) compared to non-outliers (28.8%). Similarly, outliers were more likely to be aged 21 – 25 (22.1%) in comparison to non- outliers (17.6%). Based on length of time deployed, outliers were more prone to be deployed for 24 months or more (18.2%) compared to the non-outliers (13.9%). Finally, outliers were more prone to have deployment experiences in which they felt in danger of being killed (25.3%) when compared to the non-outliers (18.3%). Among all other demographic variables previously reported, there did not appear to be a large difference between the outliers and non-outliers.

De Vaus (2002) suggested multiple methods to address outlier cases such as removing cases, changing the score, or transforming the variable. However, to maintain as representative a sample as possible the outliers were not removed. The outliers did not differ markedly on most demographic variables and had some differences related to deployment experiences which potentially suggests their "extreme" values could be related to the dependent variable. This group formed a sizeable portion of the Air Force and contributed to overall information elicited from this evaluation.

Scedasticity

When each level of the DV was assessed by regressing the set of independent variables on resilience, the residuals were approximately normally distributed and homoscedasticity could not be ruled out. Visual inspection of the normal P-P plot of regression standardized residuals suggested moderate homoscedasticity. This assumption has been met for purposes of this analysis.

Linearity

There were no sets of variables that approached a level of bivariate correlation to suggest singularity. However, six relationships had a strong correlation (see Appendix B). Resilience had a strong relationship with hardiness ($r = .628$), self-efficacy ($r = .684$), and coping ($r = .632$). Self-efficacy and coping were also strongly correlated ($r = .518$). The overall health and depression scales were strongly inversely related ($r = -.612$). Finally, leader involvement and working conditions were strongly correlated ($r = .612$). Despite these strong relationships it appeared the assumption of the absence of multicollinearity was plausible. Additionally, a VIF was calculated for each variable by placing each variable as the DV in separate regression analyses. Among all results the highest VIF was 2.865, which further supported the absence of multicollinearity.

Step 3: Correlation

The correlation between resilience and all other IV's were significant at the level of $p <$ .001. The strongest correlation was with self-efficacy, $r = .684$, while the weakest correlation was with spirituality, $r = .102$. Spirituality and alcohol usage, $r = -.118$, barely met the minimal threshold for retention in this analysis. The four measured risk factors (depression, PTSD, suicidal behaviors, and alcohol usage) were negatively correlated with resilience as anticipated by theory and the review of the literature. Based on the correlations presented, it appeared all of the 14 variables selected for use in the final analysis were at least weakly correlated with resilience and suggested each variable was able to provide information related to resilience among Airmen.

Step 4: Discriminant Analysis

This analysis utilized a seven-group DV consisting of non-deployers, past and recent deployers with no exposure, past and recent deployers with indirect exposure to danger, and past and recent deployers who engaged in combat. The seven-group DV yielded six discriminant functions. The eigenvalue, percentage of variance, and canonical correlation for each of the six functions are presented in Table 17. Canonical correlation coefficients represent the association between "the degree of relatedness between the groups and the discriminant function" (Klecka, 1980, p. 36). The canonical $R^2 = .038$ and $.026$ of function one and two, respectively, were considered low. The first two functions accounted for 91.3% of the explanatory power among the seven groups and the discriminant functions. For functions one through six, Wilk's Lambda (indicating the amount of unexplained variance) equaled .931, χ^2 (84, $N = 289,194$) = 20,697.762, $p < .001$. The null hypothesis of no difference between group centroids was rejected, but the model only explained approximately 6.9% of the total variance. Because functions one and two had the greatest discriminatory power and the greatest canonical correlation they were the primary focus of the remaining analysis. Univariate ANOVA's were calculated for each IV with significant results at the $p < .001$ level for each variable. Yet, Wilk's Lambda among the variables ranged from .999 with resilience to .981 with PTSD.

Standardized coefficients are used as a method of comparing the relative relationship of the variables within a given function (see Appendix B for the full matrix of standardized coefficients). The standardized discriminant coefficients are similar to regression coefficients, with each function serving as a new regression line, and are functionally equivalent to the beta-weights in regression. Depression (.737), health (.730), familiarity (-.443), PTSD (-.400), and self-efficacy (-.354) were the most robust variables characterizing the first function. The second

97

function was best represented by PTSD (.715), depression (.308), coping (.290), and health

behaviors (.241). Some of the variable were powerfully represented on both discriminant

functions.

Table 17

Eigenvalues and Canonical Correlations

Factor	Eigenvalue	% of Variance	Canonical Correlation
1	.040	54.5	.195
2	.027	36.8	.162
3	.004	5.4	.063
4	.001	1.6	.035
5	.001	.9	.025
6	.001	.8	.023

The structure matrix presents the correlation of each variable with the discriminant

function. As a result, the structure matrix shows the strongest relative correlation for each

variable among all the functions and is equivalent to the factor loadings used in factor analysis.

The structure matrix allows a researcher to compare relative variable importance between the

discriminant functions, not only within them, which is the use of standardized coefficients.

Generally, the structure matrix is used for naming the discriminant functions and interpreting

results. Only three variables had their highest absolute correlation with the first two functions:

health (.518) and familiarity (-.354) on function one and PTSD (.717) on function two.

Another important piece of information considered was the group means for each

function at the separate group centroids. The centroids represent group scores when the

discriminant function coefficients are applied. The group means at the functions are used to

place the centroids in multidimensional space that determines the separation between the groups.

Discriminant analysis maximizes the group differences to find the associated group centroids that

provide the greatest level of differentiation between. Patterns were found to exist between

groups within the first two functions (see Table 18). For example, past and recent combatants

had the highest scores on functions one and two than any other group.

In a visual examination of the group centroids, based on use of the first two functions, a

distinct clustering of combat groups and non-combat groups became apparent such that two

concentric groups were identified (see Figure 2; Appendix B). The Euclidean distances of the

group centroids were calculated as another method of evaluating the distances between group

centroids (see Appendix B for full results).   Both combat groups clearly had the largest distances

between other groups ranging from .588 to 1.058. The separation of non-deployers from other

groups, excluding the combat groups, ranged from .326 to .458, which was a higher degree of

separation than other non-combat related groups. With a smaller degree of group separation and

discriminating ability, non-deployers were also considered a separate group.

Table 18

Functions at Group Centroids

	Functions					
Group Levels	1	2	3	4	5	6
Non Deployed	.229	.095	.010	.005	.002	.004
Deployed	-.106	-.217	.046	.011	.031	.017
Indirect Exposure	-.175	.022	.076	-.020	-.033	-.014
Combat	-.586	.667	.007	.108	.092	-.089
Deployed—recent	.050	-.178	-.094	-.031	.006	-.039
Indirect Exposure—recent	-.192	.027	-.100	.037	-.026	.025
Combat—recent	-.446	.557	-.091	-.213	.067	.072

Unstandardized canonical discriminant functions evaluated at group means

Though not a part of descriptive discriminant analysis, the classification process was successful in correctly classifying 36.7% of all cases to the correct group. Klecka (1980) suggested models with weak discriminating ability will have widely dispersed cases from the centroid with a resulting high rate of misclassification. Additionally, close proximity of group centroids can also cause high levels of misclassification.
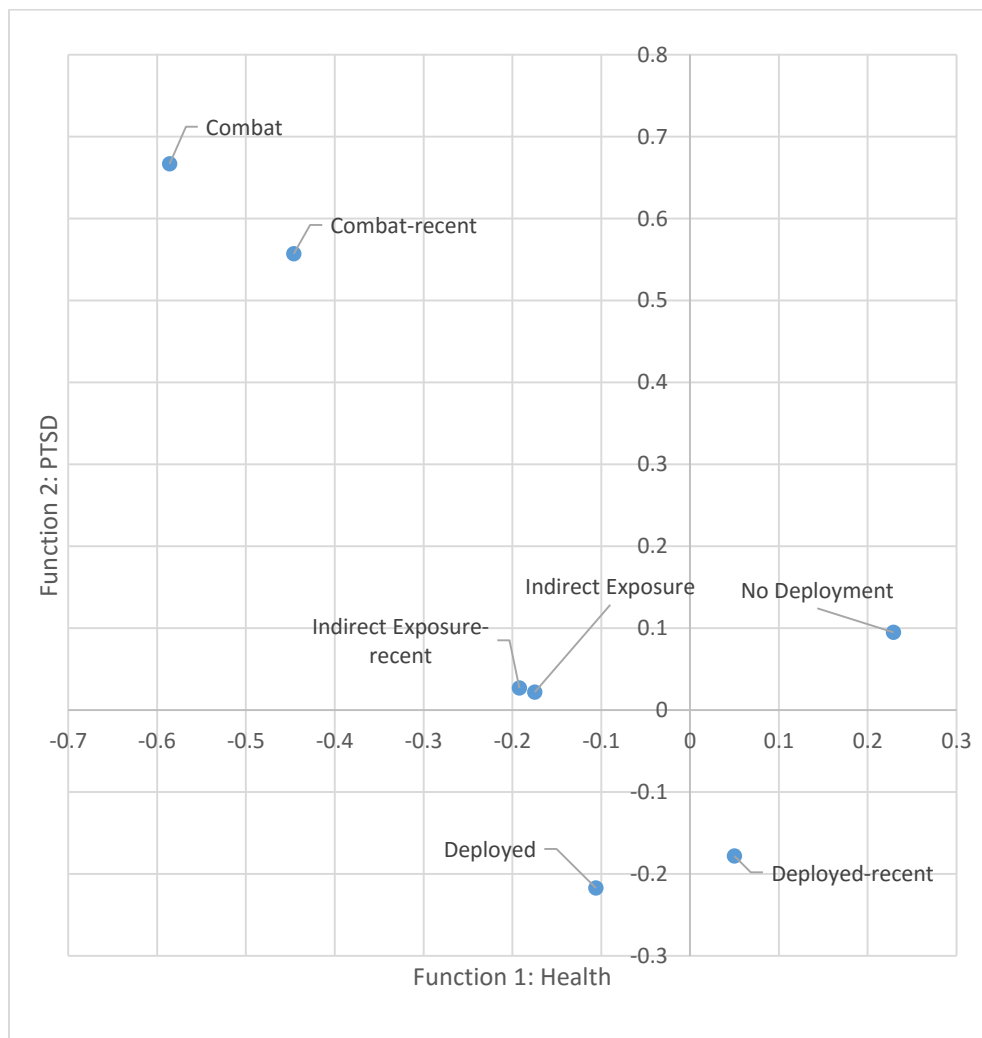
Figure 2. Full Model Group Centroids of the Canonical Discriminant Functions.

Additional Analysis

Given the previously discussed group separation between Airmen who have engaged in combat and those who have not, two additional discriminant analyses were conducted. The first consisted of three groups: combat, deployment, and non-deployment. This represented a more parsimonious model that still accounted for a theoretical difference between levels of deployment stress. The second analysis was based on two groups: combat engaged Airmen and all other Airmen, regardless of deployment status. The largest group separation was between combat engaged Airmen and all others, and thus this represented the simplest model to examine group differences based upon a single, unique deployment experience.

In the three-group analysis two functions were created. The first function had an Eigenvalue of .036, a canonical correlation of .186, and accounted for 66.8% of the explained variance. The second function had an eigenvalue of .018, a canonical correlation of .132, and explained approximately 33.2% of the variance. For the combined effects of the functions, Wilk's Lambda equaled .948, χ^2 (28, $N = 289,194$) = 15,316.184, $p < .001$. Some of the largest standardized discriminant coefficients for the first function were for depression (.805), health perceptions (.674), familiarity (-.477), and coping (.385). The second function had two large standardized coefficients for PTSD (.827) and health behaviors (.301). The structure matrix suggested the first function was most strongly associated with perceptions of health, all forms of social support and relationships, spirituality and hardiness. Meanwhile the second function consisted primarily of the mental fitness variables as well as alcohol usage and the health behaviors. The second function provided the most discriminating power in determining combat engaged Airmen (see Figure 3), which was clearly a much larger separation than that between

non-deployed Airmen and Airmen with other deployment experiences. The classification

efficiency in the three group model improved to 61.5%. For additional results see Appendix C.
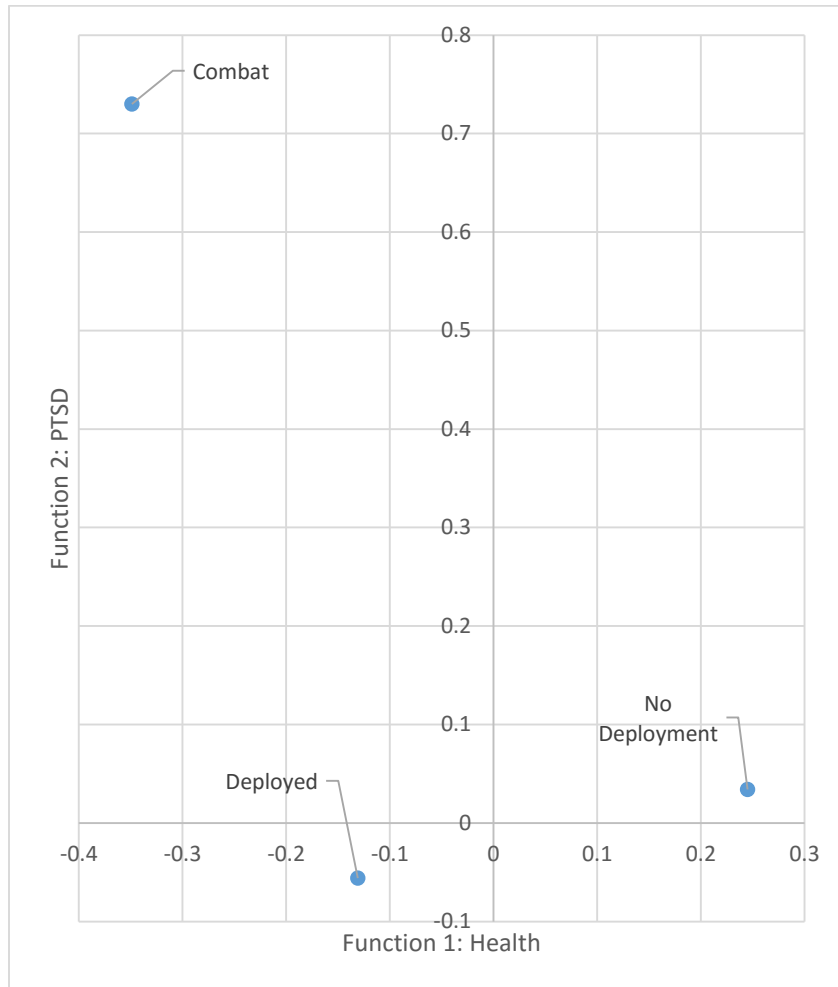
Figure 3. Three Group Centroids of the Canonical Discriminant Functions.

The two-group analysis produced a single discriminant function with an eigenvalue of

.020, a canonical correlation of .139 and explained variance of 100%. This function had a

Wilk's Lambda equaled to .981, χ^2 (14, $N = 289,194$) $= 5,632.449$, $p < .001$. The largest

standardized coefficients were for PTSD (.839), health perceptions (-.423), and self-efficacy

(.328). The structure matrix indicated PTSD (.785), health perceptions (-.318), self-efficacy

(.312), alcohol usage (.257), health behaviors (.224), and depression (.208) had the largest correlation with this function. All three health variables and three of the mental fitness variables were among the six most important variables in distinguishing between Airmen who've engaged in combat and those who have not. The classification effectiveness improved to 97.1% accuracy in distinguishing between these two groups. The values of the group centroids on the function were .808 for combat engaged Airmen and -.024 for Airmen who never experienced combat.

The result of the discriminant analysis demonstrates at least two, possibly three, distinct groups, which are related to deployment experiences, exist among Airmen. Variables such as health and PTSD were shown to have the highest discriminant ability and resulted in maximum group separation. With this understanding of the basic full model, the hypotheses can be examined in more detail within a context conducive to interpreting the results.

Hypothesis 1

It was hypothesized that as the exposure to danger increased, levels of resilience and hardiness would decrease regardless of time since exposure. The resilience and hardiness scores among groups, according to their exposure to deployment related danger, are summarized in Figure 4. Wilk's Lambda and an F statistic were calculated for the resilience and hardiness variables. For this test, failure to reject the null hypothesis (i.e. H_O) suggests the means are not statistically different between the separate groups. For resilience, Wilk's Lambda equaled .999, $F(3, 289190) = 123.701$, $p < .001$. For hardiness Wilk's Lambda equaled .997, $F(3, 289190) = 284.873$, $p < .001$. Based on the reported results the null hypothesis was rejected in support of statistically significant differences in group means on levels of self-reported resilience and hardiness. However, this test did not address if the levels comported with the hypothesis.

The resilience level for the direct combat group was higher than any other group, which went contrary to the hypothesis for this variable. In a similar manner, the direct combat group had a higher level of hardiness than other groups who have deployed, but it was not as high as the non-deployers. Based on the reported levels of resilience and hardiness, this hypothesis cannot be supported.
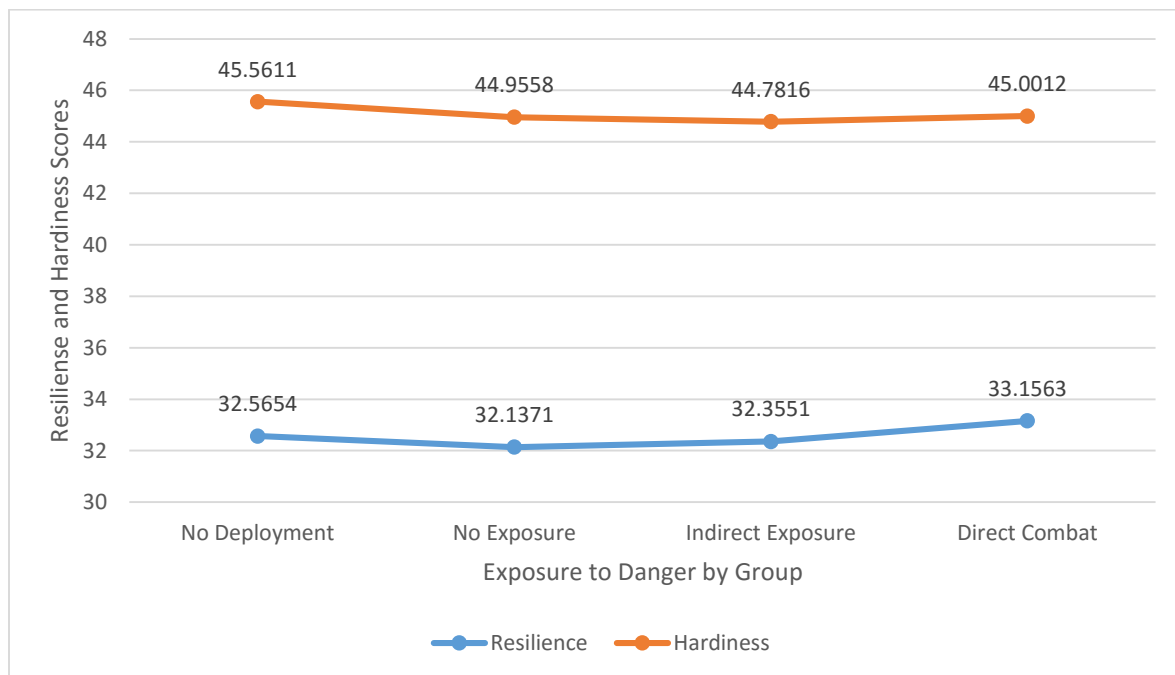
Figure 4. Resilience and Hardiness among Exposure Groups.

Hypothesis 2

It was hypothesized that resilience and hardiness levels would be higher among those who deployed greater than 24 months ago compared to those who never deployed or who deployed less than 24 months ago. The chart that follows (see Figure 5) summarizes the finding of the different groups based on time since deployment. Wilk's Lambda and an F statistic were calculated for the resilience and hardiness variables. For this test, failure to reject the null

hypothesis (i.e. H$_O$) suggests the means are not statistically different between the separate groups. For resilience, Wilk's Lambda equaled .999, F (2, 289191) = 82.021, $p < .001$. For hardiness Wilk's Lambda equaled .997, F (2, 289191) = 415.264, $p < .001$. The null hypothesis was rejected in support of statistically significant differences in group means.

The lowest level of resilience was among past deployers, which was contrary to the hypothesis. Hardiness levels were also lower among past deployers than among the non-deployment group, though higher than recent deployers. Based on the reported levels of resilience and hardiness among past and recent deployers, this hypothesis cannot be supported.
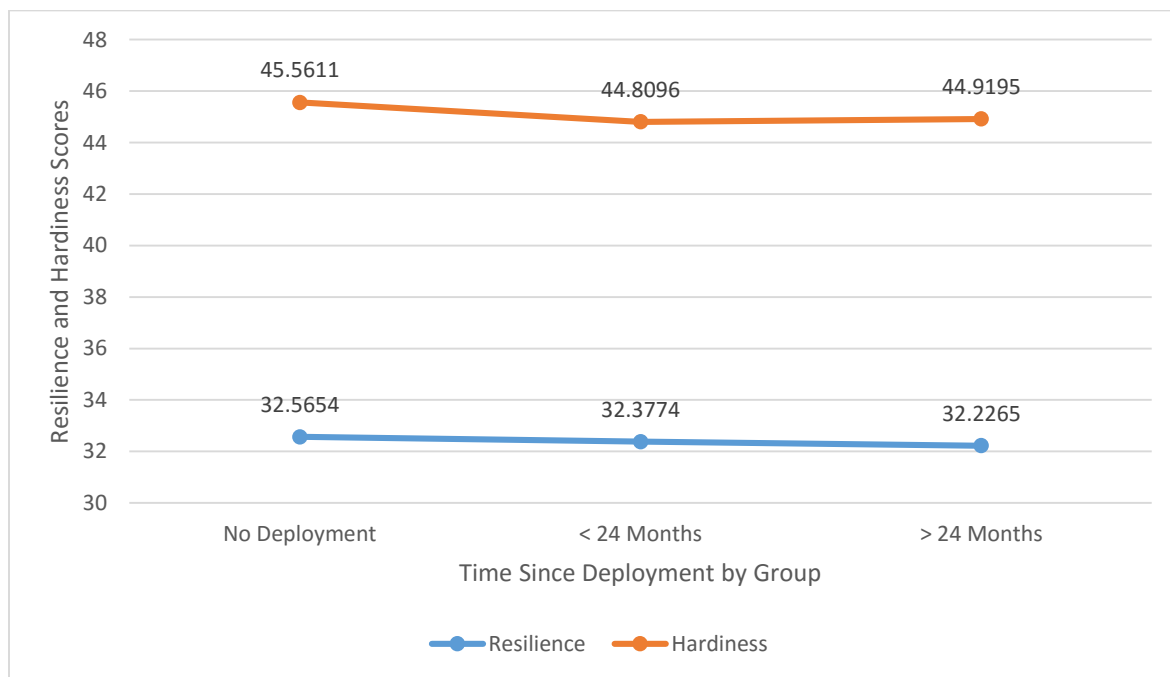
Figure 5. Resilience and Hardiness Based on Time since Deployment.

Hypothesis 3

The hypothesis projected that differences in levels of resilience and hardiness will increase between past and recent deployers as levels of exposure increase. Resilience and

105

hardiness are addressed separately in this hypothesis for purposes of clarity. The following chart (see Figure 6) summarizes findings of the groups based on time since deployment and exposure to danger in reported scores of resilience. The same tests were applied for this hypothesis as the previous two. Wilk's Lambda equaled .999, F (6, 289187) = 71.413, $p < .001$. The recent deployers (< 24 months) had a regression coefficient of .2968 and $R^2 = .4398$, while past deployers (> 24 months) had a regression coefficient of .1127 and $R^2 = .1872$. The trend lines diverged though plot points were not clearly separated. It was anticipated that past deployers would have higher levels of resilience and a steeper positive trajectory; however, recent deployers reported higher levels of resilience across deployment related exposure to danger.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	32.5654	32.041	32.3547	32.8364
< 24 Months	32.5654	32.2738	32.3557	33.5273

Exposure to Deployment Danger
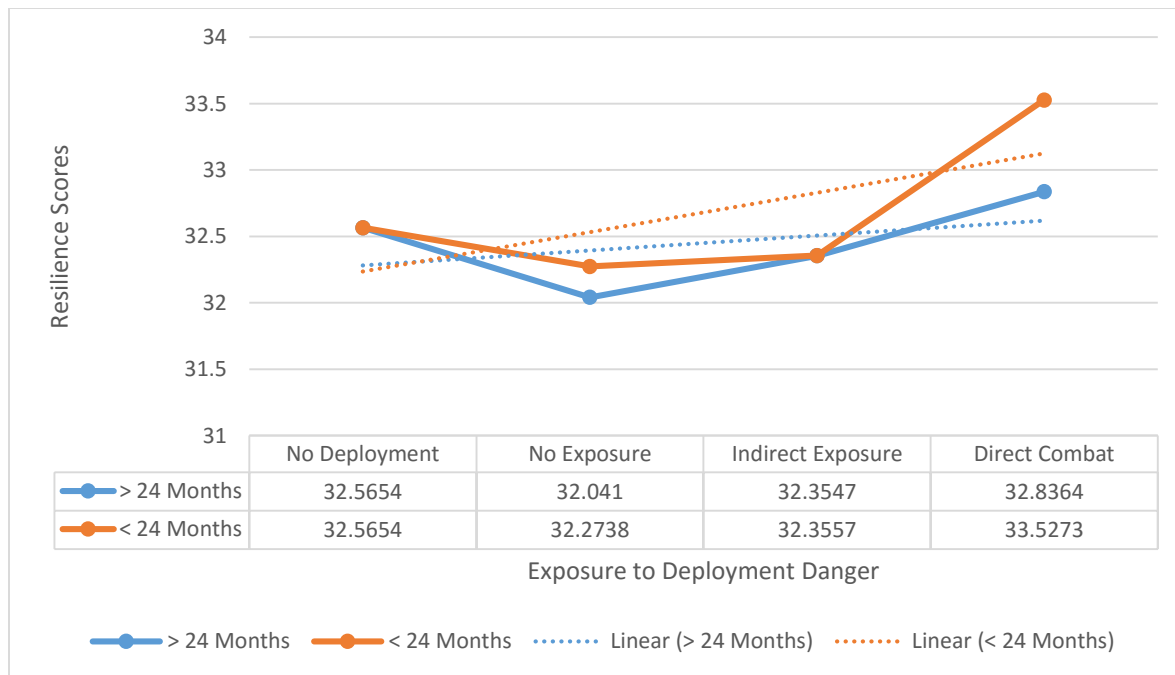
Figure 6. Resilience among Past and Recent Deployers across Deployment Danger.

For hardiness (see Figure 7) Wilk's Lambda equaled .997, F (6, 289187) = 157.023, $p <$ .001. Based on the reported results the null hypothesis was rejected in support of statistically

significant differences in group means on levels of self-reported hardiness. However, the amount of explained variance was lower than anticipated. The recent deployers had a regression coefficient of -.0398 and $R^2 = .0357$, while past deployers had a regression coefficient of -.2288 and $R^2 = .7312$. The trend lines diverged as anticipated though plot points gave a less clear picture. Recent deployers also reported higher levels of hardiness than past deployers, which was not anticipated in the hypotheses. As with the previous two hypotheses, the results cannot support this hypothesis among Airmen.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	45.5611	44.9187	44.9312	44.7943
< 24 Months	45.5611	45.0084	45.5709	45.2409

Exposure to Deployment Danger

> 24 Months　　< 24 Months　　Linear (> 24 Months)　　Linear (< 24 Months)
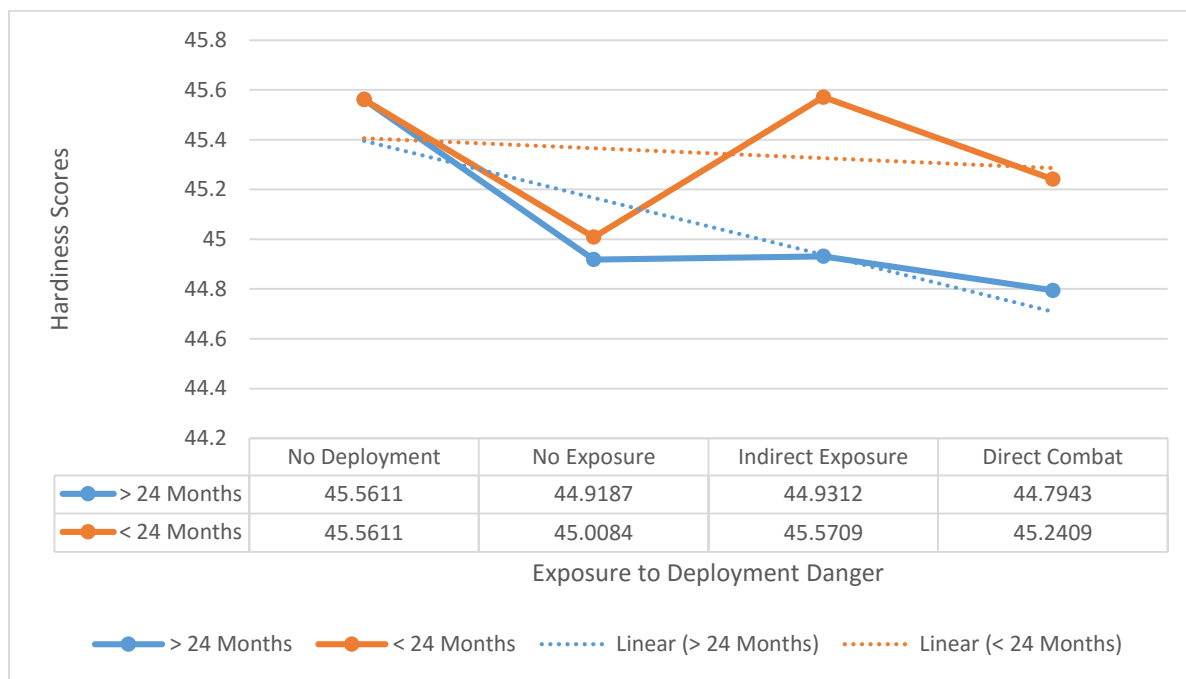
Figure 7. Hardiness among Past and Recent Deployers across Deployment Danger.

Hypothesis 4

This hypothesis predicted that PTSD, depression, and self-efficacy would have descriptive power in explaining group differences. To assess this hypothesis, two sets of information were used: the standardized canonical discriminant function coefficients and the

structure matrix (see Appendix B). Each variable had standardized coefficients on the first discriminant function above the |.3| level. Depression (.737) and the health scale (.730) were the two highest variables on the first function; these two variables also had a correlation coefficient of $r = -.612$. PTSD (-.400) and self-efficacy (-.354) were negatively associated with the first function. PTSD also had the highest coefficient on the second function (.715), followed by depression (.308). Self-efficacy only loaded on the first, fourth (-.558), and fifth (-.418) functions above the |.2| level. Given the relative importance of the first two functions in this model compared to the remaining four, this information supported the explanatory role of PTSD, depression, and self-efficacy in describing differences in group membership.

Yet, not one of these three variables was most strongly correlated with the first function on the structure matrix. PTSD had a structure coefficient of .717 on the second function followed by depression at .351. Self-efficacy (-.490) and depression (.511) were most strongly correlated with the fourth function. It should be noted that depression had the highest standardized discriminant function coefficient on the first function but was among the two lowest correlated variables on that function in the structure matrix. The fourth function was the only function with which self-efficacy had a structure coefficient above the |.3| level. The first function was interpreted to represent health perception, the second represented PTSD, and the fourth representing emotional wellness and support. Based on available data among Airmen, this hypothesis was supported.

Hypothesis 5

The final hypothesis predicted the utility of spirituality and alcohol consumption as predictors of group membership to be weak, but positive across deployment exposure to danger regardless of time since deployment. After comparing the structure coefficients of all variables,

alcohol consumption had the weakest (-.303) and was the weakest variable on the sixth function. Alcohol usage thus provided the lowest importance in interpreting the results. However, the sixth function was interpreted as a health behaviors function and it made sense that alcohol usage was a part of that function. Alcohol consumption and resilience were also the only two variables which did not have a standardized discriminant coefficient above |.3|, which suggested the weakness of alcohol usage as a part of any of the functions. Spirituality represents the fifth function with a structure coefficient of .505. It also has the largest structure coefficient (.485) of any variable on the third function. The standardized discriminant coefficient were most meaningful on the third (.424) and fifth (.423) functions. In other words, spirituality was not an important component on either of the first two functions that provided the best discrimination between groups.
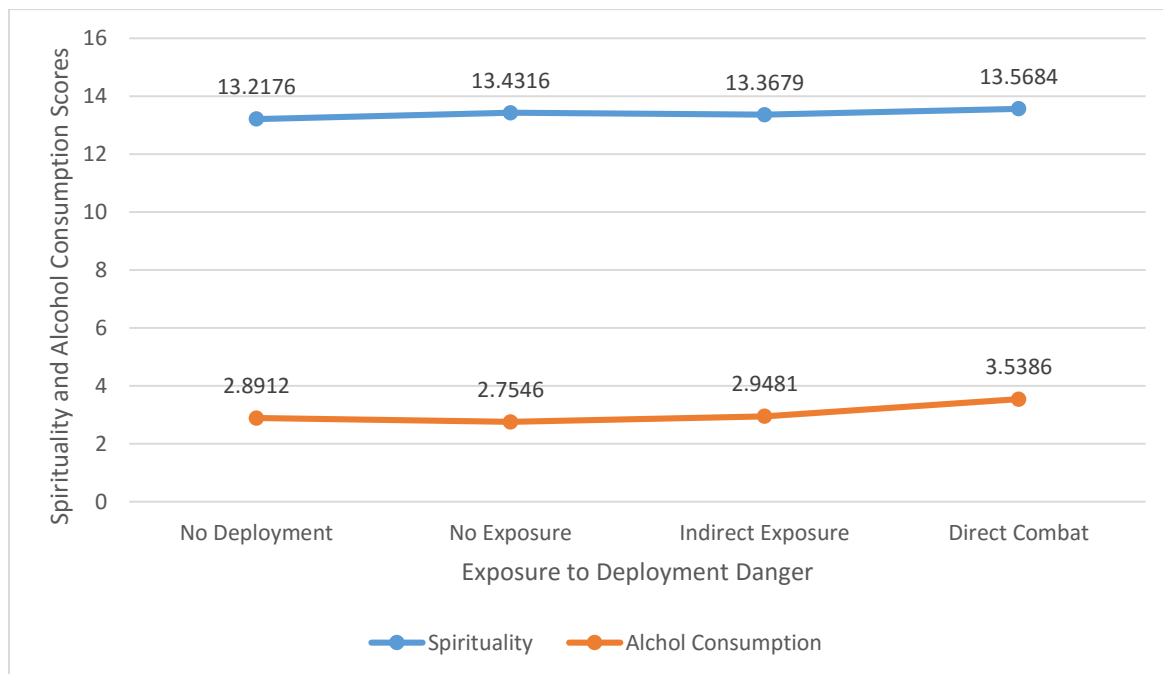
Figure 8. Spirituality and Alcohol Usage across Deployment Danger.

When comparing the means across exposure groups these variables had some information beyond a mere descriptive role (see Figure 8). Alcohol usage had a Wilk's Lambda equal to .998, $F(3, 289190) = 184.234$, $p < .001$. There was a distinct increase among Airmen directly exposed to combat. For spirituality across groups of deployment exposure, Wilk's Lambda equaled 1.000, $F(3, 289190) = 31.433$, $p < .001$. Though significant, spirituality explained virtually none of the separation among groups. It appeared, spirituality increased only slightly among deployers as the level of exposure to deployment danger increases.

Alcohol usage was relatively consistent across groups except for direct combat exposed Airmen (see Figure 9). When exposure to deployment danger was divided by past and recent deployers, the trend line was positive for both groups with a regression coefficient of .2433, $R^2 = .5705$ and .1787, $R^2 = .7621$, respectively. It appeared that alcohol consumption increased more as a function of exposure to deployment danger rather than time since deployment.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	2.8912	2.6861	2.895	3.6326
< 24 Months	2.8912	2.852	3.0228	3.4298

Exposure to Deployment Danger

> 24 Months   < 24 Months   ········ Linear (> 24 Months)   ········ Linear (< 24 Months)
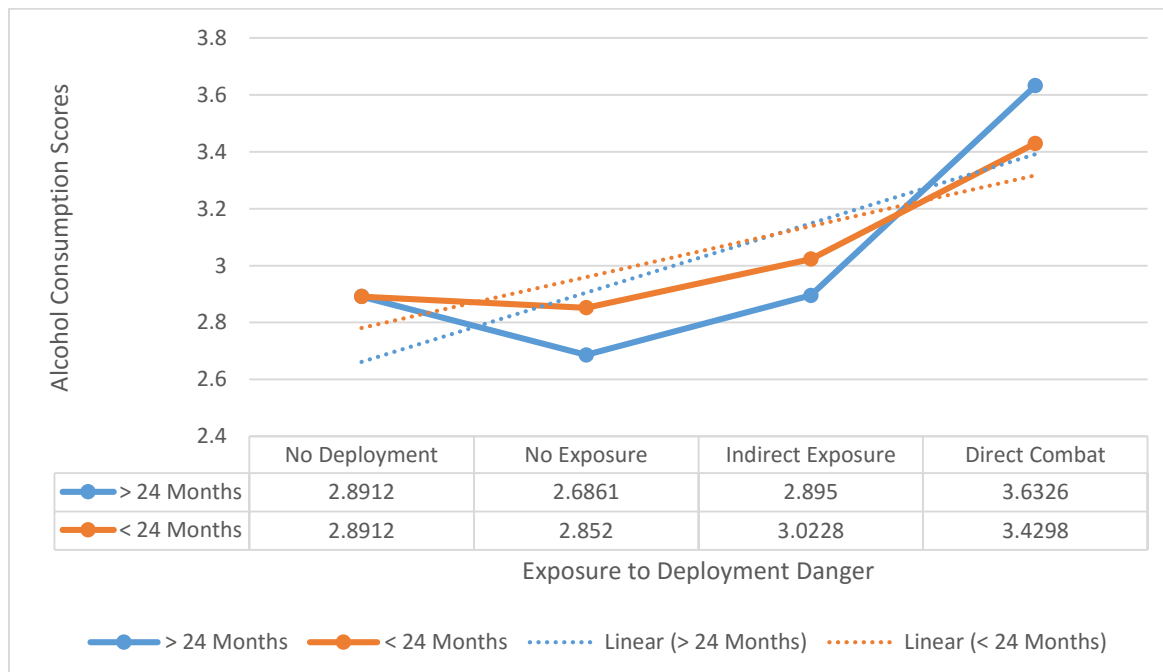
Figure 9. Alcohol Usage among Past and Recent Deployers across Deployment Danger.

When time was incorporated, spirituality increased among both past and recent deployers. The trend line was positive for past and recent deployers with respective regression coefficients of .1357, R^2 = .5712 and .0592, R^2 = .3172. Both groups had their highest levels of spirituality among Airmen who had engaged in combat (see Figure 10). It appears that levels of spirituality generally increase based upon levels of exposure to danger among both past and recent deployers. This hypothesis is supported as alcohol consumption and spirituality have a positive relationship with deployment danger and are relatively weak discriminant variables.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	13.2176	13.6892	13.5211	13.7258
< 24 Months	13.2176	13.0652	13.1521	13.386

Exposure to Deployment Danger

> 24 Months   < 24 Months   ·······Linear (> 24 Months)   ·······Linear (< 24 Months)
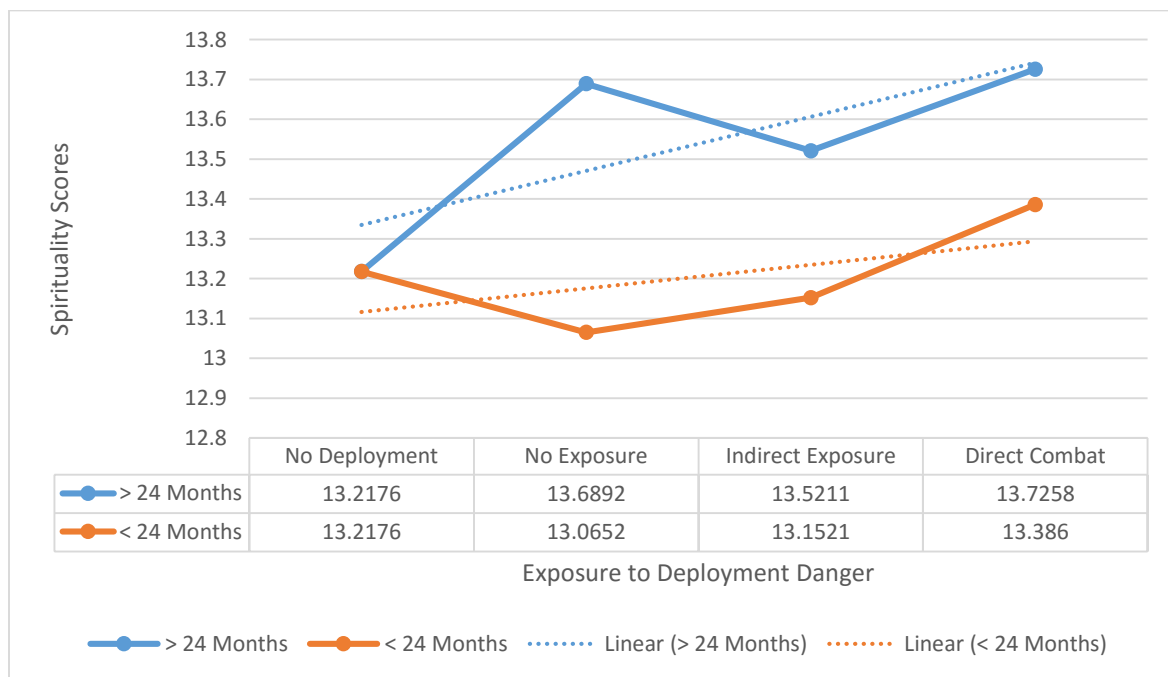
Figure 10. Spirituality among Past and Recent Deployers across Deployment Dangers.

Conclusion

The study question and hypotheses were designed to make intuitive and theoretical sense in relation to military deployments and anticipated responses by Airmen based on studies of

previous military populations. Several findings will be highlighted and support for the

hypotheses will be reviewed. First, the discriminatory power of the resilience related variables to

describe and explain group differences was smaller than anticipated. Based on the discriminant

functions the groups were somewhat homogeneous in their responses to deployment stressors.

However, some separation was noted among those who experienced combat, either in the past or

recently. The difference of the scores between groups was also notably lower than anticipated

based on previous research.

The first hypothesis was not supported as levels of resilience and hardiness increased

across deployment stressors for those Airmen who deployed. Resilience levels for combat

exposed Airmen were higher than any group including non-deployers; however, hardiness levels

were not as high among deployers as non-deployers as anticipated.

The second hypothesis was not supported either. Resilience was lowest among past

deployers, which was contrary to the hypothesis with a difference between deployers being .15.

Levels of hardiness were lowest among those who recently deployed, as anticipated, but it was

within .1 on the mean score of those who have deployed in the past, which was not a large

difference. Though tests suggested a statistically significant difference between group means, it

was unclear how meaningful the differences are in reality.

The third hypothesis was not supported. There appeared to be a trend in which the

differences between past and recent deployers increased based on exposure level. However, in

all cases recent deployers reported higher levels of resilience and hardiness across deployment

related exposure to danger than past deployers. Resilience levels were higher among combat

engaged Airmen regardless of time since exposure. The highest level of reported hardiness was

among indirectly exposed, recent deployers; however, the difference was truly miniscule

112

compared to non-deployers. As with the previous findings, it was unclear how practically meaningful and useful the findings were when the small absolute differences between the groups was considered.

The use of standardized discriminant coefficients supported the fourth hypothesis of the descriptive discriminatory power of PTSD, depression, and self-efficacy to describe group differences. These coefficients indicated each of these variables were important components of the first function, but only PTSD and depression were integral components of the second function. The structure matrix supported PTSD as critical to the second function and depression and self-efficacy to the fourth function. The hypothesis is supported, though not as strongly as initially anticipated.

Finally, the fifth hypothesis was fully supported as both alcohol and spirituality were weak descriptors of differences among deployment groups. They also both had a positive trend. All scores of spirituality among past deployers were higher than those among non-deployers. The highest levels of alcohol consumption were clearly with those Airmen who engaged in direct combat, particularly among past deployers who engaged in combat. It was important to note that alcohol consumption was not a particularly important component of any of the functions, as described by the standardized coefficients.

Chapter 5: Discussion and Implications

Study Summary

Given the prolonged military involvement in OEF and OIF, a majority of service members have deployed and some have gone through the cycle of pre-deployment, deployment, and post-deployment reintegration many times (Wooten, 2012). The variability of deployment experiences and frequency of deployment produced a tremendous amount of behavioral variability in response to these stressors (Adler et al., 2011). The initial two years following trauma in adults appears to be a transition and adjustment period with higher levels of reported psychological distress compared to the period of time after the first two years, when behavioral patterns have become more consistent (Breslau, 2001).

This study sought to describe and understand some of the behavioral manifestations, in line with the CAF model, across a spectrum of deployment related stressors and time since deployment. The primary research question was intended to determine which resilience related variables account for group differences among Airmen across levels of deployment exposure (i.e., no deployment, deployed with no exposure to danger, deployed with indirect exposure to harm, deployed with direct combat experience) and time (past deployers—greater than 2 years ago; and recent deployers—within past 2 years). With additional understanding of behavioral patterns among Airmen who have experienced various levels of exposure to danger during deployment and the changes which take place over time, resilience and prevention training

efforts among Airmen may be targeted and improved. There are no known studies specifically

addressing this topic among Airmen and the use of the large scale Air Force Community

Assessment Survey from 2013 is unique to this area of research.

Interpretation of Study Findings

This analysis produced three notable findings. First, group separation was present along

two discriminant functions which provided a method to distinguish between combat exposed

Airmen and all other deployers and non-deployers. Next, the results provided insight into post-

deployment readjustment, as past-deployers reported less resilience, lower levels of protective

factors, and higher levels of risk factors when compared to recent deployers. Finally, this study

suggests that Airmen are generally healthy and resilient despite their level of exposure to

deployment dangers or time since deployment. The rest of this section will expand upon these

three findings and their implications for Airmen.

The clearest notable finding pertained to group separation between combatants and all

other deployers and non-deployers. There was also moderate group separation between non-

deployers and deployers, other than those in direct combat. The first two discriminant functions

were characterized by health and PTSD, respectively. Health provided separation between non-

deployers, deployers without combat experience, and combat exposed Airmen (see Figure 3).

However, the second function, PTSD, created the greatest demarcation between groups and

clearly discriminated combatants from all other Airmen. This finding was in line with research

on the positive relationship between combat engagement, deployment stressors, and elevated

rates of PTSD among military personnel directly exposed to combat (Foy, Sipprelle, Rueger, &

Carroll, 1984; Hoge et al., 2004). One study found that male veterans who identified combat as

their most significant trauma were seven times more likely to experience PTSD compared to men

115

who identified other traumas as their most significant (Prigerson et al., 2001). In particular, differences in levels of PTSD are most powerfully related to combat exposure, not the branch of service to which the military personnel belong (Ramchand et al., 2015). The greatest difference across mean levels of PTSD was between past combat deployers and recent deployers with no exposure. The absolute difference essentially amounts to endorsing an additional category of PTSD symptoms. A more comprehensive PTSD assessment or scale may help clarify along which diagnostic criteria these groups differ. Distinct differences exist between the presence of PTSD symptoms and functional impairment, which affects personal functioning, relationships, or work performance (Litz, 2005). These areas were not addressed as a part of this study.

The combat groups also reported the highest levels of resilience, spirituality, self-efficacy, health behaviors, and familiarity, which was consistent with the "healthy warrior effect" in which only the most highly trained and resilient personnel repeatedly fill combat roles (Larson, Highfill-McRoy, & Booth-Kewley, 2008). This makes particular sense in the context of the Air Force which has fewer designated combat troops than the Army or Marines; those in combat designated roles are consequently highly screened, trained, and skilled in their professions. The group of combat exposed Airmen also experienced higher levels of alcohol usage and suicidal behaviors. These findings were also in line with the literature on the risks of combat exposure (C. C. Castro, 2009; Maguen et al., 2011). However, the past combat engaged group also had the lowest level of hardiness. An inverse relationship between PTSD and hardiness was identified, but this relationship did not exist between PTSD and resilience. The Dispositional Resilience Scale was used to measure hardiness as a dispositional trait, and thus should be fairly constant. However, this study may indicate malleability in hardiness.

Combat plays a unique and lasting role in the lives of individuals who actively engage in combat and has been considered a critical factor in development of resilience over the life course (Elder & Clipp, 1989; Spiro, Settersten, & Aldwin, 2016). Over time, those who engaged in the heaviest combat were initially more likely to have a mixture of emotional and behavioral problems, but later developed the highest levels of resilience and capacity. Combat-engaged Airmen reported some deleterious effects of combat but they were also prone to report higher levels of support and self-efficacy. Additionally, the higher levels of score variability among past combat deployers also suggests that the risk factors are critical to understand long-term impacts of deployment. The increased variability suggests that values around the mean become more unstable with time. Some past combat deployers will have lower scores on the risk factors while others will have higher, or worse, scores on the risk factors. The element of time seems to play a role in both the healing and possibly the worsening of the effects of combat. It was unclear from this study which characteristics were most critical to identify those with worsening scores over time.

This study suggests a potential for combat to have both adverse and positive effects within the life of an individual Airman. One set of authors suggested crises and trauma represent "constructive confrontations" which promote acquisition of coping skills and broadening of both personal and social resources, but have mixed positive and negative results during the transition period (Schaefer & Moos, 1992). Other studies support the role of adversarial growth following trauma, including combat, (Linley & Joseph, 2004) and posttraumatic growth in combat veterans (Pietrzak, Goldstein, Malley, Rivers, Johnson, Morgan Iii, et al., 2010; Tedeschi, 2011). Clearly, Airmen who engaged in combat were identifiable compared to other Airmen along multiple variables representing risk and protective factors.

117

Much has been written about the unique experience of combat, which cannot be fully captured in the absence of lived experience. However, the effects of combat experience can be discerned through some of the findings of this study.   There was a consistent decline in health scores among past and recent deployers as the level of exposure increased. However, the most precipitous drop being among past deployers, with both past and recent combatants reporting lower levels compared to all other groups. Warriors in combat must engage in the act of killing, which requires tremendous physical and mental fortitude and preparation, but also exposes them to the greatest risks to health. In the classic book *On Combat*, Dave Grossman and Loren W. Christensen (2008), discuss the important role of physical health on effective combat performance. Additionally, health has been noted as a concern among military personnel in relationship to deployment, PTSD, and exposure to danger (Taft, Stern, King, & King, 1999; Tanielian, 2009).   In a previous study of U.S. Airmen, it was found that higher levels of PTSD and depression were related to lower levels of health and performance (Hobfoll et al., 2012). This study also supports that result, as past deployers with combat experience reported the highest levels of PTSD and lowest levels of health.

The results of this study suggest that increased levels of health separate non-deployers from combatants and all other deployers. There was a clear indication that health was reported to be worse among combatants than other groups and the key variable on the first discriminating function for both the seven and three group models analyzed. Further, in the two-group model PTSD and health were the first two variables in the structure matrix, respectively. Combined, this strongly suggests PTSD is the clearest way to discriminate between combatants and all others followed by an evaluation of their health. Combatants also had higher levels of health behaviors, specifically exercise and nutrition; however, the decreased levels of health may

suggest the heavy physical toll of combat despite physical preparation. Consequently, two components of CAF to focus on with Airmen, mental and physical fitness, are important during pre- and post-deployment.

Second, the results provide some unique insight into post-deployment readjustment. Past deployers seemed to do worse on virtually every variable compared to recent deployers, which is somewhat contradictory based on theory; however, notable exceptions of spirituality and familiarity were present. In particular, past combat deployers had the highest level of PTSD followed by recent combat deployers. Though not a stated hypothesis in this study, it was anticipated that the results would have followed patterns suggested by resilience theories of reduced PTSD over time. Several theories of resilience and readjustment following trauma, and combat in particular, suggested resilience consists of a drop in performance followed by integration of the experiences into new ways of coping and appreciating life to produce growth and the "bounce back" (Blundo, Greene, & Riley, 2012; Flach, 2004; G. E. Richardson, 2002). However, recent empirical findings complicate this picture somewhat. In a comprehensive literature review, it was found that levels of PTSD rise as time since deployment increases (Ramchand et al., 2015). Also, in a longitudinal study of veterans, delayed-onset PTSD was predicted by higher levels of mental health symptoms and decreased health upon initial measurement, even though these were subthreshold levels (Goodwin et al., 2012). Though it is unclear why there exists a discrepancy between the resilience theory and the results from past and present data, there are several possible explanations, three of which are addressed here.

First, past deployers were more likely to deploy as part of OIF compared to recent deployers, thus differences in the nature of the conflicts and exposure to danger between recent and past deployers should be considered. Combat in OIF consisted of more urban warfare and

119

higher rates of casualties compared to combat in OEF. Each combat zone will have its own

characteristic hazards and stressors which are not shared among other conflicts. Next, the

difference may be explained through the cross sectional nature of the study design, which only

permitted a snapshot of two different groups at the same time. Potentially, the recent deployers

would have reported increased levels of PTSD and other risk factors in the ensuing years. Other

authors have found veterans who identified combat as their most significant trauma were more

likely to experience delayed-onset symptoms of PTSD (Prigerson et al., 2001). This could be an

accurate reflection of the experience of Airmen based on this study. If true, there must be

something about the combat experience itself or the context surrounding these Airmen to account

for the difference in PTSD levels. For example, those who deploy together have a shared

experience with their deployment cohort which generally results in bonds strong enough to

override value systems and concern for self-preservation (Moskos, 1975). As fellow deployers

separate from service or move to another assignment, Airmen may begin to feel increasingly

isolated in regard to their deployment experiences, bringing additional internal stress with fewer

of the trusted social supports to help address the struggles (Wessely, 2006). The gradual loss of

trusted social support trigger, for some, the additional symptoms of PTSD seen later as post-

deployment social support may be more critical than unit cohesion during deployment (L. A.

King et al., 2006).

Finally, another plausible explanation of differences in PTSD in this sample is the

amount and quality of resilience training received by Airmen at the time of deployment. In

short, more recently deployed Airmen were receiving more training. Among recent combat

deployed Airmen 48.4% reported receiving over 8 hours of resilience training compared to

34.3% of past combat deployers. A reduction to 11.9% of recent combat deployers received no

resilience training compared to 17.9% of past combat deployers. Similar patterns, though not as pronounced, exist between each of the deployment groups. The Air Force initiated the Airman Resilience Training, a pre-exposure, psychoeducational program and precursor to CAF, in late 2010. The recent deployers would have likely been exposed to this training program, while the past deployers would not have had that training prior to their deployment. The differences in PTSD could be the unmeasured effects of that training to improve treatment seeking and use of new skills when negative reactions occur (Gonzalez et al., 2014).

Resilience training programs may have had a differential impact among past and recent deployers; unfortunately, from the data there is no way of determining which resilience training programs Airmen were exposed to either pre- or post-deployment. Given the group differences found in this study, some Airmen may need training tailored to their experiences and culture. For example, a training programs called Defender's Edge was specifically designed to address the warrior mindset, to be action oriented, and to be presented in a dynamic format; it was well received by the participants (Bryan & Morrow, 2011). The training needs of military personnel are at least partially dependent on actual or anticipated exposure to combat during deployment. Some resilience training programs have developed pre-deployment, post-deployment, and elite resilience training programs to address the needs of military personnel based on their circumstances (Jarrett, 2008). Such models recognize the importance and application of the deployment cycle to address needs through tailoring interventions according to military personnel's timing within the cycle. Arguments have been made to improve both pre- and post-deployment screening among military personnel to better attend to the training and support needs of personnel at risk (Rona, Hyams, & Wessely, 2005). In short, training in resilience skills based on group differences and resilience factors plays a contributory role in long-term mitigation of

negative outcomes among deployed and high-risk military personnel (Maguen et al., 2008). As such, careful attention should be paid to the training programs, as well as the collection of outcome data.

The third major finding of this study suggests that Airmen, as a group, are healthy and resilient, despite levels of exposure to deployment danger or time since deployment. This was determined by examining the generally small differences between group means on the variables. Due to the size of the sample, virtually all of the outcomes of statistical tests proved significant and could not be relied upon to provide accurate assessment of clinical utility. For example, depression had a response range of $6 - 24$ and the greatest difference was between recent deployers with no exposure to deployment danger and past combat Airmen (see figure 16), but the overall difference was 1.14. Though a statistically significant difference, it did not seem to represent such a large distinction to suggest critical clinical disparities necessarily exist between these groups. One could thus consider this a study of nuance in deployment reactions as the large sample size allowed for the examination of patterns which may have otherwise been obscured in a smaller study. Rather than focus on the absolute differences and attempting to determine the potential clinical utility, there are suggestions of real differences and consistent patterns between combatants and all other deployers and non-deployers. Examining the patterns between risk and protective factors among combat exposed Airmen may provide a more clinically and practically useful picture of the effects of combat than looking at absolute differences.

Meredith et al. (2011) supported the idea of clearly defining resilience for the military population in order to improve guidance and program development. The results of this study found some support for the definition of resilience: the process of developing a combination of

122

holistic, protective resources to increase the ability to withstand, recover, and grow over time in the face of anticipated demands and past stressors. As described earlier, combatants had the highest levels of resilience, spirituality, self-efficacy, health behaviors, and familiarity. These variables represent all four of the domains of CAF and are thus a holistic pattern of protective resources. The levels reported on each variable were differential based on time, supporting the idea that resilience is developmental and that time is an active component in the resilience process. However, additional studies would be needed to determine if these factors contribute to coping with future demands and stressors.

Study Limitations

While this study has applicability in addressing the needs of Airmen who deploy from a prevention, screening, and resource allocation perspective, there are several limitations which need to be explicitly stated. Secondary data analysis is a viable and effective mode of research in the social sciences, especially when trying to study hard to reach groups (Pienta et al., 2011; Smith et al., 2011). However, one critique of using secondary data pertains to data not being collected to address certain questions, issues, or populations, which limits the knowledge that can be gleaned from the data (Vartanian, 2011). The data collected in the CAS was intended to address a breadth of Airmen's experience while serving in the Air Force and was primarily intended to be used to help Commanders and leaders understand patterns of well-being among their Airmen. As such, there were many questions in the survey which did not pertain to the research topics and the length of the survey was quite long, thus providing distractions and numerous opportunities for missing data. The dependent variable was created as a composite of several individual questions which were mutually exclusive. The independent variables were frequently not validated scales or were initially validated scales but some items, which the U.S.

Air Force found to be less useful in the past, were eliminated from the survey. This limits

comparability between studies and even the validity of some of the scales used. Additionally,

the 2013 CAS was not designed with the four-domain CAF model specifically in mind. The

CAF domains had to be approximated with variables not intended to comprehensively measure

such a model. As a result, the model represented may be underspecified, hence the utility in

explaining differences among groups and evaluating the utility of the CAF model in resilience

research may be somewhat diminished.

The second major limitation was the low response rate of 21%. This low response rate

makes it difficult to assume there are not qualitative and quantitative differences between non-

respondents and respondents. In the unweighted sample, the junior enlisted ranks and younger

Airmen were clearly underrepresented. Meanwhile the senior enlisted and officer ranks, married

Airmen, and the Active Duty force were overrepresented in the sample compared to the total

force. Given the known population parameters a weighting strategy was utilized to bring the

sample back closer to population means. Such a strategy is worthwhile, but adds a level of

uncertainty to the data as it is unclear if the respondents in the underrepresented groups were

accurate reflections of the non-respondents. Many of the junior enlisted work at jobs without

regular access to a computer terminal (i.e. security forces, jet maintainers, explosive ordinance

disposal, transportation) especially for the length of time required to complete the CAS, which

may bias the sample towards those who have frequent access to computers as a regular part of

their duties (i.e. medical, personalists, finance, communications). Even though a weighting

strategy may help correct demographic discrepancies, it cannot account for biases which may

already be inherent in the response set being weighted. Biases, such as this, increase the risk that

information represents the wrong population, or only a portion of the population, and provides inappropriate outcome results (Kelley & Maxwell, 2012).

Finally, generalizations from this study should be limited to Airmen, not to other military services, as respondents were uniquely part of the Air Force. Other services have differences in deployment cycles and duration, service culture, mission requirements, services available, pre- and post-deployment trainings, and levels of combat exposure, all of which make direct comparisons with other services difficult. As a group, Airmen have the lowest rates of combat exposure compared to the Army or Marine Corps. Additionally, interpretation should be limited to those who participated in the current conflict; conflicts outside of OEF and OIF were not sufficiently represented in this study. The prolonged nature of OEF and OIF was unprecedented in U.S. military history and the circumstances under which the AVF operated were equally unprecedented, thus limiting generalizability to cohorts from previous conflicts.

Implications of the Study for Military Social Work Practice

Social workers frequently utilize the person-in-environment perspective of the ecological model of social work practice (Gilgun, 1996; Greene, 2014). Accordingly, social workers have been encouraged to adopt a military centric perspective of the warrior-in-combat to better evaluate the role of military experiences in changing the families, groups, and social structures surrounding military personnel and veterans (Marquez, 2012). NASW (2012) published standards in working with service members, veterans, and military families. The social work literature increasingly recognizes additional knowledge in military culture, assessment, and interventions is important to working with military personnel and veterans (Dixon, 2013; DuMars, Bolton, Maleku, & Smith-Osborne, 2015; Forgey & Young, 2014). It is incumbent

upon social workers to ensure their own efficacy in helping military personnel and veterans attain a "new normal" in post-deployment life (Blundo et al., 2012).

The results of this study support several key concepts critical to resilience theory and social work practice consistent with that theory. According to resilience theory, resilience is a bio-psycho-social-spiritual characteristic, a continuum of response options, a life course or developmental dynamic, and a result of unique coping capabilities (Greene, Galambos, & Lee, 2004). These characteristics of resilience are important to military members as bio-psycho-social-spiritual models, such as CAF, are presented to Airmen in response to their adversities and challenges. Practice assessments and interventions should include comprehensive modalities which address the client's complex, multifaceted concerns holistically (Greene, 2014).

The standardized canonical discriminant functions coefficients demonstrated that a variety of risk and protective factors comprise each function to help describe group membership. Similar findings also exist among other samples of Airmen (Maguen et al., 2008). Consequently, assessing only one or two areas of capacity may not be sufficient to produce the necessary changes. This study suggests that familiarity with neighbors and a support system that offers tangible assistance are important to Airmen as well as health perceptions. This combination of variables provides several insights for social workers to consider. The importance of social interactions outside of the workplace and which are familiar and helpful in time of need is part of the explanation of separate groups along the first function. There is clear separation between non-deployers, deployers without combat experience, and combatants (see Figure 3). As deployment stressors and exposure to danger increase, the positioning on function one decreases, suggesting worse reports of health and familiarity, or neighbor social support. This is consistent with findings that post-deployment PTSD is associated with diminished health (Pietrzak et al.,

2014) and lack of social support (Ozer, Best, Lipsey, & Weiss, 2003; Possemato et al., 2014). The importance of neighbors as a form of social support may be important to Airmen, especially among the active duty, who move frequently and have to form social bonds with neighbors who provide the support which may otherwise have been provided by extended families or long-term social networks. A lack of social support or isolation can prove problematic without other forms of social support to compensate, especially if there are severe health concerns. Consequently, as social workers assess veterans and deployers, care should be taken to address several aspects of the effects of deployment.

Further, PTSD is the clear factor which discriminates combatants from all other Airmen. It was noted that PTSD symptoms were worse among past-deployers than recent-deployers, but were virtually identical among other past- and recent-deployers based on similar exposure levels (see Appendix B). There appears to be something unique about the combat experience and the timing of manifestation of PTSD symptoms. Other studies support this observation. PTSD prevalence rates among military personnel increase, as time since deployment also increases (Gates et al., 2012; Milliken, Auchterlonie, & Hoge, 2007; Ramchand et al., 2015). Additionally, when social workers assess for PTSD they can also examine the cumulative effects of combat and other traumatic exposures, in addition to the timing of the assessment since the last combat experience or combat deployment. Combatants from this sample spent more total time deployed, which indicates more frequent deployments, than other Airmen (see Table 12). Due to the intensity of combat and increased frequency of exposure, this study suggests it is insufficient in a clinical setting to simply assess whether someone was engaged in combat or not. Rather, the frequency of combat experiences, time since the last combat experience, intensity of combat, and effects over time each need to be considered during the assessment. There is also a

need to lengthen the time in which military services screen for PTSD related to deployment, particularly for those who engaged in combat (Bliese, Wright, Adler, Thomas, & Hoge, 2007).

With combatants being exposed at a higher rate to frequent deployments and potentially more intense circumstance, the need for the strength-based perspective among military social workers may prove useful. Social workers can push to have an inside-out perspective of change in which the military service member or veteran finds "innate health and natural well-being" from internal sources rather than external programs (Pransky & McMillen, 2009, p. 245). For example, the military generally represents a masculine environment averse to weakness (Braswell & Kushner, 2012) and which still has a level of stigma affecting help-seeking behaviors (Hoge et al., 2004). The mere fact that a military member is engaging in any service or self-help behavior can be easily translated into a strength and an act of resourcefulness on the part of the military member or veteran. By assessing for strengths and holistic resilience and developing a salutogenic perspective, a practitioner will have a greater likelihood of finding areas of strength upon which to build (Tedeschi & Kilmer, 2005). A social worker can actively search for strengths through assessing resilience, hardiness, coping, or self-efficacy to determine skills and abilities upon which to build during treatment or prevention efforts. This type of mindset need not be limited to a clinical setting, but could be used in multiple settings from social services to policy development.

The results of the present DA suggest that deployment experiences can be described, at least minimally, through risk and protective factors associated with holistic resilience. Additionally, it is unlikely that resilience functions as a dichotomous phenomenon—either someone has it or they don't—but rather a continuous variety of developed capacities or responses to stressors, traumas, and contextual challenges. For example, resilience and hardiness

128

scores across deployment exposure and time were not abruptly different but rather gradually

differed, suggesting changes more consistent with a response continuum rather than the

dichotomous presence or absence of an attribute.

Consequently, some will develop more effective coping skills and adaptive capacity than

others, but everyone has a resilient "default setting" which can be enhanced and activated

through social work practice (Wartel, 2003). This may have been exhibited through the small

relative differences in outcome scores of the independent variables between the dependent

groups. Their similar scores may demonstrate the overall health and resilience of Airmen as well

as their propensity to default towards resilience. This underscores the need for practitioners to

seek to understand and build upon the competence of Airmen and other military personnel. Such

actions are consistent with the strengths perspective of social work (Saleebey, 2009; VanBreda,

2001) and positive psychology (Cornum, Matthews, & Seligman, 2011). The results of this

study support such an approach to social work practice.

Policy Implications

Policy is a useful tool to address widespread or localized problems. Sherri

Torjman (2005) provided a succinct definition of policy as "a decision-making process that helps

address identified goals, problems or concerns" (p. 4). This process is generally made within a

context of relevant values, competing explanatory theories, and viable alternative choices to

solve the problem (Gilbert & Terrell, 2013). A concise yet multi-dimensional policy framework

has been proposed by Gilbert and Terrell in which four basic questions are asked about the

policy at hand: 1) Who receives the service (i.e. allocations); 2) What service is delivered (i.e.

provisions); 3) Which methods are most effective in providing the service (i.e. delivery); 4) Who

pays for the delivery (i.e. funding) (2013, p. 65). These dimensions provide a context for those

who develop or implement policy by helping to answer the "why" of policy implementation (see Figure 11). The Dimensions of Choice model can be used to address policy implications resulting from this study. There are three potential types of barriers that policy could be used to address: personal, social, and practical (Gibbons, Migliore, Convoy, Greiner, & DeLeon, 2014).
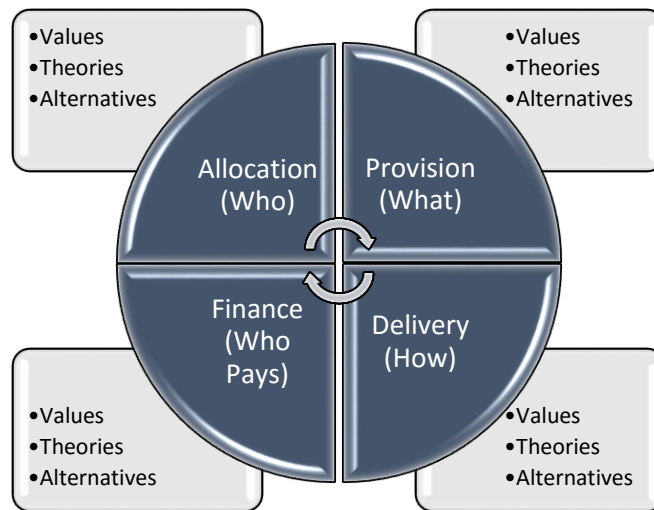
Figure 11. Depiction of Gilbert and Terrell's Dimensions of Choice Model.

Even though the majority of Airmen experience resilience, there are many who suffer in silence and do not seek available help due to misperceptions of the help, stigma, institutional barriers, or fear of negative career impacts (Hoge et al., 2004). This study included a group of outliers who had much lower scores on all protective factors and higher scores on all risk factors. It was unclear what their help-seeking behaviors were at the time, but it is clear that a group of military service members need additional help—possibly due to barriers and stigma. There are still parts of military culture which serve to minimize and deny mental health problems and concerns (Langhinrichsen-Rohling et al., 2011). In some ways this mentality of minimizing suffering and delaying help-seeking behaviors in order to press forward is comprehensible and

even critical to accomplishing the mission. However, when this attitude becomes institutionalized, ingrained as the de facto response, or accepted as the norm for all circumstance then military personnel will suffer in silence.

Personal barriers to treatment or service can be positively impacted by leadership involvement. According to Campbell, Campbell, and Ness (2008) leadership attitude, focus, and involvement with their personnel during significant times of stress improves resilience related outcomes. Additionally, leaders have an impact on hardiness as a pathway to resilience and positive outcomes (Bartone, 2006). In this study, leader involvement was most highly correlated with the work environment, which included preparation for stressful situations, followed by hardiness. There was not a clear pattern of leader involvement across the groups; however, there was a general downward trend in scores as deployment exposure increased, particularly among the past deployers. This suggests either leadership involvement dropped off during times of stress or that service members under greater stress need additional support, particularly from their leaders. Additionally, leader involvement was highly associated with the third and fourth function in both the standardized discriminant function coefficients and the structure matrix. Though not a significant variable on the first two functions, these findings suggest leadership involvement plays a relevant auxiliary function in describing group membership.

One policy implication is to ensure that leaders are trained separately in methods to promote resilience among their personnel. This does not mean that they are directly implicated in the provision of resilience services, but their day-to-day leadership and personal involvement and interactions with their personnel will have lasting positive impacts. The Dimensions of Choice Model suggests leaders and commanders have an active role in deciding the delivery, provision, and allocation of CAF to their unit. In fact, AFI 90-506, *Comprehensive Airman*

Fitness, section 2.6.2.3 states commanders are to "identify issues impacting units' ability to provide organized, trained, and equipped forces and use the CAF framework to enhance and/or refine current fitness programs" (p. 7). These are ultimately policy decisions. Commanders frequently make such decisions and may benefit from additional, specialized training on how to carry out these responsibilities to be most responsive to their Airmen.

Based on the results of this study, a focusing on methods to build clusters of resilience among Airmen would be an appropriate strategy to maximize leader's and commander's effectiveness. Much like having interlocking fields of fire in a defensive position, commanders could develop interlocking fields of resilience. For example, physical fitness is an individual responsibility; however, when unit fitness programs are established there is also an element of social fitness and unit cohesion that is also developed. This study suggests that spirituality and hardiness are useful in combination to address differences between groups. However, by addressing the values and focus inherent in spirituality, one simultaneously strengthens a component of hardiness—commitment. By continually assessing ways to build clusters of resilience in unique ways among their units and consistent with their missions, commanders can proactively encourage development of resilience in their Airmen (Bartone, 2006; MacIntyre, Charbonneau, & O'Keefe, 2013).

Suggestions of how to overcome social and practical barriers to both treatment and resilience training are implicated in this study. The use of a fitness-based resilience model seems to address at least part of the problem of stigma, as physical ailments do not carry the same level of stigma or negative connotations associated with mental health concerns. As discussed earlier, physical health was the most important discriminating variable on the first function. There seems to be concern and an implicit recognition of the importance of physical fitness and health

132

to Airmen. Models based on fitness or warrior ethos support the values, theories, and alternatives which Airmen recognize as important. Policies and evaluation procedures should be in place to ensure that training is targeted and personalized. One way to carry this out is to highlight the predominant response to trauma—resilience overtime—and provide specialized trainings and service models which support this expectation of health, fitness, and overcoming adversity. For example, this study suggests a positive relationship exists between coping and health behaviors compared to a negative relationship between alcohol usage and these variables. In other words, health behaviors such as exercise and diet support good coping but alcohol usage does not. Thus teaching coping skills that are targeted towards the audience at hand, particularly if they are likely to engage in combat, is a critical component of effective training. Programs that have applied similar strategies in the past have helped to reduce some of the stigma associated with learning and applying mental health skills among Airmen (Bryan & Morrow, 2011).

Recommendations for Future Research

Research on military personnel during and following OEF and OIF has increased at a nearly exponential rate as there is now a large cohort of military personnel and veterans who have participated in two protracted conflicts. This study utilized cross sectional data to compare groups with the incorporation of a time component to approximate trajectories. Resilience research represents a life-course endeavor with special attention paid to the interactions between the person, environment, and time (Barton, 2012). To more effectively study the effects of time, evaluate trajectories among Airmen, and reduce problems associated with the use of cross-sectional data, longitudinal studies will be required (Litz, 2005; Norris et al., 2009). A trend analysis or repeated measures study would more effectively capture the changes and outcomes

among Airmen over time and further elicit the resilience processes in operation (Barton, 2012). It is also recommended that results be collected beyond two years and at frequent intervals to potentially capture not only long-term outcomes but changes in short-term functioning and performance. This may allow researchers to identify who becomes more vulnerable over time and who engages in a steeling process through the effects of time.

The CAS has been completed over the course of multiple iterations which is helpful and can be meaningfully used in trend analyses that compare results over time. The same limitations of this study would also apply to such an evaluation, with the additional limitation of not being able to determine individual courses of development of resilience. The Millennial Cohort Study is another potential avenue to pursue research on trajectories and change over time in resilience and risk and protective factors. That study began measuring a cohort of military personnel who entered service in 2001 and will follow them for over 20 years to determine long-term health consequences of military service. The VA also has a wealth of research data that has been used in military research and is exceptionally useful in understanding effects of military service outside of the military environment.

As mentioned earlier regarding differences between past and recent deployers, it is unclear which environmental factors outside the model, such as resilience training, had effects upon the group differences. Predictive models which use other statistical methods such as regression, rather than explanatory or descriptive studies may be helpful in the future as they can control for a variety of environmental factors which were not addressed in this study. Additionally, more attention should be paid in future research to both the frequency of exposure to deployment dangers and intensity of situations in which Airmen find themselves (Britt, Sinclair, & McFadden, 2013). This can be accomplished through questionnaires that ask the

number of combat exposures, overall intensity of the combat exposures, or ask about the worst

combat experience. This would allow for a somewhat objective comparison of combat

experiences.

An alternative method would be to implement qualitative research, perhaps conducting

detailed interviews with participants to glean subjective information. During WWII flight crews

frequently had to complete post-mission debriefings in which detailed information was gathered

related to carrying out the mission. Though labor intensive, a similar methodology of gathering

information would provide a comprehensive view of the effects of the intensity and frequency of

exposure. A narrative approach may be useful in this regard. Narratives represent the stories

people tell about themselves, their lives, and surroundings; the language employed belies their

interpretation of the world around them (Kamya, 2010). A personalized or life narrative

becomes a filter of past events, current circumstances, and future possibilities via use of

language. One author suggested that narrative memories are how life events are organized and

recalled, meaning that the stories we tell about ourselves and our past determine what we recall

and how we recall it (May, 2005). Through a qualitative inquiry, researchers may be able to

better understand the interpretations which combatants and others employ, based on their

deployment experiences.

The data utilized in this study were not designed to assess CAF and originated from a

much larger survey. The developers of the 2013 CAS understandably used screeners or one to

two items to measure a particular concept. Future research based on this or similar models may

benefit from use of larger scales which provide a more complete measurement of the concept

under evaluation. For example, spirituality is a critical component of the CAF model, but the

entire 2013 CAS only asked four questions directly related to involvement with religious

communities and personal spirituality. This limited the amount of available information related to spirituality and may have accounted for some of the weak results related to spirituality. Due to the limited operationalization of spirituality, future research could more effectively determine the role of spirituality among combatants, deployers, and non-deployers. Spirituality was also weakly correlated with other variables in the study, which was either due to limited operationalization or its function as an independent source of variation among Airmen. It also remained unclear if differences existed between religiosity and spirituality among Airmen. Future research may further delineate the relationship between spirituality and resilience among deployed Airmen. Similar recommendations would benefit our understanding of other constructs such as PTSD, health, health behaviors, social support, self-efficacy, coping, and leader involvement.

Future use of full scales in research with Airmen would allow for additional statistical methods, such as factor analysis, to be used as well as improve our understanding of resilience related behavioral patterns among Airmen. As previously discussed the 10-item CD-RISC was a reduced scale from the original 25-item version and its representativeness, or utility, within the Air Force has not been fully determined at this point. By using the full scale among Airmen, or other military personnel, a more appropriate, reduced scale can be developed that may be a better approximation of resilience in studies among military members.

Future research could also highlight the effects of resilience training and prevention programs. The DoD spends large sums of money to create, promote, and implement resilience, prevention, and training programs for military members. This is a beneficial and useful undertaking to ensure a healthy and ready military force (Bliese, Adler, & Castro, 2011; Meredith et al., 2011). Additionally, early training programs appear to help reduce long-term

negative consequences among veterans (Tanielian & Jaycox, 2008). Understanding the role

CAF plays among Airmen returning from deployment may prove useful to improving prevention

efforts. This study reveals a clear group difference among combatants along the lines of social

support, health perceptions, and PTSD suggesting that they need additional training and support

to help offset the additional strain and stressors they face. This can come in the form of pre-

deployment training to enhance resilience and coping skills as well as post-deployment training

and treatment, when necessary.

It appears that more resilience training was associated with lower rates of risk factors and

higher levels of protective factors of recent deployers compared to past deployers. However, it is

unclear which components, or even type of training, were most effective or if there were other

factors associated with the group differences. Evaluation research may be helpful to elicit which

characteristics of training are most helpful to groups of Airmen, which would improve flexibility

and screening to better meet Airmen's needs and prevent a standardized, "one size fits all"

mentality in resilience training (Walter et al., 2010).

Another finding which needs further consideration is the role of depression in

distinguishing between groups. Depression and health were highly correlated and both had large

standardized coefficients on the first discriminant function. However, depression and suicide

behaviors had the lowest correlation with the first function on the structure matrix but had their

largest correlations on the fourth function. These two variables had positive correlations with the

fourth function compared to moderate to high negative correlations of leader involvement, self-

efficacy, work environment, and resilience. There is evidence to suggest that these variables, as

risk and protective factors, are simultaneously useful in distinguishing between groups. The

fourth function was also most useful in describing the effects among recent and past combat

engaged Airmen, but in opposite directions. This may indicate that past combat engaged Airmen were more likely to have higher levels of depression and suicide behavior while recently deployed combatants were more strongly represented by the protective factors in this study. Further studies would be necessary to elicit how and through which processes these variables differentially affect Airmen through the passage of time, as suggested in this study.

Conclusion

The Airmen in this study represent a sample of those who have voluntarily served in the military during time of war. They have been exposed to deployments and a variety of deployment adversities while their families have been exposed to uncertainty and separation. As work continues to aid and support this population with services for them and their families, their resilience as a group should be taken into consideration. Whether this is a result of "ordinary magic" (Masten, 2001), military grit (Matthews, 2008), a default setting (Wartel, 2003), or the effects of current policies, this research shows military personnel demonstrate resilience on multiple levels. Evidence suggests health perceptions, support systems, spirituality, and the effects of deployment, particularly PTSD, are effective in describing differences in these groups. These differences represent areas where Airmen are either struggling or excelling in their personal lives and social relationships. It also represents both the benefits and the costs of military service.

Our military service personnel and veterans have learned problem solving and adaptability; they have witnessed loss and endured trials over many years. The most important takeaway from this project is knowing service personnel engage in combat which places them at heighted risk for deleterious effects, but they also have exceptional skills and abilities to overcome these challenges. The absolute differences between those who engaged in combat and

those never deployed were not substantial, suggesting these Airmen are particularly resilient and

adaptable to stressors and challenges. With the increased emphasis on TFF, prevention, and

training within the military (Mullen, 2010; Simmons & Yoder, 2013) it remains to be seen if

current efforts and knowledge are sufficient to support this resilient, hardy, tough-minded, yet

susceptible population. However, there is a group of particularly vulnerable Airmen, the

outliers, who are most at risk and in need of direct attention from social workers, other helping

professionals, and their support system. As social workers and helping professionals, utilization

of our professional skills and talents should be used in meaningful ways to address the long-term

and fluctuating experiences and responses of post-deployment Airmen.

References

References

Adler, A. B., Britt, T. W., Castro, C. A., McGurk, D., & Bliese, P. D. (2011). Effect of transition home from combat on risk-taking and health-related behaviors. *Journal of Traumatic Stress, 24*(4), 381-389. doi:10.1002/jts.20665

Adler, A. B., Huffman, A. H., Bliese, P. D., & Castro, C. A. (2005). The impact of deployment length and experience on the well-being of male and female soldiers. *Journal of Occupational Health Psychology, 10*(2), 121-137. doi:10.1037/1076-8998.10.2.121

Antonovsky, A. (1979). *Health, stress, and coping*. San Fransisco, CA: Jossey-Bass Publishers.

Antonovsky, A. (1993). The structure and properties of the sense of coherence scale. *Social Science and Medicine, 36*(6), 725-733. doi:10.1016/0277-9536(93)90033-Z

Antonovsky, A. (1996). The salutogenic model as a theory to guide health promotion. *Health Promotion International, 11*(1), 11-18.

Aspinwall, L. G., & MacNamara, A. (2005). Taking positive changes seriously. *Cancer, 104*(S11), 2549-2556. doi:10.1002/cncr.21244

Bachynski, K. E., Canham-Chervak, M., Black, S. A., Dada, E. O., Millikan, A. M., & Jones, B. H. (2012). Mental health risk factors for suicides in the US Army, 2007–8. *Injury Prevention, 18*(6), 405-412. doi:10.1136/injuryprev-2011-040112

Baier, F. L. (1999). *Fifty questions every Airman can answer*. Maxwell, AFB: Air University Press.

Baiocchi, D. (2013). *Measuring Army deployments to Iraq and Afghanistan*. (RR-145-A). Arlington, VA:

    RAND Corporation. Retrieved from

    http://www.rand.org/content/dam/rand/pubs/research_reports/RR100/RR145/RAND_RR145.p

    df.

Ballenger-Browning, K., & Johnson, D. C. (2010). *Key facts on resilience*. Retrieved from

    http://www.med.navy.mil/sites/nmcsd/nccosc/healthprofessionalsv2/reports/documents/resili

    encetwpformatted2.pdf.

Barton, W. H. (2012). Resilience research: Methodological square pegs and theoretical black holes. In R.

    R. Greene (Ed.), *Resiliency: An integrated approach to practice, policy, and research* (2nd ed., pp.

    95-116). Washington, DC: NASW Press.

Bartone, P. T. (1995). *A short hardiness scale*. Paper presented at the Meeting of the American

    Psychological Society, New York: NY.

Bartone, P. T. (2006). Resilience under military operational stress: Can leaders influence hardiness?

    Military Psychology, 18(Suppl.), S131-148.

Bartone, P. T., Hystad, S. W., Eid, J., & Brevik, J. I. (2012). Psychological hardiness and coping style as

    risk/resilience factors for alcohol abuse. *Military Medicine, 177*(5), 517-524.

Bartone, P. T., Ursano, R. J., Wright, K. M., & Ingraham, L. H. (1989). The impact of a military air disaster

    on the health of assistance workers: A prospective study. *The Journal of Nervous and Mental*

    Disease, 177(6), 317-328.

Berg, G. (2011). The relationship between spiritual distress, PTSD and depression in Vietnam combat

    veterans. *Journal of Pastoral Care & Counseling, 65*(1), e1-e11.

Bhattacherjee, A. (2012). *Social science research: Principles, methods, and practices* (pp. 1-150).

    Retrieved from http://scholarcommons.usf.edu/oa_textbooks/3.

Bilmes, L. J., & Stiglitz, J. E. (2011). The long-term cost of conflict: the case of the Iraq War. In D. L.

  Braddon & K. Hartley (Eds.), *Handbook on the economics of conflict* (pp. 293-310). Northampton,

  MA: Edward Elgar Publishing.

Bjorck, J. P., & Thurman, J. W. (2007). Negative life events, patterns of positive and negative religious

  coping, and psychological functioning. *Journal for the Scientific Study of Religion, 46*(2), 159-167.

  doi:10.1111/j.1468-5906.2007.00348.x

Bliese, P. D., Adler, A. B., & Castro, C. A. (2011). Research-based preventive mental health care strategies

  in the military. In A. B. Adler, P. D. Bliese, & C. A. Castro (Eds.), *Deployment psychology:*

  Evidence-based strategies to promote mental health in the military (pp. 103-124). Washington,

  DC: American Psychological Association.

Bliese, P. D., Wright, K. M., Adler, A. B., Thomas, J. L., & Hoge, C. W. (2007). Timing of postcombat

  mental health assessments. *Psychological Services, 4*(3), 141-148. doi:10.1037/1541-

  1559.4.3.141

Blundo, R., Greene, R. R., & Riley, J. G. (2012). Promoting resilience among returning veterans. In R. R.

  Greene (Ed.), *Resiliency: An integrated approach to practice, policy, and research* (2nd ed., pp.

  307-333). Washington, DC: NASW Press.

Boden, M. T., Kimerling, R., Jacobs-Lentz, J., Bowman, D., Weaver, C., Carney, D., . . . Trafton, J. A. (2012).

  Seeking Safety treatment for male veterans with a substance use disorder and post-traumatic

  stress disorder symptomatology. *Addiction, 107*(3), 578-586. doi:10.1111/j.1360-

  0443.2011.03658.x

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human

  capacity to thrive after extremely aversive events? *American Psychologist, 59*(1), 20-28.

  doi:10.1037/0003-066X.59.1.20

Bonanno, G. A., & Mancini, A. D. (2012). Beyond resilience and PTSD: Mapping the heterogeneity of

responses to potential trauma. *Psychological Trauma: Theory, Research, Practice, and Policy,*

4(1), 74-83. doi:10.1037/a0017829

Bonanno, G. A., Mancini, A. D., Horton, J. L., Powell, T. M., LeardMann, C. A., Boyko, E. J., . . . Smith, T. C.

(2012). Trajectories of trauma symptoms and resilience in deployed US military service

members: Prospective cohort study. *British Journal of Psychiatry, 200*(4), 317-323.

doi:10.1192/bjp.bp.111.096552

Boscarino, J. A. (1995). Post-traumatic stress and associated disorders among Vietnam veterans: The

significance of combat exposure and social support. *Journal of Traumatic Stress, 8*(2), 317-336.

Boscarino, J. A. (2004). Posttraumatic stress disorder and physical illness: Results from clinical and

epidemiologic studies. *Annals of the New York Academy of Sciences, 1032*(1), 141-153.

doi:10.1196/annals.1314.011

Bowen, G. L., & Martin, J. A. (2011). The Resiliency Model of Role Performance for service members,

veterans, and their families: A focus on social connections and individual assets. *Journal of*

Human Behavior in The Social Environment, 21(2), 162-178. doi:10.1080/10911359.2011.546198

Brandon, S. (1970). Crisis theory and possibilities of therapeutic intervention. *The British Journal of*

Psychiatry, 117(541), 627-633. doi:10.1192/bjp.117.541.627

Braswell, H., & Kushner, H. I. (2012). Suicide, social integration, and masculinity in the U.S. military.

Social Science & Medicine, 74(4), 530-536. doi:10.1016/j.socscimed.2010.07.031

Breslau, N. (2001). Outcomes of posttraumatic stress disorder. *The Journal of Clinical Psychiatry,*

62(Supplement 17), 55-59.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic

stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology, 68*(5),

748-766. doi:10.1037/0022-006X.68.5.748

Brewin, C. R., & Holmes, E. A. (2003). Psychological theories of posttraumatic stress disorder. *Clinical Psychology Review, 23*(3), 339-376. doi:10.1016/S0272-7358(03)00033-3

Britt, T. W., Sinclair, R. R., & McFadden, A. C. (2013). Introduction: The meaning and importance of military resilience. In R. R. Sinclair & T. W. Britt (Eds.), *Building psychological resilience in military personnel: Theory and practice* (pp. 3-17). Washington, DC: American Psychological Association.

Brown, M. C., Creel, A. H., Engel, C. C., Herrell, R. K., & Hoge, C. W. (2011). Factors associated with interest in receiving help for mental health problems in combat veterans returning from deployment to Iraq. *The Journal of Nervous and Mental Disease, 199*(10), 797-801. doi:10.1097/NMD.0b013e31822fc9bf

Brown, M. T., & Wicker, L. R. (2000). Discriminant analysis. In H. E. A. Tinsley & S. D. Brown (Eds.), *Handbook of applied muiltivariate statistics and mathematical modeling* (pp. 209-235): Elsevier.

Bryan, C. J., & Morrow, C. E. (2011). Circumventing mental health stigma by embracing the warrior culture: Lessons learned from the Defender's Edge program. *Professional Psychology: Research and Practice, 42*(1), 16-23. doi:10.1037/a0022290

Bryan, C. J., Ray-Sannerud, B. N., Morrow, C. E., & Etienne, N. (2013). Optimism reduces suicidal ideation and weakens the effect of hopelessness among military personnel. *Cognitive Therapy and Research, 37*(5), 996-1003. doi:10.1007/s10608-013-9536-1

Burke, S. O. (1980). The invulnerable child. *Nursing Papers, 12*, 48-55.

Burnam, M. A., Meredith, L. S., Helmus, T. C., Burns, R. M., Cox, R. A., D'Amico, E., . . . Yochelson, M. R. (2008). Systems of care: Challenges and opportunities to improve access to high-quality care. In T. Tanielian & L. H. Jaycox (Eds.), *Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to assist recovery* (pp. 245-428). Arlington, VA: RAND Corporation.

Burnett-Zeigler, I., Ilgen, M., Valenstein, M., Zivin, K., Gorman, L., Blow, A., . . . Chermack, S. (2011).

    Prevalence and correlates of alcohol misuse among returning Afghanistan and Iraq Veterans.

    Addictive Behaviors, 36(8), 801-806. doi:10.1016/j.addbeh.2010.12.032

Cabrera, D. E., & Benedek, D. M. (2014). Combat stress reactions and pyschiatric disorders after

    deployment. In S. J. Cozza, M. N. Goldenberg, & R. J. Ursano (Eds.), *Care of military service*

    members, veterans, and their families (pp. 91-117). Washington, DC: American Psychiatric

    Publishing.

Cacioppo, J. T., Adler, A. B., Lester, P. B., McGurk, D., Thomas, J. L., Chen, H.-Y., & Cacioppo, S. (2015).

    Building social resilience in soldiers: A double dissociative randomized controlled study. *Journal*

    of Personality and Social Psychology, 109(1), 90-105. doi:10.1037/pspi0000022

Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor–Davidson

    Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic*

    Stress, 20(6), 1019-1028. doi:10.1002/jts.20271

Campbell, D., Campbell, K., & Ness, J. W. (2008). Resilience through leadership. In B. J. Lukey & V. Tepe

    (Eds.), *Biobehavioral resilience to stress* (pp. 57-88). Boca Raton, FL: CRC Press.

Campbell, D. A. (2007). Secondary analysis. *Orthopaedic Nursing, 26*(4), 241-242.

Campbell, D. G., Felker, B. L., Liu, C.-F., Yano, E. M., Kirchner, J. E., Chan, D., . . . Chaney, E. F. (2007).

    Prevalence of depression–PTSD comorbidity: Implications for clinical practice guidelines and

    primary care-based interventions. *Journal of General Internal Medicine, 22*(6), 711-718.

    doi:10.1007/s11606-006-0101-4

Canda, E. R., & Furman, L. D. (2010). *Spiritual diversity in social work practice: The heart of helping* (2nd

    ed.). New York, NY: Oxford University Press.

Cantrell, B. C., & Dean, C. (2007). *Once a warrior: Wired for life*. Seattle, WA: WordSmith Publishing.

Carver, C. S. (1998). Resilience and thriving: Issues, models, and linkages. *Journal of Social Issues, 54*(2), 245-266. doi:10.1111/j.1540-4560.1998.tb01217.x

Castro, C. A., & Adler, A. B. (2011a). Military mental health training: Building resilience. In S. M. Southwick, B. T. Litz, D. Charney, & M. J. Friedman (Eds.), *Resilience and mental health: Challenges across the lifespan* (pp. 323-339). New York, NY: Campbridge University Press.

Castro, C. A., & Adler, A. B. (2011b). Reconceptualizing combat-related posttraumatic stress disorder as an occupational hazard. In A. B. Adler, P. D. Bliese, & C. A. Castro (Eds.), *Deployment psychology: Evidence-based strategies to promote mental health in the military* (pp. 217-242). Washington, DC: American Psychological Association.

Castro, C. C. (2009). Impact of combat on the mental health and well-being of soldiers and Marines. *Smith College Studies in Social Work, 79*(3-4), 247-262. doi:10.1080/00377310903130290

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: Opportunities and implementation. *Shanghai Archives of Psychiatry, 26*(6), 371-375. doi:10.11919/j.issn.1002-0829.214171

Cicchetti, D., & Tucker, D. (1994). Development and self-regulatory structures of the mind. *Development and Psychopathology, 6*(4), 533-549. doi:10.1017/S0954579400004673

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310-357.

Coll, J. E., Weiss, E. L., & Yarvis, J. S. (2011). No one leaves unchanged: Insights for civilian mental health care professionals into the military experience and culture. *Social Work in Health Care, 50*(7), 487-500. doi:10.1080/00981389.2010.528727

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety, 18*(2), 76-82. doi:10.1002/da.10113

Cornum, R., Matthews, M. D., & Seligman, M. E. P. (2011). Comprehensive Soldier Fitness: Building

  resilience in a challenging institutional context. *American Psychologist, 66*(1), 4-9.

  doi:10.1037/a0021420

Coyer, S. M., & Gallo, A. M. (2005). Secondary analysis of data. *Journal of Pediatric Health Care, 19*(1),

  60-63. doi:10.1016/j.pedhc.2004.10.003

Currier, J. M., Holland, J. M., & Drescher, K. D. (2015). Spirituality factors in the prediction of outcomes

  of PTSD treatment for U.S. military veterans. *Journal of Traumatic Stress, 28*(1), 57-64.

  doi:10.1002/jts.21978

Dattalo, P. (2013). *Analysis of multiple dependent variables*. New York: NY: Oxford University Press.

De Terte, I., Becker, J., & Stephens, C. (2009). An integrated model for understanding and developing

  resilience in the face of adverse events. *Journal of Pacific Rim Psychology, 3*(1), 20-26.

  doi:10.1375/prp.3.1.20

de Vaus, D. (2002). *Analyzing social science data: 50 key problems in data analysis*. Thousand Oaks, CA:

  SAGE Publications.

DeGeorge, R. T. (1987). A code of ethics for officers. In M. M. Watkin, K. Wenker, & J. Kempf (Eds.),

  Military ethics: Reflections on principles--The profession of arms, military leadership, ethical

  practices, war and morality, educating the citizen-soldier (pp. 13-29). Washington, DC: National

  Defense University Press.

Department of Defense. (2010). *Report on the impact of deployment of members of the armed forces on*

  their dependent children. Washington, DC: Office of the Secretary of the Department of Defense.

  Retrieved from http://www.militaryonesource.mil/12038/MOS/Reports/Report-to-Congress-on-

  Impact-of-Deployment-on-Military-Children.pdf.

Department of Defense. (2015). DoDI 1310.02 *Original Appointment of Officers*. Washington, DC.

Department of the Air Force. (2009). AFI 36-2618 *The Enlisted Force Structure*. Washington, DC.

Department of the Air Force. (2014). AFI 90-506 *Comprehensive Airman Fitness* (pp. 1-16). Washington,

DC.

Department of the Air Force. (2015). America's Air Force: A profession of arms. Washington, DC.

DeVellis, R. F. (2012). *Scale development: Theory and applications* (3rd ed.). Thousand Oaks, CA: SAGE

Publications.

Dixon, M. A. (2013). A social worker in the making: The questions I had to learn. *Reflections, 19*(2), 11-

19.

Dolan, C. A., & Adler, A. B. (2006). Military hardiness as a buffer of psychological health on return from

deployment. *Military Medicine, 171*(2), 93-98.

Donders, A. R. T., van der Heijden, G. J. M. G., Stijnen, T., & Moons, K. G. M. (2006). Review: A gentle

introduction to imputation of missing values. *Journal of Clinical Epidemiology, 59*(10), 1087-

1091. doi:10.1016/j.jclinepi.2006.01.014

Drake, B., & Jonson-Reid, M. (2008). *Social work research methods: From conceptualization to

dissemination*. Boston, MA: Pearson Education, Inc.

DuMars, T., Bolton, K., Maleku, A., & Smith-Osborne, A. (2015). Training MSSW students for military

social work practice and doctoral students in military resilience research. *Journal of Social Work

Education, 51*(Sup 1), S117-S127. doi:10.1080/10437797.2015.1001294

Dunn, S. L., Arslanian-Engoren, C., DeKoekkoek, T., Jadack, R., & Scott, L. D. (2015). Secondary data

analysis as an efficient and effective approach to nursing research. *Western Journal of Nursing

Research, 37*(10), 1295-1307. doi:10.1177/0193945915570042

Dyer, J. G., & McGuinness, T. M. (1996). Resilience: Analysis of the concept. *Archives of Psychiatric

Nursing, 10*(5), 276-282. doi:10.1016/S0883-9417(96)80036-7

Earvolino-Ramirez, M. (2007). Resilience: A concept analysis. *Nursing Forum, 42*(2), 73-82.

Egeland, B., Carlson, E., & Sroufe, L. A. (1993). Resilience as process. *Development and Psychopathology, 5*(4), 517-528. doi:10.1017/S0954579400006131

Ehlers, A., Bisson, J., Clark, D. M., Creamer, M., Pilling, S., Richards, D., . . . Yule, W. (2010). Do all psychological treatments really work the same in posttraumatic stress disorder? *Clinical Psychology Review, 30*(2), 269-276. doi:10.1016/j.cpr.2009.12.001

Eibner, C., Ringel, J. S., Kilmer, B., Pacula, R. L., & Diaz, C. (2008). The cost of post-deployment mental health and cognitive conditions. In T. Tanielian & L. H. Jaycox (Eds.), *Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to assist recovery* (pp. 169-241). Arlington, VA: RAND Corporation.

Elder, G. H. (1986). Military times and turning points in men's lives. *Developmental Psychology, 22*(2), 233-245. doi:10.1037/0012-1649.22.2.233

Elder, G. H. (1987). War mobilization and the life course: A cohort of World War II veterans. *Sociological Forum, 2*(3), 449.

Elder, G. H., & Clipp, E. C. (1989). Combat experience and emotional health: Impairment and resilience in later life. *Journal of Personality, 57*(2), 311-341. doi:10.1111/1467-6494.ep8972725

Evans, J. D. (1996). *Straightforward statistics for the behavioral sciences*. Pacific Grove, CA: Brooks/Cole Publishing Company.

Farley, Y. R. (2007). Making the connection: Spirituality, trauma and resiliency. *Journal of Religion & Spirituality in Social Work, 26*(1), 1-15.

Fawcett, J. (1999). *The relationship of theory and research* (3rd ed.). Philadelphia, PA: F. A. Davis Company.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Thousand Oaks, CA: SAGE Publications.

Fikretoglu, D., & McCreary, D. R. (2012). *Psychological resilience: A brief review of definitions, and key theoretical, conceptual, and methodological issues*. (2012-012). Toronto, Ontario: Defense Research and Development Canada. Retrieved from http://cradpdf.drdc-rddc.gc.ca/PDFS/unc121/p536951_A1b.pdf.

Fisher, R. A. (1936). The use of multiple measurements in taxonomic problems. *Annals of Eugenics, 7*, 179-188.

Flach, F. (1989). *Resilience: Discovering a new strength at times of stress*. New York, NY: Ballantine Books.

Flach, F. (2004). *Resilience: Discovering a new strength at times of stress*. New York, NY: Hatherleigh Press.

Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts, and theory. *European Psychologist, 18*(1), 12-23. doi:10.1027/1016-9040/a000124

Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change, 16*(3), 253-267. doi:10.1016/j.gloenvcha.2006.04.002

Foran, H. M., Adler, A. B., McGurk, D., & Bliese, P. D. (2012). Soldiers' perceptions of resilience training and postdeployment adjustment: Validation of a measure of resilience training content and training process. *Psychological Services, 9*(4), 390-403. doi:10.1037/a0028178

Forgey, M. A., & Young, S. L. (2014). Increasing military social work knowledge: An evaluation of learning outcomes. *Health & Social Work, 39*(1), 7-15.

Foy, D. W., Sipprelle, R. C., Rueger, D. B., & Carroll, E. M. (1984). Etiology of posttraumatic stress disorder in Vietnam veterans: Analysis of premilitary, military, and combat exposure influences. *Journal of Consulting and Clinical Psychology, 52*(1), 79-87. doi:10.1037/0022-006X.52.1.79

Franklin, K. (2010). *The impact of deployment and psychological well-being on family relationships: A secondary analysis of Air Force Community Assessment data.* (PhD), Virginia Commonwealth University, VCU Theseses and Dissertations.   (2315)

Fraser, M. W., Richman, J. M., & Galinsky, M. J. (1999). Risk, protection, and resilience: Toward a conceptual framework for social work practice. *Social Work Research, 23*(3), 131-143. doi:10.1093/swr/23.3.131

Garmezy, N., Masten, A. S., & Tellegen, A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. *Child Development, 55*(1), 97-111. doi:10.1111/1467-8624.ep7405463

Gates, M. A., Holowka, D. W., Vasterling, J. J., Keane, T. M., Marx, B. P., & Rosen, R. C. (2012). Posttraumatic stress disorder in veterans and military personnel: Epidemiology, screening, and case recognition. *Psychological Services, 9*(4), 361-382. doi:10.1037/a0027649

Gibbons, S. W., Migliore, L., Convoy, S. P., Greiner, S., & DeLeon, P. H. (2014). Military mental health stigma challenges: Policy and practice considerations. *Journal for Nurse Practitioners, 10*(6), 365-372. doi:10.1016/j.nurpra.2014.03.021

Gilbert, N., & Terrell, P. (2013). *Dimensions of social welfare policy* (8th ed.). United States: Pearson Education.

Gilgun, J. (1996). Human development and adversity in ecological perspective, part 1: A conceptual framework. *Families in Society: The Journal of Contemporary Social Services, 77*(7), 395-402. doi:10.1606/1044-3894.939

Gonzalez, G. C., Singh, R., Schell, T. L., & Weinick, R. M. (2014). *An evaluation of the implementation and perceived utility of the Airman Resilience Training program*. Arlington, VA: RAND Corporation.

Goodwin, L., Jones, M., Rona, R. J., Sundin, J., Wessely, S., & Fear, N. T. (2012). Prevalence of delayed-onset posttraumatic stress disorder in military personnel: Is there evidence for this disorder?

Results of a prospective UK cohort study. *Journal of Nervous and Mental Health, 200*(5), 429-437. doi:10.1097/NMD.0b013e31825322fe

Green, B. L., Lindy, J. D., & Grace, M. C. (1988). Long-term coping with combat stress. *Journal of Traumatic Stress, 1*(4), 399-412. doi:10.1007/BF00980363

Green, K. T., Beckham, J. C., Youssef, N., & Elbogen, E. B. (2014). Alcohol misuse and psychological resilience among U.S. Iraq and Afghanistan era veterans. *Addictive Behaviors, 39*(2), 406-413. doi:10.1016/j.addbeh.2013.08.024

Greene, R. R. (2014). Resilience as effective functional capacity: An ecological-stress model. *Journal of Human Behavior in The Social Environment, 24*(8), 937-950. doi:10.1080/10911359.2014.921589

Greene, R. R. (Ed.) (2002). *Resiliency: An integrated approach to practice, policy, and research*. Washington, D.C.: NASW Press.

Greene, R. R. (Ed.) (2012). *Resiliency: An integrated approach to practice, policy, and research* (2nd ed.). Washington, DC: NASW Press.

Greene, R. R., Cohen, H. L., Gonzalez, J., & Lee, Y. (2009). *Narratives of social and economic justice*. Washington, DC: NASW Press.

Greene, R. R., Galambos, C., & Lee, Y. (2004). Resilience theory. *Journal of Human Behavior in The Social Environment, 8*(4), 75-91. doi:10.1300/J137v08n04_05

Greenhoot, A. F., & Dowsett, C. J. (2012). Secondary data analysis: An important tool for addressing developmental questions. *Journal of Cognition & Development, 13*(1), 2-18. doi:10.1080/15248372.2012.646613

Griffiths, C. A., Ryan, P., & Foster, J. H. (2011). Thematic analysis of Antonovsky's sense of coherence theory. *Scandinavian Journal of Psychology, 52*(2), 168-173. doi:10.1111/j.1467-9450.2010.00838.x

Grossman, D., & Christensen, L. W. (2008). *On combat: The psychology and physiology of deadly conflict in war and in peace* (3rd ed.). USA: Warrior Science Publications.

Hamaoka, D., Bates, M. J., McCarroll, J. E., Brim, W. L., Lunasco, T. K., & Rhodes, J. E. (2014). An introduction to military service. In S. J. Cozza, M. N. Goldenberg, & R. J. Ursano (Eds.), *Care of military service members, veterans, and their families* (pp. 3-22). Washington, DC: American Psychiatric Publishing.

Herrman, H., Stewart, D. E., Diaz-Granados, N., Berger, E. L., Jackson, B., & Yuen, T. (2011). What is resilience? *Canadian Journal of Psychiatry, 56*(5), 258-265.

Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. *Applied Psychology, 50*(3), 337-369. doi:10.1111/1464-0597.00062

Hobfoll, S. E., & de Jong, J. T. V. M. (2014). Sociocultural and ecological views of trauma: Replacing cognitive-emotional models of trauma. In L. A. Zoellner & N. C. Feeny (Eds.), *Facilitating resilience and recovery following trauma* (pp. 69-90). New York, NY: Guilford Press.

Hobfoll, S. E., Palmieri, P. A., Johnson, R. J., Canetti-Nisim, D., Hall, B. J., & Galea, S. (2009). Trajectories of resilience, resistance, and distress during ongoing terrorism: The case of Jews and Arabs in Israel. *Journal of Consulting and Clinical Psychology, 77*(1), 138-148. doi:10.1037/a0014360

Hobfoll, S. E., Vinokur, A. D., Pierce, P. F., & Lewandowski-Romps, L. (2012). The combined stress of family life, work, and war in Air Force men and women: A test of conservation of resources theory. *International Journal of Stress Management, 19*(3), 217-237. doi:10.1037/a0029247

Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine, 351*(1), 13-22. doi:10.1056/NEJMoa040603

154

Hoge, C. W., Terhakopian, A., Castro, C. A., Messer, S. C., & Engel, C. C. (2007). Association of

    posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism

    among Iraq war veterans. *American Journal of Psychiatry, 164*, 150-153.

    doi:10.1176/appi.ajp.164.1.150

Huberty, C. J. (1975). Discriminant analysis. *Review of Educational Research, 45*(4), 543-598.

Huberty, C. J., & Hussein, M. H. (2003). Some problems in reporting use of discriminant analyses. *Journal*

    of Experimental Education, 71(2), 177.

Huberty, C. J., & Olejnik, S. (2006). *Applied MANOVA and discriminant analysis.* . Hoboken, NJ: John

    Wiley and Sons, Inc.

Hufford, D. J., Fritts, M. J., & Rhodes, J. E. (2010). Spiritual fitness. *Military Medicine, 175*(8), 73-87.

Hutchison, E. (2005). The life course perspective: A promising approach for bridging the micro and

    macro worlds for social work. *Families in Society: The Journal of Contemporary Social Services,*

    86(1), 143-152. doi:10.1606/1044-3894.1886

Institute of Medicine. (2010). *Returning home from Iraq and Afghanistan: Preliminary assessment of*

    readjustment needs of veterans, service members, and their families. Washington, DC: The

    National Academies Press.

James, R. K., & Gilliland, B. E. (2001). *Crisis intervention strategies* (4th Ed.). Belmont, CA: Thomson

    Learning.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. New York, NY:

    The Free Press.

Jarrett, T. (2008). Warrior resilience training in Operation Iraqi Freedom: Combining rational emotive

    behavior therapy, resiliency, and positive psychology. *U.S. Army Medical Department Journal,*

    Jul-Sept, 32-38.

Johnson, J., Wood, A. M., Gooding, P., Taylor, P. J., & Tarrier, N. (2011). Resilience to suicidality: The buffering hypothesis. *Clinical Psychology Review, 31*(4), 563-591. doi:10.1016/j.cpr.2010.12.007

Jonas, W. B., O'Connor, F. G., Deuster, P., Peck, J., Shake, C., & Frost, S. S. (2010). Why Total Force Fitness? *Military Medicine, 175*(8), 6-13.

Kachadourian, L. K., Pilver, C. E., & Potenza, M. N. (2014). Trauma, PTSD, and binge and hazardous drinking among women and men: Findings from a national study. *Journal of Psychiatric Research, 55*, 35-43. doi:10.1016/j.jpsychires.2014.04.018

Kamya, H. (2010). The cultural universality of narrative techniques in the creation of meaning. In R. A. McMackin, E. Newman, J. M. Fogler, & T. M. Keane (Eds.), *Trauma therapy in context: The science and craft of evidence-based practice.* (pp. 231-245). Washington, DC: American Psychological Association.

Karney, B. R., Ramchand, R., Osilla, K. C., Caldarone, L. B., & Burns, R. M. (2008). Predicting the immediate and long-term consequences of post-traumatic stress disorder, depression, and traumatic brain injury in veterans of Operation Enduring Freedom and Operation Iraqi Freedom. In T. Tanielian & L. H. Jaycox (Eds.), *Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to assist recovery* (pp. 119-166).

Keane, T. M., Marshall, A. D., & Taft, C. T. (2006). Posttraumatic stress disorder: Etiology, epidemiology, and treatment outcome. *Annual Review of Clinical Psychology, 2*, 161-197. doi:10.1146/annurev.clinpsy.2.022305.095305

Kelley, K., & Maxwell, S. E. (2012). Sample size planning. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol 1: Foundations, planning, measures, and psychometrics* (pp. 181-202). Washington, DC: American Psychological Association.

Kelty, R., Kleykamp, M., & Segal, D. R. (2010). The military and the transition to adulthood. *Future of Children, 20*(1), 181-207.

Kiecolt, K. J., & Nathan, L. E. (1985). *Secondary analysis of survey data*. Beverly Hills, CA: SAGE Publications.

Kim, P. Y., Britt, T. W., Klocko, R. P., Riviere, L. A., & Adler, A. B. (2011). Stigma, negative attitudes about treatment, and utilization of mental health care among soldiers. *Military Psychology, 23*(1), 65-81 17p. doi:10.1080/08995605.2011.534415

King, D. W., King, L. A., Foy, D. W., Keane, T. M., & Fairbank, J. A. (1999). Posttraumatic stress disorder in a national sample of female and male Vietnam veterans: Risk factors, war-zone stressors, and resilience-recovery variables. *Journal of Abnormal Psychology, 108*(1), 164-170. doi:10.1037/0021-843X.108.1.164

King, L. A., King, D. W., Fairbank, J. A., Keane, T. M., & Adams, G. A. (1998). Resilience–recovery factors in post-traumatic stress disorder among female and male Vietnam veterans: Hardiness, postwar social support, and additional stressful life events. *Journal of Personality and Social Psychology, 74*(2), 420-434. doi:10.1037/0022-3514.74.2.420

King, L. A., King, D. W., Vogt, D. S., Knight, J., & Samper, R. E. (2006). Deployment risk and resilience inventory: A collection of measures for studying deployment-related experiences of military personnel and veterans. *Military Psychology, 18*(2), 89-120.

Klecka, W. R. (1980). *Discriminant analysis*. Beverly Hills, CA: SAGE Publications.

Kline, A., Ciccone, D. S., Weiner, M., Interian, A., St. Hill, L., Falca-Dodson, M., . . . Losonczy, M. (2013). Gender differences in the risk and protective factors associated with PTSD: A prospective study of National Guard troops deployed to Iraq. *Psychiatry: Interpersonal & Biological Processes, 76*(3), 256-272. doi:10.1521/psyc.2013.76.3.256

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Kobasa, S. C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology, 37*(1), 1-11. doi:10.1037/0022-3514.37.1.1

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology, 42*(1), 168-177. doi:10.1037/0022-3514.42.1.168

Kolenda, C. (Ed.) (2001). *Leadership: The warrior's art* (2nd ed.). Carlisle, PA: The Army War College Foundation Press.

Krosnick, J. A., Lavrakas, P. J., & Kim, N. (2014). Survey research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 404-442). New York, NY: Cambridge University Press.

Kumpfer, K. L. (1999). Factors and processes contributing to resilience: The resilience framework. In M. D. Glantz & J. L. Johnson (Eds.), *Resilience and development: Positive life adaptations* (pp. 179-224). New York, NY: Kluwer Academci/Plenum Publishers.

Langhinrichsen-Rohling, J., Snarr, J. D., Slep, A. M. S., Heyman, R. E., & Foran, H. M. (2011). Risk for suicidal ideation in the U.S. Air Force: An ecological perspective. *Journal of Consulting and Clinical Psychology, 79*(5), 600-612. doi:10.1037/a0024631

Larson, G. E., Highfill-McRoy, R. M., & Booth-Kewley, S. (2008). Psychiatric diagnoses in historic and contemporary military cohorts: Combat deployment and the healthy warrior effect. *American Journal of Epidemiology, 167*(11), 1269-1276. doi:10.1093/aje/kwn084

Lazar, S. G. (2014). The mental health needs of military service members and veterans. *Psychodynamic Psychiatry, 42*(3), 459-478. doi:10.1521/pdps.2014.42.3.459

Lazarus, R. S. (2007). Stress and emotion: A new synthesis. In A. Monat, R. S. Lazarus, & G. Reevy (Eds.), *The Praeger handbook of stress and coping* (Vol. 1, pp. 33-52). Westport, CT: Praeger.

Lee, E. S., & Forthofer, R. N. (2006). *Analyzing complex survey data* (2nd ed.). Thousand Oaks, CA: SAGE

    Publications.

Lemaire, C. M., & Graham, D. P. (2011). Factors associated with suicidal ideation in OEF/OIF veterans.

    Journal of Affective Disorders, 130(1–2), 231-238. doi:10.1016/j.jad.2010.10.021

Lester, P. B., McBride, S., Bliese, P. D., & Adler, A. B. (2011). Bringing science to bear: An emperical

    assessment of the Comprehensive Soldier Fitness Program. *American Psychologist, 66*(1), 77-81.

    doi:10.1037/a0022083

Lew, H. L., Otis, J. D., Tun, C., Kerns, R. D., Clark, M. E., & Cifu, D. X. (2009). Prevalence of chronic pain,

    posttraumatic stress disorder, and persistent postconcussive symptoms in OIF/OEF veterans:

    Polytrauma clinical triad. *Journal of Rehabilitation Research and Development, 46*(6), 697-702.

Linley, P. A., & Joseph, S. (2004). Positive change following trauma and adversity: A review. *Journal of

    Traumatic Stress, 17*(1), 11-21. doi:10.1023/B:JOTS.0000014671.27856.7e

Linley, P. A., & Joseph, S. (2005). The human capacity for growth through adversity. *American

    Psychologist, 60*(3), 262-264. doi:10.1037/0003-066X.60.3.262b

Litz, B. T. (2005). Has resilience to severe trauma been underestimated? *American Psychologist, 60*(3),

    262. doi:10.1037/0003-066X.60.3.262a

Litz, B. T., Steenkamp, M. M., & Nash, W. P. (2014). The military. In L. A. Zoellner & N. C. Feeny (Eds.),

    Facilitating resilience and recovery following trauma (pp. 113-133). New York, NY: Guilford

    Press.

Luthar, S. S. (1991). Vulnerability and resilience: A study of high-risk adolescents. *Child Development,

    62*(3), 600-616. doi:10.1111/1467-8624.ep9109090184

Luthar, S. S., & Ciccetti, D. (2000). The construct of resilience: Implications for interventions and social

    policies. *Development and Psychopathology, 12*(4), 857-885.

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and

    guidelines for future work. *Child Development, 73*(3), 543-562.

MacIntyre, A., Charbonneau, D., & O'Keefe, D. (2013). The role of transformational and ethical

    leadership in building and maintaining resilience. In R. R. Sinclair & T. W. Britt (Eds.), *Building*

    psychological resilience in military personnel: Theory and practice (pp. 85-111). Washington, DC,

    US: American Psychological Association.

Maddi, S. R. (2004). Hardiness: An operationalization of existential courage. *Journal of Humanistic*

    Psychology, 44(3), 279-298. doi:10.1177/0022167804266101

Maddi, S. R. (2005). On hardiness and other pathways to resilience. *American Psychologist, 60*(3), 261-

    262. doi:10.1037/0003-066X.60.3.261

Maddi, S. R., Matthews, M. D., Kelly, D. R., Villarreal, B., & White, M. (2012). The role of hardiness and

    grit in predicting performance and retention of USMA cadets. *Military Psychology, 24*(1), 19-28.

    doi:10.1080/08995605.2012.639672

Maeseele, P. A., Verleye, G., Stevens, I., & Speckhard, A. (2008). Psychosocial resilience in the face of a

    mediated terrorist threat. *Media, War, and Conflict, 1*(1), 50-69.

    doi:10.1177/1750635207087625

Maguen, S., Luxton, D. D., Skopp, N. A., Gahm, G. A., Reger, M. A., Metzler, T. J., & Marmar, C. R. (2011).

    Killing in combat, mental health symptoms, and suicidal ideation in Iraq war veterans. *Journal of*

    Anxiety Disorders, 25(4), 563-567. doi:10.1016/j.janxdis.2011.01.003

Maguen, S., Turcotte, D. M., Peterson, A. L., Dremsa, T. L., Garb, H. N., McNally, R. J., & Litz, B. T. (2008).

    Description of risk and resilience factors among military medical personnel before deployment

    to Iraq. *Military Medicine, 173*(1), 1-9. doi:10.7205/MILMED.173.1.1

Malloy, P. F., Fairbank, J. A., & Keane, T. M. (1983). Validation of a multimethod assessment of

posttraumatic stress disorders in Vietnam veterans. *Journal of Consulting and Clinical*

Psychology, 51(4), 488-494. doi:10.1037/0022-006X.51.4.488

Marquez, M. R. (2012). Not just about posttraumatic stress disorder: A call for military-centric social

work. *Journal of Human Behavior in The Social Environment, 22*(8), 960-970.

doi:10.1080/10911359.2012.707942

Marsh, J. C. (2004). Theory-driven versus theory-free research in empirical social work practice. In H. E.

Briggs & T. L. Rzepnicki (Eds.), *Using evidence in social work practice: Behavioral perspectives*

(pp. 20-35). Chicago, IL: Lyceum Books.

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist,*

56(3), 227-238. doi:10.1037/0003-066X.56.3.227

Masten, A. S. (2007). Resilience in developing systems: Progress and promise as the fourth wave rises.

Development and Psychopathology, 19(3), 921-930. doi:10.1017/S0954579407000442

Masten, A. S. (2014). *Ordinary magic*. New York, NY: Guilford Press.

Masten, A. S., Best, K. M., & Garmezy, N. (1990). Resilience and development: Contributions from the

study of children who overcome adversity. *Development and Psychopathology, 2*(4), 425-444.

doi:10.1017/S0954579400005812

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology,*

22(Special Issue 3), 491-495. doi:10.1017/S0954579410000222

Matthews, M. D. (2008). Positive psychology: Adaptation, leadership, and performance in exceptional

circumstances. In P. A. Hancock & J. L. Szalma (Eds.), *Performance under stress* (pp. 163-180).

Hampshire, UK: Ashgate Publishing.

May, J. C. (2005). Family Attachment Narrative Therapy: Healing the experience of early childhood

maltreatment. *Journal of Marital and Family Therapy, 31*(3), 221-237. doi:10.1111/j.1752-

0606.2005.tb01565.x

McGeary, D. D. (2011). Making sense of resilience. *Military Medicine, 176*(6), 603-604.

Meredith, L. S., Sherbourne, C. D., Gaillot, S., Hansell, L., Ritschard, H. V., Parker, A. M., & Wrenn, G.

(2011). *Promoting psychological resilience in the U.S. military*. Arlington, VA: RAND Corporation.

Military One Source. (2013). *2013 demographics: Profile of the military community*. Retrieved from

Washington, DC: http://download.militaryonesource.mil/12038/MOS/Reports/2013-

Demographics-Report.pdf

Miller, L. L., & Aharoni, E. (2015). *Understanding low survey response rates among young U.S. military

personnel*. Retrieved from Santa Monica, CA:

Miller, P. (2011). *Theories of development psychology* (5th ed.). New York, NY: Worth Publishers.

Milliken, C. S., Auchterlonie, J. L., & Hoge, C. W. (2007). Longitudinal assessment of mental health

problems among active and reserve component soldiers returning from the Iraq War. *Journal of

the American Medical Association, 298*(18), 2141-2148. doi:10.1001/jama.298.18.2141

Moore, B. A., & Penk, W. (2011). *Treating PTSD in military personnel: A clinical handbook.* New York, NY:

The Guildford Press.

Morrow, C. E., Bryan, C. J., Stephenson, J. A., Bryan, A. O., Haskell, J., & Staal, M. A. (2013).

Posttraumatic stress, depression, and insomnia among U.S. Air Force pararescuemen. *Military

Psychology, 25*(6), 568-576. doi:10.1037/mil0000021

Moskos, C. C., Jr. (1975). The American combat soldier in Vietnam. *Journal of Social Issues, 31*(4), 25-37.

Mullen, M. (2010). On Total Force Fitness in war and peace. *Military Medicine, 175*(8), 1-2.

Naifeh, J. A., Cox, D. W., Goldenberg, M. N., & Nock, M. K. (2014). Suicidal thoughts and behaviors in

military service members and veterans. In S. J. Cozza, M. N. Goldenberg, & R. J. Ursano (Eds.),

Care of military service members, veterans, and their families (pp. 183-201). Washington, DC: American Psychiatric Publishing.

National Association of Social Workers. (1996). NASW Code of Ethics. Washington, DC: NASW Press.

National Association of Social Workers. (2012). NASW standards for social work practice with service members, veterans, and their families. Washington, DC: NASW Press.

Newman, D. A. (2014). Missing data: Five practical guidelines. *Organizational Research Methods, 17*(4), 372-411. doi:10.1177/1094428114548590

Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology, 41*(1-2), 127-150. doi:10.1007/s10464-007-9156-6

Norris, F. H., Tracy, M., & Galea, S. (2009). Looking for resilience: Understanding the longitudinal trajectories of responses to stress. *Social Science & Medicine, 68*(12), 2190-2198. doi:10.1016/j.socscimed.2009.03.043

O'Leary, V. E., & Ickovics, J. R. (1995). Resilience and thriving in response to challenge: An opportunity for a paradigm shift in women's health. *Women's Health: Research, Gender, Behavior, and Policy, 1*(2), 121-142.

Ogden, H., Harris, J. I., Erbes, C. R., Engdahl, B. E., Olson, R. H. A., Winskowski, A. M., & McMahill, J. (2011). Religious functioning and trauma outcomes among combat veterans. *Counseling and Spirituality, 30*(1), 71-89.

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*(1), 52-73. doi:10.1037/0033-2909.129.1.52

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2008). Predictors of posttraumatic stress disorder and

    symptoms in adults: A meta-analysis. *Psychological Trauma: Theory, Research, Practice, and*

    Policy, S(1), 3-36. doi:10.1037/1942-9681.S.1.3

Payne, M. (2014). *Modern social work theory* (4th ed.). Chicago, IL: Lyceum Books, Inc.

Perron, B. E., & Gillespie, D. F. (2015). *Key concepts in measurement*. New York, NY: Oxford University

    Press

Pienta, A. M., O'Rourke, J. M., & Franks, M. M. (2011). Getting started: Working with secondary data. In

    K. H. Trzesniewski, M. B. Donnellan, & R. E. Lucas (Eds.), *Secondary data analysis: An*

    introduction for psychologists (pp. 13-25). Washington, DC, US: American Psychological

    Association.

Pietrzak, R. H., el-Gabalawy, R., Tsai, J., Sareen, J., Neumeister, A., & Southwick, S. M. (2014). Typologies

    of posttraumatic stress disorder in the U.S. adult population. *Journal of Affective Disorders, 162*,

    102-106. doi:10.1016/j.jad.2014.03.024

Pietrzak, R. H., Goldstein, M. B., Malley, J. C., Rivers, A. J., Johnson, D. C., Morgan Iii, C. A., & Southwick,

    S. M. (2010). Posttraumatic growth in veterans of Operations Enduring Freedom and Iraqi

    Freedom. *Journal of Affective Disorders, 126*, 230-235. doi:10.1016/j.jad.2010.03.021

Pietrzak, R. H., Goldstein, M. B., Malley, J. C., Rivers, A. J., Johnson, D. C., & Southwick, S. M. (2010). Risk

    and protective factors associated with suicidal ideation in veterans of Operations Enduring

    Freedom and Iraqi Freedom. *Journal of Affective Disorders, 123*, 102-107.

    doi:10.1016/j.jad.2009.08.001

Pietrzak, R. H., Goldstein, M. B., Malley, J. C., Rivers, A. J., & Southwick, S. M. (2010). Structure of

    posttraumatic stress disorder symptoms and psychosocial functioning in Veterans of Operations

Enduring Freedom and Iraqi Freedom. *Psychiatry Research, 178*(2), 323-329.

doi:10.1016/j.psychres.2010.04.039

Possemato, K., McKenzie, S., McDevitt-Murphy, M. E., Williams, J. L., & Ouimette, P. (2014). The

relationship between postdeployment factors and PTSD severity in recent combat veterans.

Military Psychology, 26(1), 15-22. doi:10.1037/mil0000027

Poulsen, J., & French, A. (2008). *Discriminant function analysis (DA)*. San Francisco State University. San

Francisco, CA. Retrieved from

http://userwww.sfsu.edu/~efc/classes/biol710/discrim/discrim.pdf

Pransky, J., & McMillen, D. P. (2009). Exploring the true nature of internal resilience: A view from the

inside out. In D. Saleebey (Ed.), *The strengths perspective in social work practice* (pp. 240-261).

Boston, MA: Pearson Education, Inc.

Prigerson, H. G., Maciejewski, P. K., & Rosenheck, R. A. (2001). Combat trauma: Trauma with highest risk

of delayed onset and unresolved posttraumatic stress disorder symptoms, unemployment, and

abuse among men. *Journal of Nervous and Mental Disease, 189*(2), 99-108.

Radey, M. (2010). Secondary data analysis studies. In B. A. Thyer (Ed.), *The handbook of social work

research methods* (2nd ed., pp. 163-182). Thousand Oaks, CA: SAGE Publications.

Ramchand, R., Karney, B. R., Osilla, K. C., Burns, R. M., & Calderone, L. B. (2008). Prevalence of PTSD,

depression, and TBI among returning servicemembers. In T. Tanielian & L. H. Jaycox (Eds.),

*Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to

assist recovery* (pp. 35-85). Arlington, VA: RAND Corporation.

Ramchand, R., Rudavsky, R., Grant, S., Tanielian, T., & Jaycox, L. (2015). Prevalence of risk factors for and

consequences of posttraumatic stress disorder and other mental health problems in military

populations deployed to Iraq and Afghanistan. *Current Psychiatry Reports, 17*(5), 1-11.

doi:10.1007/s11920-015-0575-z

Randolph, K. A., & Myers, L. L. (2013). *Basic statistics in multivariate analysis*. New York, NY: Oxford

University Press.

Resick, P. A., Monson, C. M., & Chard, K. M. (2008). *Cognitive processing therapy: Veteran/military*

version. Washington, DC: Department of Veterans' Affairs.

Richardson, G. E. (2002). The metatheory of resilience and resiliency. *Journal of Clinical Psychology,*

58(3), 307-321. doi:10.1002/jclp.10020

Richardson, G. E., Neiger, B. L., Jensen, S., & Kumpfer, K. L. (1990). The resiliency model. *Health*

Education, 21(6), 33-39. doi:10.1080/00970050.1990.10614589

Richardson, L. K., Frueh, B. C., & Acierno, R. (2010). Prevalence estimates of combat-related post-

traumatic stress disorder: Critical review. *Australian & New Zealand Journal of Psychiatry, 44*(1),

4-19. doi:10.3109/00048670903393597

Robinson, B. E., & Fields, N. H. (1983). Casework with invulnerable children. *Social Work, 28*(1), 63-65.

Rona, R. J., Hyams, K. C., & Wessely, S. (2005). Screening for psychological illness in military personnel.

Journal of the American Medical Association, 293(10), 1257-1260.

doi:10.1001/jama.293.10.1257

Rose, R. D., Buckey Jr, J. C., Zbozinek, T. D., Motivala, S. J., Glenn, D. E., Cartreine, J. A., & Craske, M. G.

(2013). A randomized controlled trial of a self-guided, multimedia, stress management and

resilience training program. *Behaviour Research and Therapy, 51*(2), 106-112.

doi:10.1016/j.brat.2012.11.003

Rostker, B. D. (2006). The evolution of the all-volunteer force. Arlington, VA: RAND Corporation.

Royse, D. (1995). *Research methods in social work* (2nd ed.). Chicago, IL: Nelson-Hall Publishers.

Runeson, B., Tidemalm, D., Dahlin, M., Lichtenstein, P., & Långström, N. (2010). Method of attempted

suicide as predictor of subsequent successful suicide: National long term cohort study. *British*

Medical Journal, 341. doi:10.1136/bmj.c3222

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry, 57*(3), 316-331. doi:10.1111/j.1939-0025.1987.tb03541.x

Rutter, M. (1993). Resilience: Some conceptual considerations. *Journal of Adolescent Health, 14*(8), 626-631. doi:10.1016/1054-139X(93)90196-V

Rutter, M. (2006). Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Sciences, 1094*(1), 1-12. doi:10.1196/annals.1376.002

Ryff, C. D., & Singer, B. (1996). Psychological well-being: Meaning, measurement, and implications for psychotherapy research. *Psychotherapy and Psychosomatics, 65*(1), 14-23.

Saleebey, D. (2009). *The strengths perspective in social work practice* (5th ed.). Boston, MA: Pearson Education, Inc.

Saleebey, D. (2011). Some basic ideas about the strengths perspective. In F. J. Turner (Ed.), *Social work treatment: Interlocking theoretical approaches* (pp. 477-485). New York, NY: Oxford University Press.

Sameroff, A. (2009). The transactional model. In A. Sameroff (Ed.), *The transactional model of development: How chidlren and contexts shape each other* (pp. 3-21). Washington, DC: American Psychological Association.

Schaefer, J. A., & Moos, R. H. (1992). Life crises and personal growth. In B. N. Carpenter (Ed.), *Personal coping: Theory, research, and application* (pp. 149-170). Westport, CT: Praeger.

Schuster, M. A., Stein, B. D., Jaycox, L. H., Collins, R. L., Marshall, G. N., Elliott, M. N., . . . Berry, S. H. (2001). A national survey of stress reactions after the September 11, 2001, terrorist attacks. *New England Journal of Medicine, 345*(20), 1507-1512. doi:10.1056/NEJM200111153452024

Schwerin, M. J., & Corcoran, K. J. (1998). Discriminant analysis of medical-care use among shipboard U.S. Navy men and women. *Military Psychology, 10*(3), 147-158. doi:10.1207/s15327876mp1003_1

Seery, M. D. (2011). Resilience: A silver lining to experiencing adverse life events? *Current Directions in Psychological Science, 20*(6), 390-394. doi:10.1177/0963721411424740

Selaman, Z. M. H., Chartrand, H. K., Bolton, J. M., & Sareen, J. (2014). Which symptoms of post-traumatic stress disorder are associated with suicide attempts? *Journal of Anxiety Disorders, 28*(2), 246-251. doi:10.1016/j.janxdis.2013.12.005

Simmons, A., & Yoder, L. (2013). Military resilience: A concept analysis. *Nursing Forum, 48*(1), 17-25. doi:10.1111/nuf.12007

Smith, A. K., Ayanian, J. Z., Covinsky, K. E., Landon, B. E., McCarthy, E. P., Wee, C. C., & Steinman, M. A. (2011). Conducting high-value secondary dataset analysis: An introductory guide and resources. *Journal of General Internal Medicine, 26*(8), 920-929. doi:10.1007/s11606-010-1621-5

Southwick, S. M., Vythilingam, M., & Charney, D. S. (2005). The psychobiology of depression and resilience to stress: Implications for prevention and treatment. *Annual Review of Clinical Psychology, 1*(1), 255-291. doi:10.1146/annurev.clinpsy.1.102803.143948

Spiro, A., Settersten, R. A., & Aldwin, C. M. (2016). Long-term outcomes of military service in aging and the life course: A positive re-envisioning. *The Gerontologist, 56*(1), 5-13. doi:10.1093/geront/gnv093

Strong, J., Ray, K., Findley, P. A., Torres, R., Pickett, L., & Byrne, R. J. (2014). Psychosocial concerns of veterans of Operation Enduring Freedom/Operation Iraqi Freedom. *Health & Social Work, 39*(1), 17-24. doi:10.1093/hsw/hlu002

Sundin, J., Fear, N. T., Iversen, A., Rona, R. J., & Wessely, S. (2010). PTSD after deployment to Iraq: Conflicting rates, conflicting claims. *Psychological Medicine, 40*(3), 367-382. doi:10.1017/S0033291709990791

Sutker, P. B., Davis, J. M., Uddo, M., & Ditta, S. R. (1995). War zone stress, personal resources, and PTSD

    in Persian Gulf War returnees. *Journal of Abnormal Psychology, 104*(3), 444-452.

    doi:10.1037/0021-843X.104.3.444

Tabachnick, B. G., & Fidell, L. S. (2014). *Pearson new international edition: Using multivariate statistics*

    (6th ed.). Essex, UK: Pearson Education.

Taft, C. T., Stern, A. S., King, L. A., & King, D. W. (1999). Modeling physical health and functional health

    status: The role of combat exposure, posttraumatic stress disorder, and personal resource

    attributes. *Journal of Traumatic Stress, 12*(1), 3-23. doi:10.1023/A:1024786030358

Taft, C. T., Watkins, L. E., Stafford, J., Street, A. E., & Monson, C. M. (2011). Posttraumatic stress disorder

    and intimate relationship problems: A meta-analysis. *Journal of Consulting and Clinical*

    Psychology, 79(1), 22-33. doi:10.1037/a0022196

Tanielian, T. (2009, 24 March). *Assessing combat exposure and post-traumatic stress disorder in troops*

    and estimating the costs to society. Paper presented at the House Veterans' Affairs Committee,

    Subcommittee on Disability Assistance and Memorial Affairs, Washington, DC.

Tanielian, T., & Jaycox, L. H. (Eds.). (2008). *Invisible wounds of war: Psychological and cognitive injuries,*

    their consequences, and services to assist recovery. Arlington, VA: RAND Corporation.

Tedeschi, R. G. (2011). Posttraumatic growth in combat veterans. *Journal of Clinical Psychology in*

    Medical Settings, 18(2), 137-144. doi:10.1007/s10880-011-9255-2

Tedeschi, R. G., & Kilmer, R. P. (2005). Assessing strengths, resilience, and growth to guide clinical

    interventions. *Professional Psychology: Research and Practice, 36*(3), 230-237.

    doi:10.1037/0735-7028.36.3.230

Thoren, H., & Persson, J. (2015). Resilience: Some philosophical remarks on ostensively and stipulatively

    defined concepts. *Sustainability: Science, Practice, & Policy, 11*(1), 64-74.

Torjman, S. (2005). What is policy? (pp. 1-20). Ottowa, Ontario: Caledon Institute of Social Policy.

Tucker, J. S., Sinclair, R. R., & Thomas, J. L. (2005). The multilevel effects of occupational stressors on

      Soldiers' well-being, organizational attachment, and readiness. *Journal of Occupational Health*

      Psychology, 10(3), 276-299. doi:10.1037/1076-8998.10.3.276

Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back

      from negative emotional experiences. *Journal of Personality and Social Psychology, 86*(2), 320-

      333. doi:10.1037/0022-3514.86.2.320

Tusaie, K., & Dyer, J. (2004). Resilience: A historical review of the construct. *Holistic Nursing Practice,*

      18(1), 3-10.

Vaillant, G. E. (2003). Mental health. *American Journal of Psychiatry, 160*, 1373-1384.

      doi:10.1176/appi.ajp.160.8.1373

VanBreda, A. D. (2001). *Resilience theory: A literature review*. Pretoria, South Africa: South African

      Military Health Service. Retrieved from http://www.vanbreda.org/adrian/resilience.htm.

Varker, T., & Devilly, G. J. (2012). An analogue trial of inoculation/resilience training for emergency

      services personnel: Proof of concept. *Journal of Anxiety Disorders, 26*(6), 696-701.

      doi:10.1016/j.janxdis.2012.01.009

Vartanian, T. P. (2011). *Secondary data analysis*. New York, NY: Oxford University Press.

Wagnild, G. M., & Young, H. M. (1993). Development and psychomentric evaluation of the Resilience

      Scale. *Journal of Nursing Measurement, 1*(2), 165-178.

Waite, P. J., & Richardson, G. E. (2004). Determining the efficacy of resiliency training in the work site.

      Journal of Allied Health, 33(3), 178-183.

Wald, J., Taylor, S., Asmundson, G. J. G., Jang, K. L., & Stapleton, J. (2006). *Literature review of concepts:*

      Psychological resiliency. . (W7711-057959/A). Toronto, Ontario: Defence Research and

      Development Canada. Retrieved from http://www.dtic.mil/dtic/tr/fulltext/u2/a472961.pdf.

Walter, J. A., Coulter, I., Hilton, L., Adler, A. B., Bliese, P. D., & Nicholas, R. A. (2010). Program evaluation of Total Force Fitness programs in the military. *Military Medicine, 175*(8), 103-109.

Wansink, B., & Wansink, C. (2013). Are there atheists in foxholes? Combat intensity and religious behavior. *Journal of Religion and Health, 52*(3), 768-779. doi:10.1007/s10943-013-9733-y

Warchal, J. R., & Graham, L. B. (2011). Promoting positive adaptation in adult survivors of natural disasters. *Adultspan Journal, 10*(1), 34-51.

Wartel, S. G. (2003). A strengths-based practice model: Psychology of mind and health realization. *Families in Society: The Journal of Contemporary Social Services, 84*(2), 185-191. doi:10.1606/1044-3894.104

Weiss, E. L., & Albright, D. L. (2014). Introduction to the special issue: Mental health care for military service members, veterans, and their families: Opportunities for social work. *Social Work in Mental Health, 12*(5-6), 387-390. doi:10.1080/15332985.2014.927408

Werner, E. E., & Smith, R. S. (1982). *Vulnerable but invincible: A longitudinal study of resilient children and youth*. New York, NY: McGraw Hill.

Werner, E. E., & Smith, R. S. (1992). *Overcoming the odds: High-risk children from birth to adulthood*. Ithica, NY: Cornell University Press.

Wessely, S. (2006). Twentieth-century theories on combat motivation and breakdown. *Journal of Contemporary History, 41*(2), 268-286. doi:10.1177/0022009406062067

Whitesell, A. A., & Owens, G. P. (2012). The impact of patriotism, morale, and unit cohesion on mental health in Veterans of Iraq and Afghanistan. *Traumatology, 18*(1), 1-7. doi:10.1177/1534765610395625

Wolin, S., & Wolin, S. (1995). Resilience among youth growing up in substance-abusing families. *Pediatric Clinics of North America, 42*(2), 415-429.

Wooten, N. R. (2012). Deployment cycle stressors and post-traumatic stress symptoms in Army National

    Guard women: The mediating effect of resilience. *Social Work in Health Care, 51*(9), 828-849.

    doi:10.1080/00981389.2012.692353

Wooten, N. R. (2013). A bioecological model of deployment risk and resilience. *Journal of Human*

    Behavior in the Social Environment, 23(6), 699-717. doi:10.1080/10911359.2013.795049

Worthington, E. L., & Langberg, D. (2012). Religious considerations and self-forgiveness in treating

    complex trauma and moral injury in present and former soldiers. *Journal of Psychology and*

    Theology, 40(4), 274-288.

Wortmann, J. H., Park, C. L., & Edmondson, D. (2011). Trauma and PTSD symptoms: Does spiritual

    struggle mediate the link? *Psychological Trauma: Theory, Research, Practice, and Policy, 3*(4),

    442-452. doi:10.1037/a0021413

Wright, M. O., & Masten, A. S. (2006). Resilience processes in development: Fostering positive

    adaptation in the context of adversity. In S. Goldstein & R. B. Brooks (Eds.), *Handbook of*

    resilience in children (pp. 17-37). New York, NY: Springer.

Yates, T. M., Egeland, B., & Sroufe, L. A. (2003). Rethinking resilience: A developmental process

    perspective. In S. S. Luthar (Ed.), *Resilience and vulnerability: Adaptation in the context of*

    childhood adversitites (pp. 243-266). New York, NY: Cambridge University Press.

Yeung, D., & Martin, M. T. (2013). *Spiritual fitness and resilience: A review of relevant constructs,*

    measures and links to well-being. Arlington, VA: RAND Corporation.

Youssef, N. A., Green, K. T., Dedert, E. A., Hertzberg, J. S., Calhoun, P. S., Dennis, M. F., . . . Beckham, J. C.

    (2013). Exploration of the influence of childhood trauma, combat exposure, and the resilience

    construct on depression and suicidal ideation among U.S. Iraq/Afghanistan era military

    personnel and veterans. *Archives of Suicide Research, 17*(2), 106-122.

    doi:10.1080/13811118.2013.776445

Zautra, A. J., Hall, J. S., & Murray, K. E. (2010). Resilience: A new definition of health for people and

communities. In J. W. Reich, A. J. Zautra, & J. S. Hall (Eds.), *Handbook of adult resilience* (pp. 3-

29). New York, NY: Guilford Press.

Zoellner, L. A., & Feeny, N. C. (2014). Conceptualizing risk and resilience following trauma exposure. In L.

A. Zoellner & N. C. Feeny (Eds.), *Facilitating resilience and recovery following trauma* (pp. 3-14).

New York, NY: Guilford Press.

Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology — A critical review and

introduction of a two component model. *Clinical Psychology Review, 26*(5), 626-653.

doi:10.1016/j.cpr.2006.01.008

Appendices

Appendix A

List of Acronyms

AD – Active duty
ART – Airman Resilience Training
AUDIT – Alcohol Use Disorders Identification Test
AVF – All volunteer force
CBCT – Cognitive behavioral conjoint therapy
CAF – Comprehensive Airman Fitness
CAS – Community assessment survey
CD-RISC – Connor-Davidson Resilience Scale
CPT – Cognitive processing therapy
DA – Discriminant analysis
DDA – Descriptive discriminant analysis
DFA – Discriminant function analysis
DoD – Department of Defense
DV – Dependent variable
EMDR – Eye Movement Desensitization and Reprocessing
MANOVA – Multivariate analysis of variance
MAR – Missing at random
MCAR – Missing completely at random
MNAR – Missing not at random
NASW – National Association of Social Workers
IV – Independent variable
OEF – Operation Enduring Freedom
OIF – Operation Iraqi Freedom
PDA – Predictive discriminant analysis
PE – Prolonged exposure
PTSD – Posttraumatic stress disorder
SOC – Sense of Coherence
TFF – Total Force Fitness
VIF – Variance inflation factor

Appendix B

Selected Seven Group Discriminant Analysis SPSS Output

Table 19

Seven Group Standardized Discriminant Function Coefficients

Standardized Canonical Discriminant Function Coefficients

	Function					
	1	2	3	4	5	6
Recoded--Summed score of the CD-RISC	-.135	.105	-.159	.145	-.100	-.177
Reverse coded--summed, adjusted score of the DRS15	.307	.083	.472	.118	.465	-.269
Self-efficacy scale--5 items	-.354	.143	-.181	-.558	-.418	-.038
Coping and management of stress--2 items	.292	.290	.127	.328	-.325	.598
CES depression scale--6 items	.737	.308	-.048	.479	-.314	.105
PC-PTSD, lifetime experience of symptoms--4 items	-.400	.715	-.138	.185	.385	-.327
Suicidal thoughts and behaviors--5 items	.036	.114	.373	.160	-.329	.335
Health scale--4 items	.730	-.004	-.670	.295	.225	-.208
Health scale--2 items	-.102	.241	-.137	-.424	.278	.640
AUDIT score--10 items	-.055	.163	-.238	-.114	.157	-.274
Work relationships and preparedness--6 items combined	.072	.165	-.107	.052	.242	.321
Neighborhood Support--3 items	-.443	-.213	.007	.032	-.024	.116
Leader Support of Families--3 items	.268	.210	.533	-.642	-.277	-.456
Role of spirituality and faith scale--4 items	-.136	-.025	.424	.118	.423	.180

Table 20

Seven Group Structure Matrix

Structure Matrix

	Function					
	1	2	3	4	5	6
Health scale--4 items	.518[*]	-.069	-.372	-.257	.376	.096
Neighborhood Support--3 items	-.354[*]	-.139	.132	-.112	.147	.142
PC-PTSD, lifetime experience of symptoms--4 items	-.379	.717[*]	-.022	.386	.112	-.241
Leader Support of Families--3 items	.374	.212	.425	-.645[*]	.013	-.202
CES depression scale--6 items	-.009	.351	.124	.511[*]	-.355	-.078
Self-efficacy scale--5 items	-.140	.281	-.152	-.490[*]	-.224	.093
Work relationships and preparedness--6 items combined	.271	.195	.185	-.392[*]	.232	.113
Suicidal thoughts and behaviors--5 items	-.009	.257	.263	.355[*]	-.348	.158
Recoded--Summed score of the CD-RISC	.047	.213	-.093	-.340[*]	.031	.077
Role of spirituality and faith scale--4 items	-.108	-.048	.485	.080	.505[*]	.209
Reverse coded-- summed, adjusted score of the DRS15	.249	.121	.229	-.272	.411[*]	-.026
Health scale--2 items	.064	.275	-.242	-.440	.336	.616[*]
Coping and management of stress--2 items	.233	.217	-.060	-.225	-.034	.412[*]
AUDIT score--10 items	-.079	.249	-.279	.017	-.017	-.303[*]

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions
Variables ordered by absolute size of correlation within function.

[*]. Largest absolute correlation between each variable and any discriminant function

177

Table 21

Seven Group Functions at Group Centroids

Functions at Group Centroids

Graduated exposure to deployment stressors--2 years, recoded	Function					
	1	2	3	4	5	6
No Deployment	.229	.095	.010	.005	.002	.004
Deployment	-.106	-.217	.046	.011	.031	.017
Indirect Exposure	-.175	.022	.076	-.020	-.033	-.014
Combat	-.586	.667	.007	.108	.092	-.089
Deployed--recent	.050	-.178	-.094	-.031	.006	-.039
Indirect Exposure--recent	-.192	.027	-.100	.037	-.026	.025
Combat--recent	-.446	.557	-.091	-.213	.067	.072

Unstandardized canonical discriminant functions evaluated at group means

Table 22

Euclidean Distances between Seven Group Centroids

	ND	DP	IEP	CP	DR	IER	CR
ND	--						
DP	.458	--					
IEP	.411	.249	--				
CP	.996	1.006	.765	--			
DR	.326	.161	.301	1.058	--		
IER	.426	.259	.017	.752	.317	--	
CR	.818	.845	.600	.178	.887	.588	--

ND = No deployment; DP = Deployment, past; IEP = Indirect exposure, past; CP = Combat, past; DR = Deployment, recent; IER = Indirect exposure, recent; CR = Combat, recent
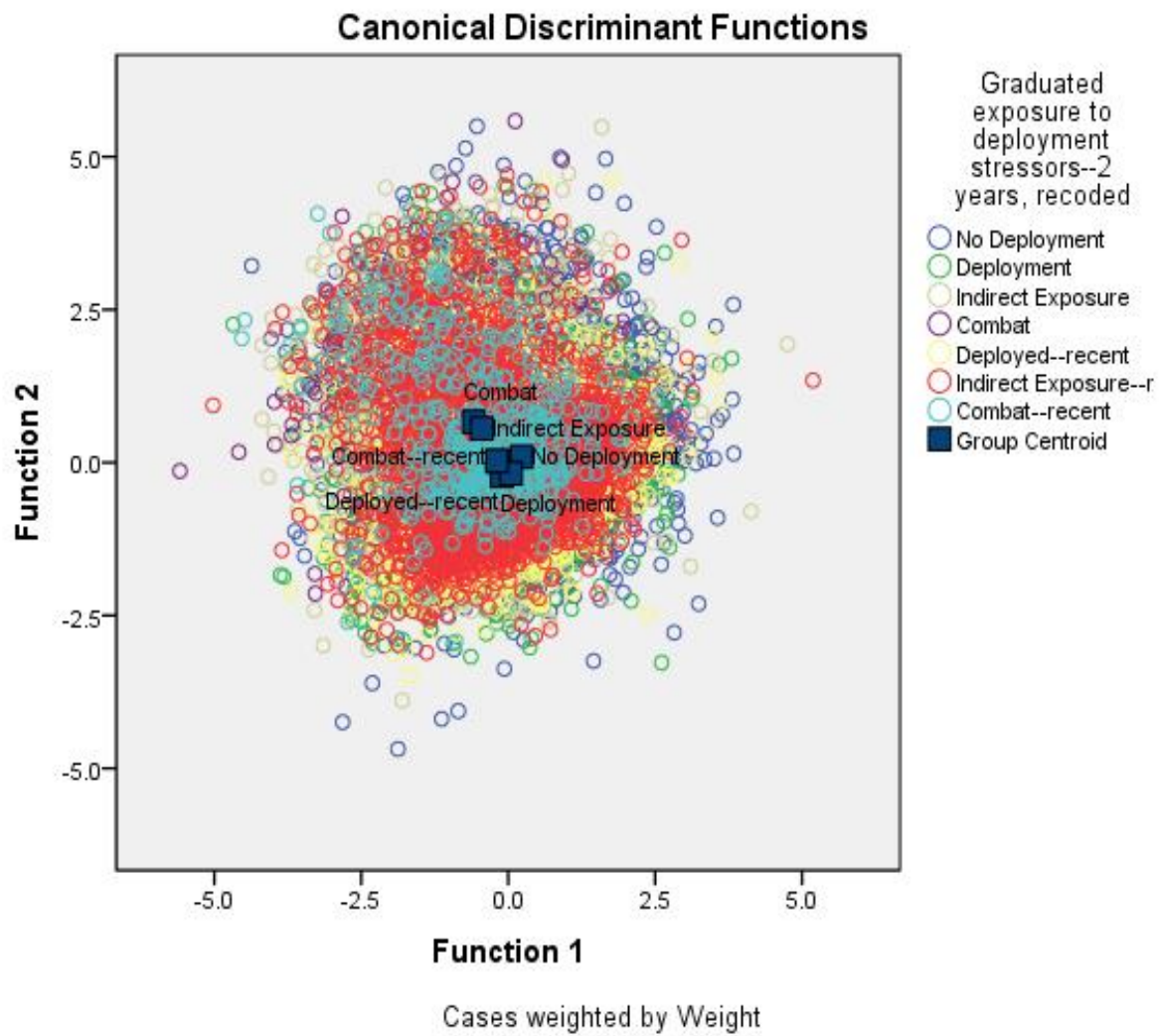
Figure 12. Seven Group Canonical Discriminant Functions.

Table 23

Complete-Case Sample Correlation Matrix

Correlations[a]

		Recoded--Summed score of the CD-RISC	Reverse coded--summed, adjusted score of the DRS15	Self-efficacy scale--5 items	Coping and management of stress--2 items	CES depression scale--6 items	PC-PTSD, lifetime experience of symptoms--4 items	Suicidal thoughts and behaviors--5 items	Health scale--4 items	Health scale--2 items	AUDIT score--10 items	Work relationships and preparedness--6 items combined	Neighborhood Support--3 items	Leader Support of Families--3 items	Role of spirituality and faith scale--4 items
Recoded--Summed score of the CD-RISC	Pearson Correlation	1	.628	.684	.632	-.437	-.224	-.258	.426	.233	-.118	.360	.200	.264	.102
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Reverse coded--summed, adjusted score of the DRS15	Pearson Correlation	.628	1	.448	.496	-.450	-.228	-.267	.445	.208	-.174	.414	.241	.322	.186
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Self-efficacy scale--5 items	Pearson Correlation	.684	.448	1	.518	-.271	-.122	-.170	.263	.176	-.061	.259	.150	.165	.042
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Coping and management of stress--2 items	Pearson Correlation	.632	.496	.518	1	-.480	-.255	-.280	.456	.264	-.133	.339	.155	.248	.074
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
CES depression scale--6 items	Pearson Correlation	-.437	-.450	-.271	-.480	1	.479	.385	-.612	-.192	.205	-.313	-.164	-.246	-.094
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
PC-PTSD, lifetime experience of symptoms--4 items	Pearson Correlation	-.224	-.228	-.122	-.255	.479	1	.288	-.342	-.055	.158	-.196	-.066	-.168	-.038
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
Suicidal thoughts and behaviors--5 items	Pearson Correlation	-.258	-.267	-.170	-.280	.385	.288	1	-.215	-.097	.170	-.156	-.113	-.129	-.060
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
Health scale--4 items	Pearson Correlation	.426	.445	.263	.456	-.612	-.342	-.215	1	.330	-.141	.338	.136	.291	.103
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
Health scale--2 items	Pearson Correlation	.233	.208	.176	.264	-.192	-.055	-.097	.330	1	-.074	.100	.071	.096	.034
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
AUDIT score--10 items	Pearson Correlation	-.118	-.174	-.061	-.133	.205	.158	.170	-.141	-.074	1	-.094	-.090	-.094	-.160
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
Work relationships and preparedness--6 items combined	Pearson Correlation	.360	.414	.259	.339	-.313	-.196	-.156	.338	.100	-.094	1	.240	.612	.150
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
Neighborhood Support--3 items	Pearson Correlation	.200	.241	.150	.155	-.164	-.066	-.113	.136	.071	-.090	.240	1	.180	.199
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
Leader Support of Families--3 items	Pearson Correlation	.264	.322	.165	.248	-.246	-.168	-.129	.291	.096	-.094	.612	.180	1	.098
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
Role of spirituality and faith scale--4 items	Pearson Correlation	.102	.186	.042	.074	-.094	-.038	-.060	.103	.034	-.160	.150	.199	.098	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

a. Listwise N=289194

180

Appendix C

Selected Three Group Discriminant Analysis SPSS Output

Table 24

Three Group Standardized Discriminant Analysis Coefficients

Standardized Canonical Discriminant Function Coefficients

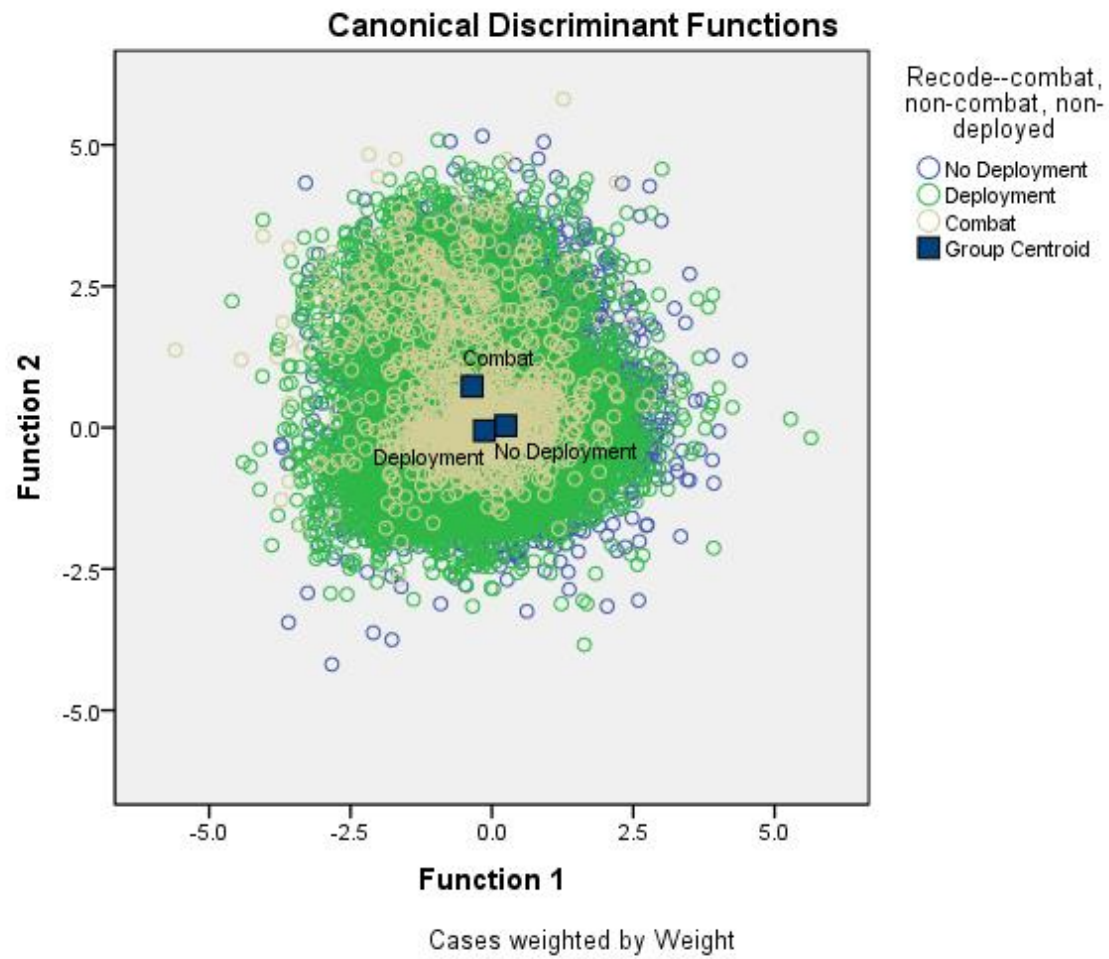|	Function	
	1	2
Recoded--Summed score of the CD-RISC	-.110	.124
Reverse coded--summed, adjusted score of the DRS15	.334	.037
Self-efficacy scale--5 items	-.326	.210
Coping and management of stress--2 items	.385	.146
CES depression scale--6 items	.805	.059
PC-PTSD, lifetime experience of symptoms--4 items	-.215	.827
Suicidal thoughts and behaviors--5 items	.095	.043
Health scale--4 items	.674	-.150
Health scale--2 items	-.045	.301
AUDIT score--10 items	-.033	.202
Work relationships and preparedness--6 items combined	.112	.164
Neighborhood Support--3 items	-.477	-.100
Leader Support of Families--3 items	.314	.122
Role of spirituality and faith scale--4 items	-.114	.035

Table 25

Three Group Structure Matrix

Structure Matrix

	Function	
	1	2
Health scale--4 items	.457[*]	-.135
Leader Support of Families--3 items	.415[*]	.128
Neighborhood Support--3 items	-.372[*]	-.030
Work relationships and preparedness--6 items combined	.310[*]	.154
Coping and management of stress--2 items	.280[*]	.154
Reverse coded-- summed, adjusted score of the DRS15	.272[*]	.103
Role of spirituality and faith scale--4 items	-.092[*]	.014
PC-PTSD, lifetime experience of symptoms--4 items	-.181	.783[*]
Self-efficacy scale--5 items	-.081	.307[*]
Health scale--2 items	.117	.304[*]
CES depression scale--6 items	.101	.278[*]
AUDIT score--10 items	-.031	.270[*]
Recoded--Summed score of the CD-RISC	.088	.214[*]
Suicidal thoughts and behaviors--5 items	.083	.189[*]

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions
Variables ordered by absolute size of correlation within function.

[*]. Largest absolute correlation between each variable and any discriminant function

Figure 13. Three Group Canonical Discriminant Functions.

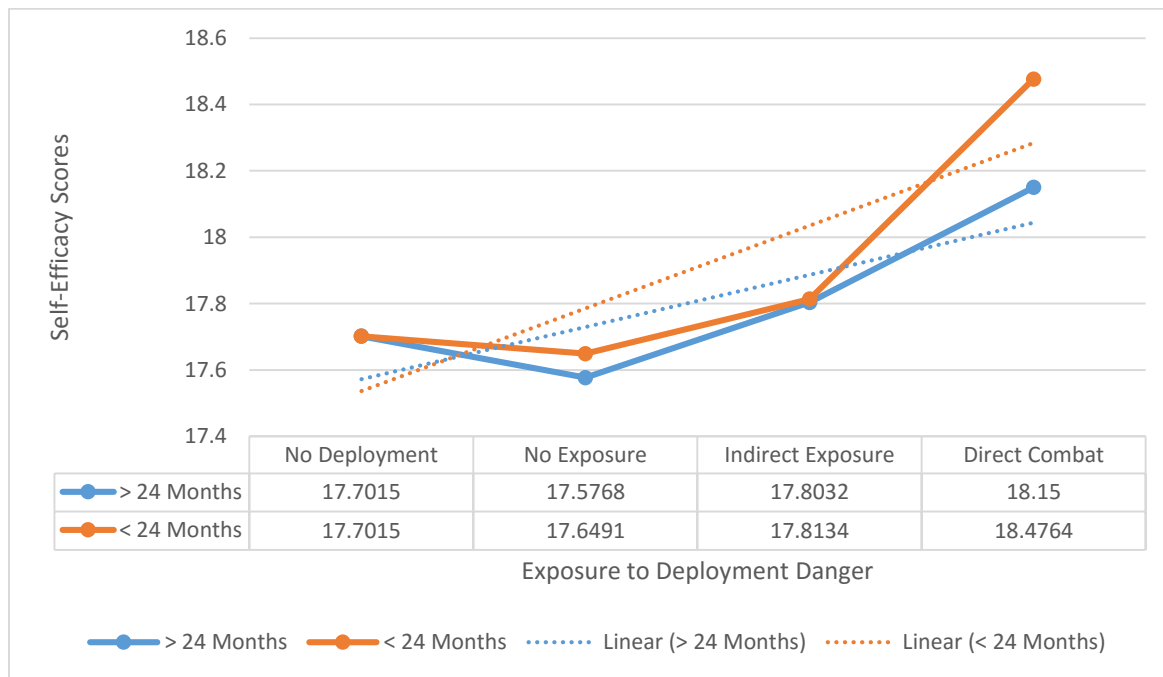**Comparison of Past and Recent Deployers across Exposure to Deployment Dangers by**

Variable

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	17.7015	17.5768	17.8032	18.15
< 24 Months	17.7015	17.6491	17.8134	18.4764

Exposure to Deployment Danger

Figure 14. Self-Efficacy among Past and Recent Deployers across Deployment Danger.

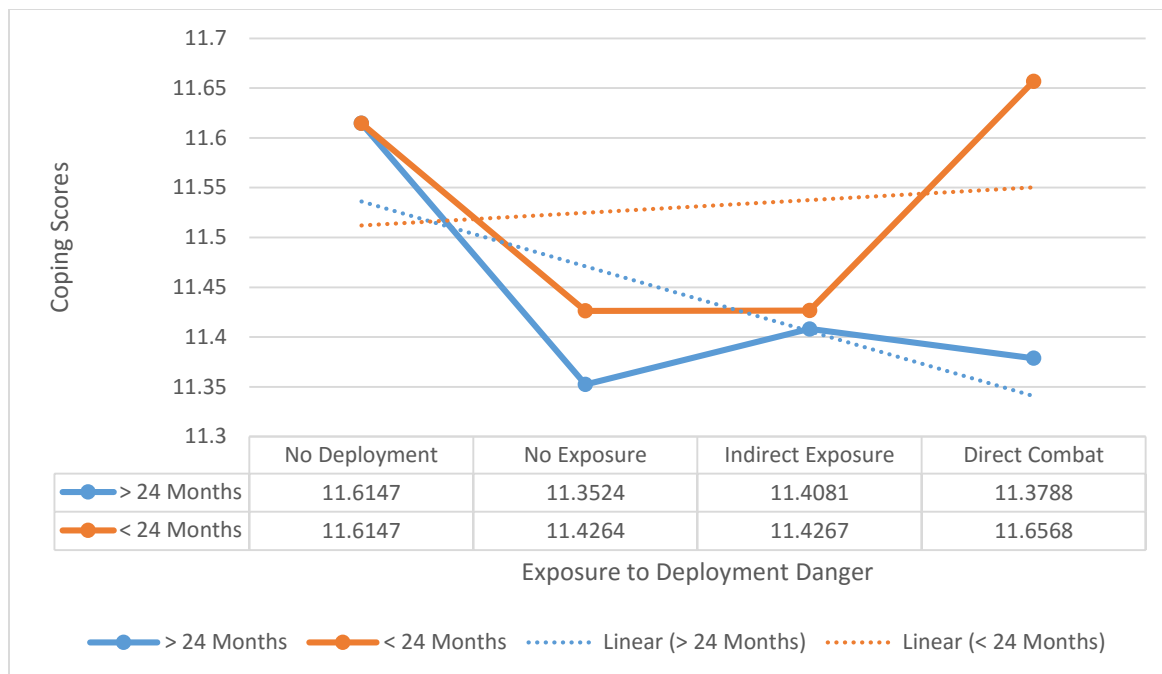|	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	11.6147	11.3524	11.4081	11.3788
< 24 Months	11.6147	11.4264	11.4267	11.6568

Figure 15. Coping among Past and Recent Deployers across Deployment Danger.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	8.8528	8.2232	8.5319	9.3228
< 24 Months	8.8528	8.1792	8.5433	8.6235
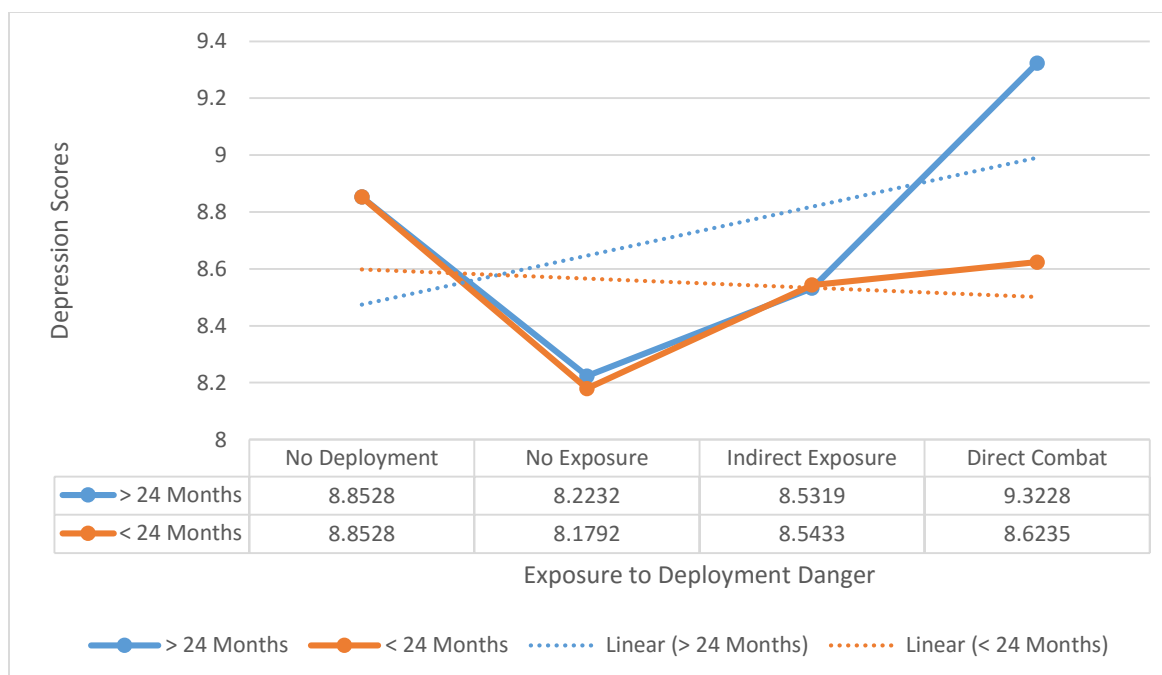
Figure 16. Depression among Past and Recent Deployers across Deployment Danger.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	4.4068	4.3136	4.4964	5.1902
< 24 Months	4.4068	4.2797	4.5235	4.8986
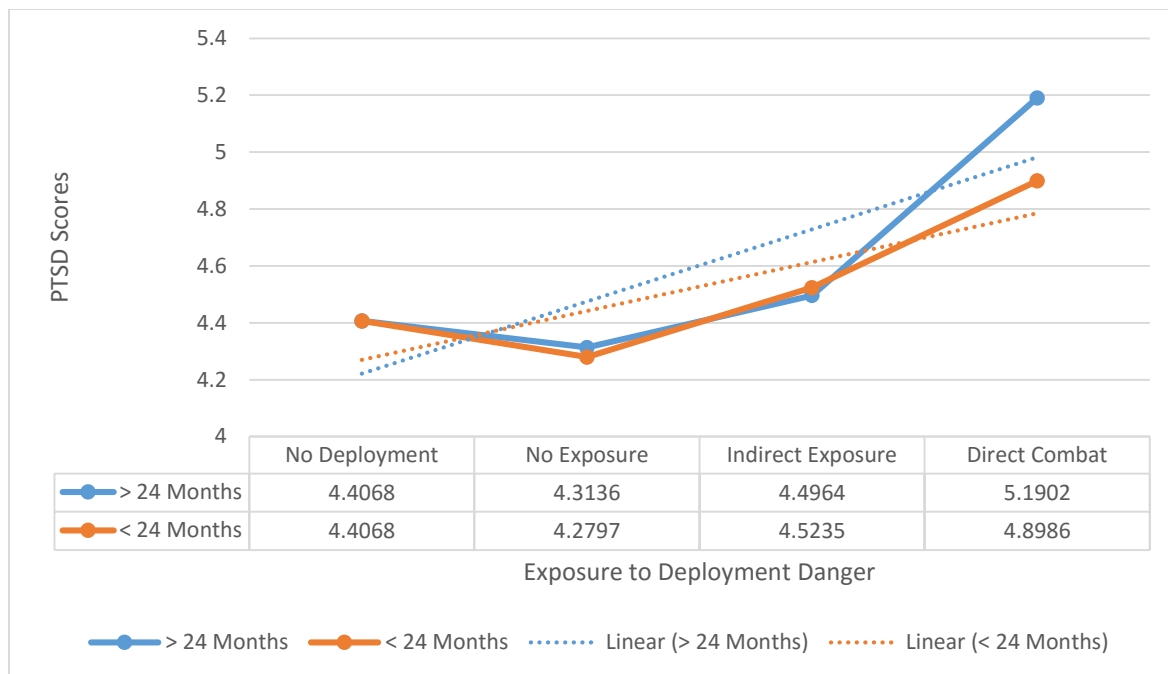
Figure 17. PTSD among Past and Recent Deployers across Deployment Danger.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	1.4699	1.3549	1.4738	1.696
< 24 Months	1.4699	1.2867	1.441	1.4846
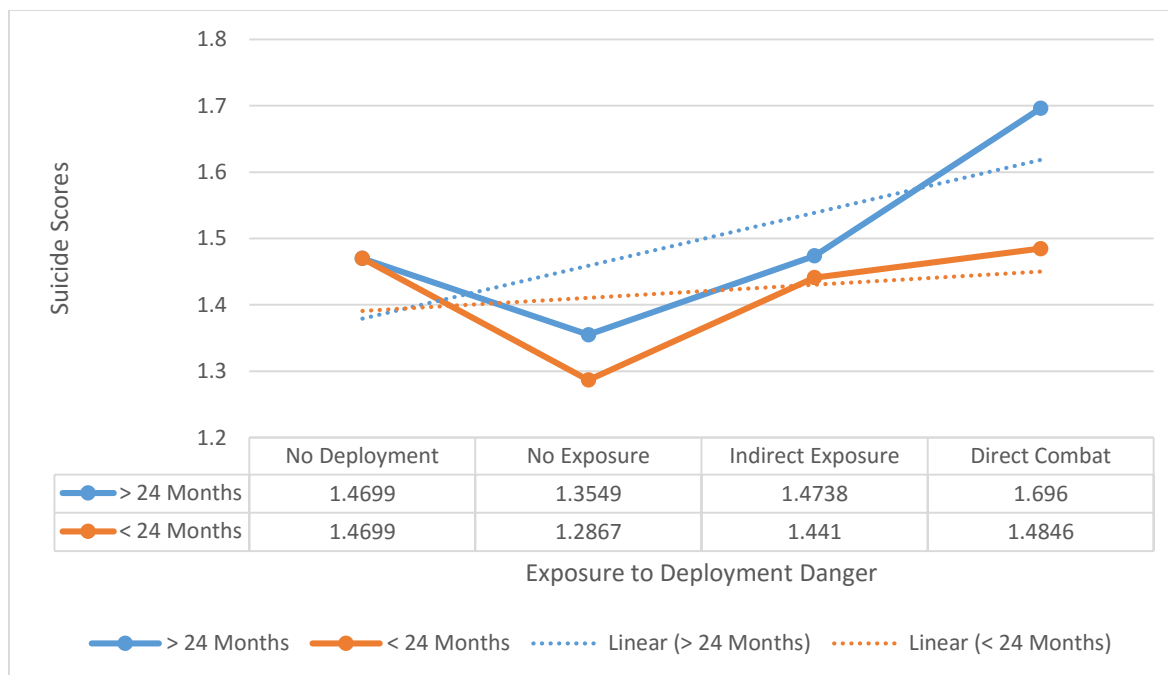
Figure 18. Suicide Behavior among Past and Recent Deployers across Deployment Danger.
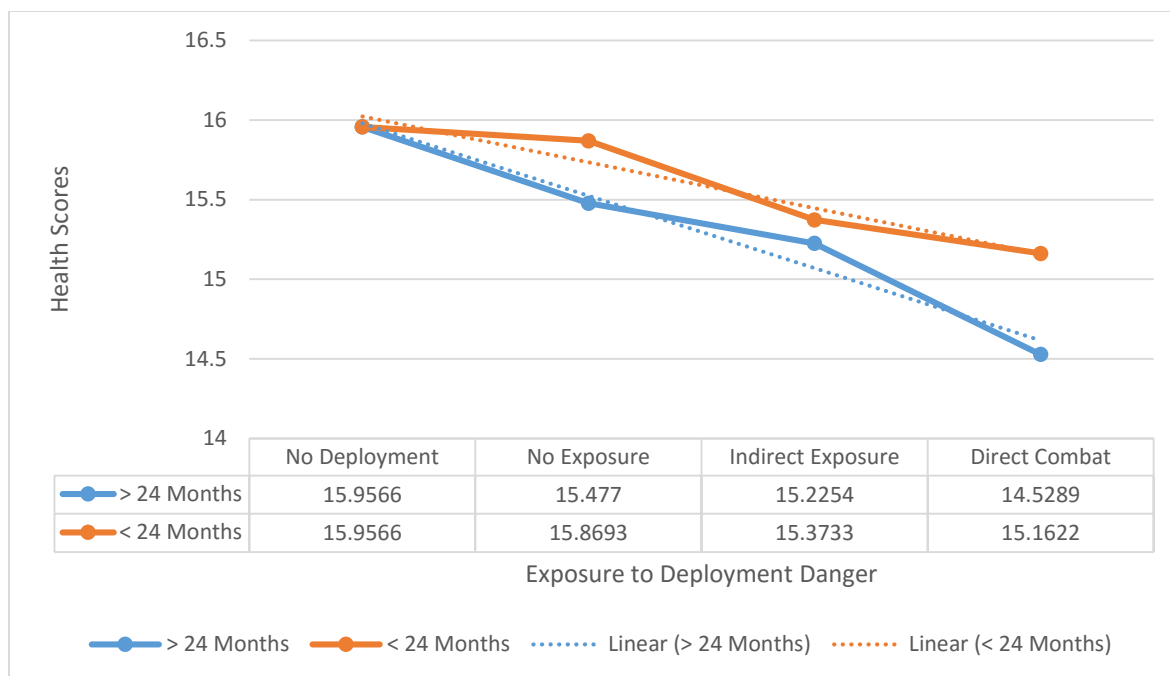
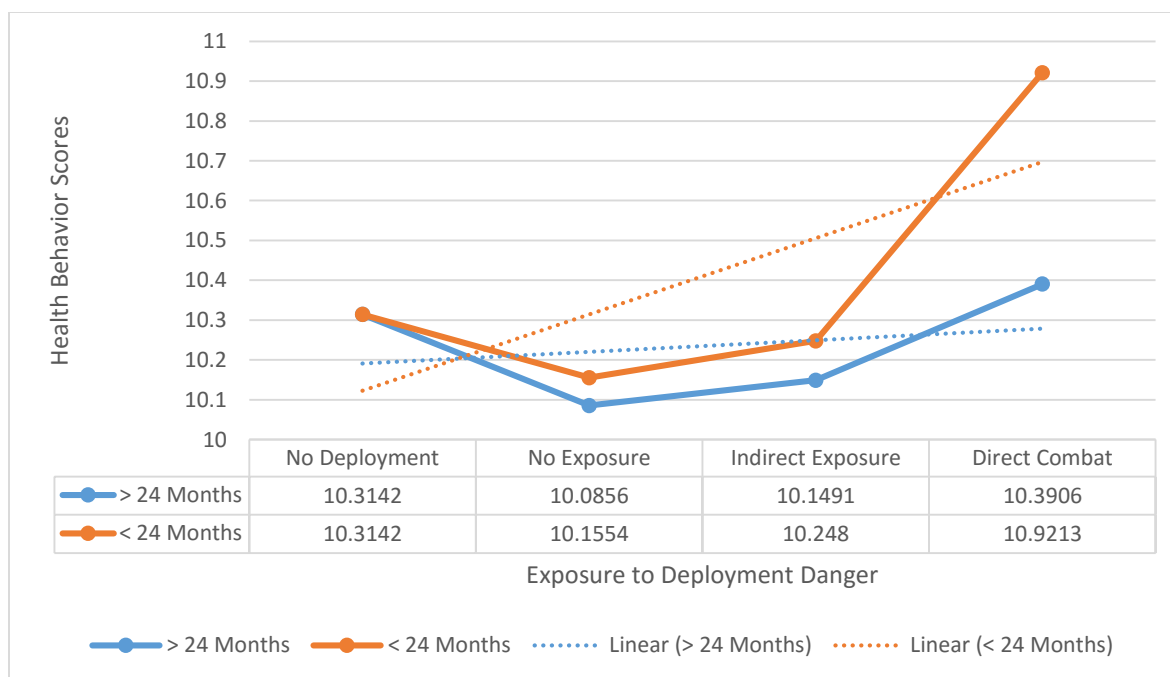*Figure 19.* Health among Past and Recent Deployers across Deployment Danger.

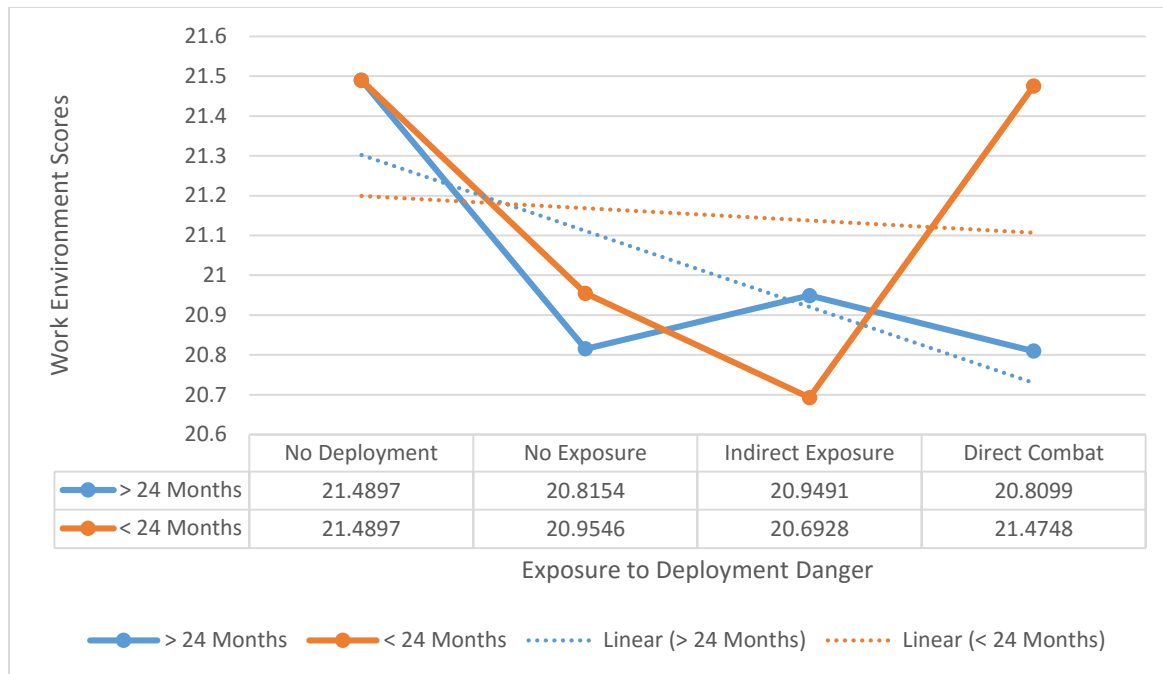*Figure 20.* Health Behavior among Past and Recent Deployers across Deployment Danger.

187

Figure 21. Work Environment among Past and Recent Deployers across Deployment Danger.
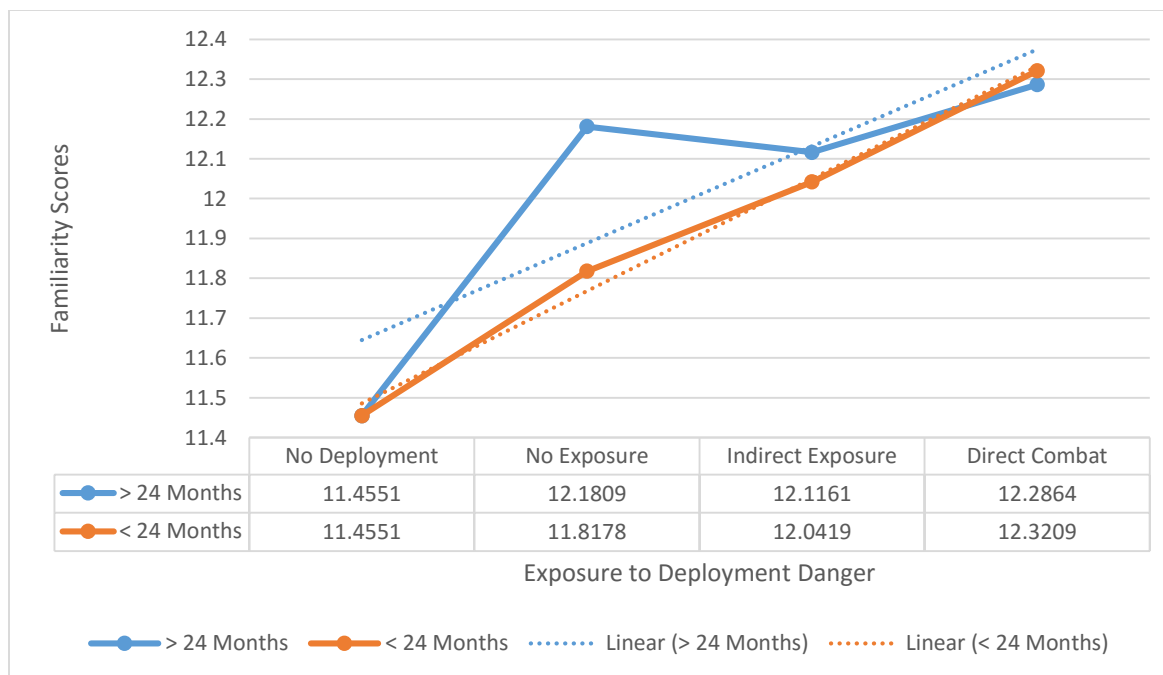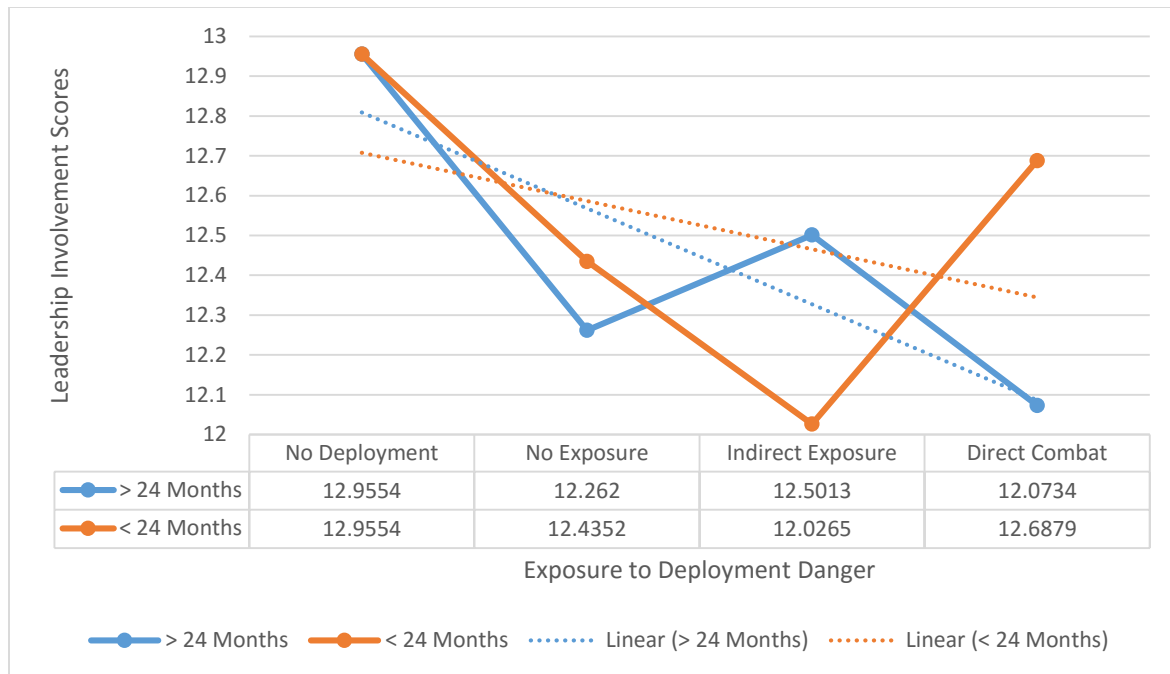

Figure 22. Familiarity among Past and Recent Deployers across Deployment Danger.

	No Deployment	No Exposure	Indirect Exposure	Direct Combat
> 24 Months	12.9554	12.262	12.5013	12.0734
< 24 Months	12.9554	12.4352	12.0265	12.6879

Exposure to Deployment Danger

> 24 Months ● < 24 Months ······· Linear (> 24 Months) ······· Linear (< 24 Months)

Figure 23. Leader Involvement among Past and Recent Deployers across Deployment Danger.