ADVERSE CHILDHOOD EXPERIENCES AND DISORDERED EATING IN THE MILITARY

by

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Over the last two decades, researchers, clinicians, and policy makers have increasingly acknowledged the impact of adverse childhood experiences (ACEs; Felitti et al., 1998) on adult health outcomes. Although the prevalence of disordered eating in military populations has been acknowledged in the literature, little seems to be known about its connection to childhood adversity. This dissertation explores the interplay between ACEs, disordered eating, protective factors, and health outcomes. A better understanding of these relationships is essential to develop policies, as well as clinical, research, and training practices that can effectively attend to the needs of military Service members. This dissertation includes a systematic review of research with military populations that attends to the relationship between childhood adversity and disordered eating, and presents the methodology and results from a survey distributed internationally to 135 active duty Service members. This dissertation concludes with recommendations for integrating key findings into existing screening, treatment, and prevention practices.

ADVERSE CHILDHOOD EXPERIENCES AND DISORDERED EATING IN THE MILITARY

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DEDICATION

For my husband. I am forever grateful for the unconditional love, commitment, and support you have shown me throughout this experience.

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PREFACE

Looking back, I never intended to study trauma or childhood adversity. I have always had an interest in disordered eating and planned to the make that the primary focus of my career. As a master's student, I received excellent training in eating disorder research and treatment and was well on my to continue on that trajectory. As a scientist-practitioner, it has always been important to me to develop as both a clinician and a researcher, and it was a clinical experience that informed this shift in focus. Prior to coming to East Carolina University, I worked at a pediatric obesity treatment center in an area known for high rates of poverty and community violence. One day, I received a referral for a three-year-old weighing over 100 pounds. The doctors had ruled out every possible medical cause for her weight and no other facilities would take her because of her age. Soon enough, we started getting more referrals for other three-year-olds. Through conversations, it became very apparent that family- and community-level traumas were likely playing a significant role in this trend. While these were extreme cases, they created a lasting impression on me. At the time, I had heard about adverse childhood experiences (ACEs; Felitti et al., 1998) and their impact on health, and this experience planted a seed that continued to grow.

Simultaneously, as a newlywed, I frequently heard my husband lament about some of the personnel issues he had encountered as a new junior-level officer. I used to joke that he should be trained as a therapist! These conversations further helped the ACEs seed take root. Shortly thereafter, I began my doctoral studies and began to pour into the literature on eating disorders and learned that disordered eating is common in military populations (e.g., McNulty, 1997a, 1997b, 2001). As I progressed further into my program, I learned more about the impact of stressors during early childhood on adult health outcomes (Shonkoff, Boyce, & McEwen, 2009).

When I encountered an article on the relationship between child abuse and disordered eating among military recruits (Warner et al., 2007), I knew that combining my interests in the military, disordered eating, and ACEs was the right thing to do.

As stated previously, I never intended to study ACEs; however, as I continued to progress as a researcher and clinician, I could not ignore the role ACEs played in influencing health outcomes. Knowing that ACEs are very prevalent in the general population (Felitti et al., 1998), and especially prevalent in military populations (Blosnich, Dichter, Cerulli, Batten, & Bossarte, 2014), military Service members deserve to have greater focus given to understanding how ACEs impact their health. As the study of ACEs in the military continues to expand, many questions remain. How do ACEs impact health and eating behaviors? Can anything help mitigate the impact of ACEs? If a Service member has experienced ACEs, what resources or treatment options are available? My hope is that this dissertation can lend some clarity to how ACEs impact health and eating behaviors, as well as some potential protective factors. I hope these findings can influence treatment and policy efforts in the military and that I can continue to serve this population throughout my career.

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CHAPTER 1: INTRODUCTION

Readiness refers to the military's ability to fight and win our Nation's wars (Milley, 2016). An essential component of readiness is military Service members' ability to meet fitness and body composition standards, which are believed to also support good health and appropriate military appearance. However, a large body of evidence indicates that a significant number of personnel struggle to meet these standards. In 2004, the Institute of Medicine (IOM) released a comprehensive review of weight management research, practice, and policy in the military. Their review highlighted the broad scope of overweight and obesity across branches and made recommendations for improving weight management programs for military personnel. Over a decade later, the problem remains, and in the Army alone, 17% of solders meet the criteria for obesity (U.S. Department of the Army, 2016a). Notably, the IOM's (2004) report identified disordered eating as a significant risk factor for and consequence of obesity among the active duty population.

The IOM's (2004) review devoted considerable attention to the role of disordered eating and called for more precise assessment and documentation. In addition, the IOM called for additional research in several areas, including the prevalence of disordered eating in military personnel and the role of the military lifestyle in promoting disordered eating. This call has been answered by many researchers, who have identified that (a) disordered eating is at least as prevalent among military personnel as civilians (Bartlett & Mitchell, 2015), and (b) factors associated with the military lifestyle, such as pressure to meet fitness (Carlton, Manos, & Van Slyke, 2005) and weight requirements (Peterson, Talcott, Kelleher, & Smith, 1995), as well as risk factors associated with military service, such as combat exposure (Jacobson et al., 2009) and military sexual trauma (Blais et al., 2017) drive disordered eating behaviors. To accurately

understand the research on military-specific factors and disordered eating, it is necessary to explore the relationship between each of these factors and disordered eating.

Each branch of the military has its own fitness and weight standards. Fitness standards require military personnel to meet certain benchmarks within a set timeframe and may include running, push-ups, sit-ups, or pull-ups. Weight standards require personnel to fall within the minimum and maximum weight range determined by their height, as well as a maximum body fat percentage (U. S. Department of the Army, 2016b). For men, body fat percentage is measured as a function of abdominal and neck circumference and height, whereas for women, it is measured as a function of abdominal, neck, and hip circumference and weight (IOM, 2004). If fitness and body composition standards are not met, the Service member is placed in a remedial fitness program and given a timeframe to meet the standard. However, due to the negative stigma often carried by these programs, those enrolled can face ostracism from other Service members. Additionally, failure to meet these standards can negatively impact Service members' careers, with effects ranging from being placed on a non-promotable status and becoming ineligible for certain training programs, to being discharged (Antczak & Brininger, 2008; U.S. Department of the Army, 2016b). McNulty (1997) found that the rate of disordered eating behaviors increases in the weeks preceding a Service member's physical evaluation, which typically occurs twice per year.

In addition to pressure to meet fitness and weight standards, trauma is a well-known risk factor for eating disorders (National Eating Disorders Association, 2015). In a study on the effect of combat exposure on eating disorder onset, Jacobson et al. (2009) found that women who deployed and experienced combat exposures were more likely to lose an extreme or moderate amount of weight, while men who deployed and experienced combat exposures were

more likely to gain a moderate or extreme amount of weight when compared with both nondeployed women and men and those deployed without combat exposure. For both men and women who have served in the military, the connection between military sexual trauma and disordered eating is well documented (Blais et al., 2017; Forman-Hoffman et al., 2012). While there is value in studying the contribution of military-specific trauma factors in relation to disordered eating, the eating disorder literature often fails to take into consideration the role of pre-enlistment factors.

The dearth of research on factors occurring prior to enlistment that may influence disordered eating is concerning, given that 77% of personnel reported that they have engaged in disordered eating behaviors at some point in the past (Garber et al., 2008). Further, between 9.8% and 20% of active duty Service members exhibit symptoms of disordered eating at the time of enlistment (Beekley et al., 2009; Lauder & Campbell, 2001; Warner et al., 2007). In particular, Warner et al. (2007) identified childhood sexual, physical, and verbal abuse as key risk factors for disordered eating behaviors among soldiers at basic training. Warner and colleagues' (2007) findings are supported in the civilian literature. Hasselle, Howell, Dormois, and Miller-Graff (2017) posited that disordered eating could become a maladaptive coping strategy to cope with the difficulties regulating emotions that commonly result from adverse childhood experiences (ACEs). These findings indicate that active duty personnel may be better served by a conceptualization of disordered eating that captures their experiences prior to joining the military.

Adverse Childhood Experiences and Toxic Stress

ACEs are traumatic events experienced during childhood (0 to 18 years old) that occur in a family or social environment, vary in severity, are often chronic, and cause harm or distress

(Kalmakis & Chandler, 2014). First generation ACEs research has focused on abuse (i.e., emotional, physical, and sexual), neglect (i.e., emotional and physical), and household dysfunction (i.e., substance abuse/misuse, mental illness/suicide, domestic violence, parental separation or divorce, or an incarcerated household member; Anda et al., 2006; Felitti et al., 1998). More recently, second generation ACEs research has encompassed cultural and ecological factors (e.g., family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, and violent crime victimization; Mersky et al., 2017). The lifespan impact of ACEs is conceptualized through the ACE pyramid, which outlines the progression of the effects of ACEs beginning in childhood, leading to disrupted neurodevelopment, social/emotional/cognitive impairment, adoption of health risk behaviors, disease/disability/social problems, and early death (Anda et al., 2006; Felitti et al., 1998). Through the theory of toxic stress, ACEs can be understood as toxic stressors, which set into motion a cascade of biological and psychological processes that persist into adulthood (National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016).

A grizzly bear metaphor is useful to conceptualize the difference between toxic stress and other, more normative types of stress, and their subsequent influence on health. If a person sees a grizzly bear in the woods, they may experience a stress response. In that moment, their body may release cortisol, the "stress hormone." However, their cortisol levels should return to normal levels after the situation is resolved, assuming they made it home safely (Tyrka, Ridout, & Parade, 2016). For many people, encountering a grizzly bear is not a one-time event; rather, the grizzly bear lives in their house or roams through their neighborhood. When people are exposed to chronic or extreme stressors (i.e., ACEs) in the absence of supportive relationships,

their bodies undergo a toxic stress response (Shonkoff, Boyce, & McEwen, 2009), leading to the health effects depicted in the ACE pyramid (Anda et al., 2006; Felitti et al., 1998).

ACEs research is particularly relevant to the active duty military population, as the literature has consistently indicated that greater numbers of people who have served in the military have experienced ACEs than the civilian population and that they tend to experience higher numbers of ACEs than civilians (Blosnich, Dichter, Cerulli, Batten, & Bossarte, 2014; Katon et al., 2015; McCauley, Blosnich, & Dichter, 2015). The prevalence of ACEs and disordered eating (Bartlett & Mitchell, 2015) in the military, coupled with the strong connection between ACEs and disordered eating in the civilian population (e.g., Hasselle et al., 2017), indicate that this is an area that deserves further exploration. The goal of this dissertation is to fill this gap in the literature through the examination of the interplay between ACEs, disordered eating, health behaviors, health outcomes, and social support/protective factors for active duty military Service members.

Purpose and Design

For this dissertation, the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) were chosen to ground the research design in theory. Given the prevalence of disordered eating in the active duty population (Bartlett & Mitchell, 2015) and the significant health risk they pose to personnel (IOM, 2004), this research specifically focuses on disordered eating and its associated health effects. This dissertation provides insight and understanding of the physical and behavioral health needs of active duty Service members. The purpose of this dissertation is to explore the relationship between ACEs and disordered eating through a conceptualization informed by the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) and the

theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016). This dissertation begins with a literature review (chapter two) about the research on ACEs in the active duty population and the need to include disordered eating in the conversation about ACEs with this population, which then transitions into a systematic review (chapter three) that identifies the research on ACEs and disordered eating with military populations, using the ACE pyramid as a conceptual guide (Anda et al., 2006; Felitti et al., 1998). Based on the findings in the systematic review, a methodology is proposed in chapter four to explore how ACEs, protective factors, disordered eating, and health outcomes are connected. Chapter five is a presentation of the results of a survey (see Appendix A for IRB approval, Appendix C for survey) of active duty military personnel, who were asked about their experiences during childhood and health behaviors. This dissertation concludes with chapter six, which discusses the implications of chapters 3 and 5 and provides a series of research, clinical, policy, and training recommendations informed by these findings.

Overview

Chapter two presents the conceptual foundation for this dissertation, which is grounded in the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998). The literature review summarizes the progression of this area of research over the past several decades and applies the ACEs and toxic stress framework to the active duty population. Then, the case is made for why disordered eating should be explored through this lens. The literature review concludes with recommendations for research to strengthen our understanding of the relationship between ACEs and disordered eating with active duty personnel.

The systematic review presented in chapter three identifies original research on ACEs and disordered eating in military populations. Due to the dearth of literature on this topic, "military populations," which is inclusive of active duty personnel and veterans, was the population of focus. Articles that utilized disordered eating and military MeSH/key terms were identified. Then, each article was examined for the presence of any of the ten original ACEs (Anda et al., 2006; Felitti et al., 1998). This systematic review answers the question: "How do adverse childhood experiences impact the prevalence of disordered eating, overweight, and obesity among veterans and military Service members?" Searches of four databases yielded a total of 1,689 articles, which was reduced to only eight based on the search criteria. Results from the systematic review identify key gaps in the literature, which include (a) the need for clearly defined constructs, (b) the inclusion of diverse samples (i.e., gender, race/ethnicity, etc.), and (c) the collection of data on multiple ACEs and an array of demographic variables in context of disordered eating and military populations.

The findings of the systematic review presented in chapter three informed the methodology detailed in chapter four. This methodology is grounded in the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) and toxic stress theory (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) and explored the relationship between ACEs and disordered eating among active duty personnel. For this study, the researchers recruited active duty personnel to take a self-report, electronically administered survey and asked participants about general and military-specific demographics, ACEs, adverse adult experiences, disordered eating, and health. Chapter five is a publishable manuscript that describes the results of the study proposed in chapter four. Key findings include significant correlations between ACEs and disordered eating, mental and physical health conditions, and health behaviors.

Specifically, connections were found between ACEs and purging behaviors, stress fractures, asthma, and posttraumatic stress disorder. Additionally, disordered eating behaviors were significantly associated with health behaviors; namely, binge eating and binge drinking, and purging and number of sexual partners. Notably, a substantial number of Service members in this sample had a parent who had served in the military. This trend, coupled with the links between ACEs, disordered eating, and health behaviors/conditions described in chapter five, informed chapter six. The final chapter of this dissertation elucidates research, clinical, policy, and training recommendations that incorporate a systemic, ACEs-informed approach to health screening, treatment, and prevention in an active duty population.

Summary

Disordered eating has significant implications for military Service members' readiness. Despite evidence in the civilian world that ACEs contribute to disordered eating, this area has remained largely unexplored in the active duty population. The ACE pyramid (Anda et al., 2006; Felitti et al., 1998) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) provide a useful framework for conceptualizing this relationship. This dissertation seeks to fill the gap in knowledge about the relationship between ACEs and disordered eating among active duty personnel.

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CHAPTER 2: THE IMACT OF CHILDHOOD ADVERSITY ON DISORDERED EATING AMONG ACTIVY DUTY SERVICE MEMBERS

Upon enlistment, between 9.8% and 20% of active duty Service members exhibit symptoms of disordered eating (Beekley et al., 2009; Lauder & Campbell, 2001; Warner et al., 2007), and as many as 77% report engaging in disordered eating behaviors at some point in their past (Garber et al., 2008). This prevalence indicates that pre-enlistment factors may contribute to pre-existing or newly formed disordered eating thoughts and behaviors. It is clear that most researchers have not attended to the role of pre-enlistment factors in relation to disordered eating, but instead have focused on risk factors that may influence the likelihood for disordered eating among active duty Service members, including pressure from (a) physical fitness tests (Carlton, Manos, & Van Slyke, 2005), (b) weight requirements (Peterson, Talcott, Kelleher, & Smith, 1995), (c) combat exposure (Jacobson et al., 2009), and (d) military sexual trauma (Blais et al., 2017). While research on military-specific risk factors is essential to understanding disordered eating among active duty personnel, an investigation of pre-enlistment factors, such as childhood adversity experiences (Warner et al., 2007), is also essential in order to better understand the pre and post enlistment experiences and risk factors that coincide with disordered eating.

The purpose of this literature review is to explore the research pertaining to pre-enlistment factors and their potential role in disordered eating among active duty personnel. Two frameworks were selected to ground this review in theory. First, the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016) was selected to describe the "how," or the mechanism behind a child's ecology becoming biologically embedded during development. Second, the adverse childhood experiences (ACE)

pyramid (Anda et al., 2006; Felitti et al., 1998) was chosen to describe the "what," or the impact that pre-military factors, specifically ACEs, have on the health of military personnel.

Thus, this paper includes a: (a) brief description of ACEs and an overview of the key tenets of the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016), (b) snapshot of ACEs research with active duty personnel to illustrate the lifespan effects of ACEs depicted in the ACE pyramid (Anda et al., 2006; Felitti et al., 1998), (c) description of the state of research on disordered eating with active duty personnel, and (d) series of recommendations for future researchers that recognizes the need for a systematic review to capture a comprehensive look at the role of ACEs in disordered eating for military personnel, as well as research that explores the relationship between ACEs and disordered eating in this population.

Adverse Childhood Experiences and Toxic Stress Theory

Researchers' conceptualization of ACEs has evolved considerably since Felitti et al.'s landmark study in 1998, which linked ACEs to an array of health issues in adulthood, ranging from depression to heart disease. ACEs are broadly defined as traumatic events experienced during childhood that (a) occur in a family or social environment, (b) vary in severity, (c) are often chronic, and (d) cause harm or distress (Kalmakis & Chandler, 2014). Initially, researchers focused on abuse and neglect (i.e., emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect), as well as household dysfunction (i.e., substance abuse/misuse, mental illness/suicide, domestic violence, parental separation or divorce, or an incarcerated household member; Anda et al., 2006; Felitti et al., 1998). More recently, to be more inclusive of ethnic, cultural, and ecological diversity, researchers have proposed additional ACEs, such as family financial problems, food insecurity, and bullying (e.g., Cronholm et al. 2015; Mersky et

al., 2017). Through the inclusion of these additional ACEs, researchers continue to provide evidence for their negative impact on health outcomes in diverse populations.

ACE Pyramid

Although researchers have explored the influence of childhood adversity on adult health outcomes for decades (i.e., Felitti et al., 1998), the ACEs research has been critiqued for lacking a theoretical basis (Kalmakis & Chandler, 2014). Felitti et al. (1998) identified the health conditions that were among the leading causes of mortality in the United States (e.g., ischemic heart disease, cancer, stroke, etc.), as well as ten risk factors believed to contribute to these conditions (e.g., smoking, suicide attempts, obesity, etc.). Then, the researchers asked respondents about ACEs, health risk factors, and health conditions. The connection between ACEs and health risk factors/conditions was so profound that the researchers proposed a model detailing the potential lifespan influences of ACEs. This model, termed the ACE pyramid (Felitti et al., 1998), was described through researchers' observations and assumptions of ACEs, suggesting that they can lead to cognitive, social, and emotional problems, and ultimately the adoption of maladaptive coping strategies (such as smoking). These strategies were then thought to lead to physical and mental health conditions, as well as increase the risk for experiencing additional traumas and an early death. Upon receiving feedback from neuroscientists at the turn of the century, researchers added disrupted neurodevelopment to the model and recognized that childhood adversity can cause changes in brain structure and function (Anda et al., 2006). More recent advances in genetics, neuroscience, and the social sciences have enabled the articulation of a general theory that grounds the ACEs research and pyramid: the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016).

The theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) serves to connect the levels of the ACE pyramid (Anda et al., 2006; Felitti et al., 1998). For example, a child is exposed to an ACE, such as emotional abuse. Over time, this toxic stressor leads to changes in brain structure and function. These changes disrupt the child's neurodevelopment, leading to difficulties in functioning, such as emotional regulation, which can persist into adolescence and adulthood. To cope with these difficulties, maladaptive coping strategies are adopted, such as smoking or binge eating, which can lead to health problems, such as cancer or obesity, and early death. The connection between the theory of toxic stress and health is described in more detail below (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016).

Toxic Stress

According to the theory of toxic stress, a child's genetic predispositions interact with environmental influences that occur during key periods of development. Through this gene-environment interaction, adverse experiences can cause a number of physiological changes, including the structural remodeling of the brain. Shern and colleagues (2016) purport that in the absence of effective support, these circumstances can form a "vicious cycle" and can trickle down from generation to generation. Thus, toxic stress plays a central role in the development and health of children, adults, and intergenerational processes.

To understand the role of toxic stress, it is important to note that not all forms of stress are harmful. The National Scientific Council on the Developing Child (2005/2014) identified three types of stress: positive, tolerable, and toxic. Positive stress responses are brief, moderate in severity, and often result from day-to-day stressors (e.g., meeting someone new). Conversely, tolerable stress responses (e.g., from a car accident) have the potential to negatively impact

development, but generally occur over a limited period of time and in the presence of supportive relationships, which promote adaptive coping. *Toxic stress* results when stressors are chronic, uncontrollable, and/or occur without access to supportive adults. Over time, toxic stress can alter how the body responds to daily stressors, which can result in an array of negative health outcomes across the lifespan (Shonkoff, 2010; Shonkoff, Boyce, and McEwen (2009). An essential component of the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) in relation to the effect of toxic stress on adult health outcomes is that *timing matters*. Toxic stress that occurs during critical periods of development can generate changes in structure and function that persist later in life (Shonkoff, 2012). Adverse childhood experiences are commonly identified as toxic stressors (National Scientific Council on the Developing Child, 2005/2014). The constructs of allostatic load and biological embedding illustrate how toxic stress can impact a child's development.

Allostatic load. In a review of the literature, Danese and McEwen (2012) found that toxic stressors affect the body's mechanisms for maintaining physiological stability in response to changes in environment, or allostasis. Although allostasis is the body's ability to maintain stability through change (Sterling, 1988), factors such as toxic stress can lead to *allostatic load*, or the wear and tear of allostatic systems (McEwen & Wingfield, 2003). Key allostatic systems that are impacted by ACEs include the nervous, immune, and endocrine systems (Danese & McEwen, 2012). Specifically, ACEs have been demonstrated to affect both the size and reactivity of the hippocampus, prefrontal cortex, and amygdala (Chaney et al., 2014; Veer et al., 2015, Danese & McEwen, 2012). In terms of immune function, Slopen, McLaughlin, Dunn, and Koenen (2013) studied Epstein-Barr virus antibodies in young adults and found that childhood sexual abuse was associated with higher levels of antibodies. Additionally, among those who

had been physically abused, abuse occurring between ages three to five was more predictive of heightened antibodies than abuse first occurring during adolescence.

A robust body of literature supports the deleterious effects of ACEs on the endocrine system, namely the hypothalamus-pituitary-adrenal (HPA) axis. The (HPA) axis has received considerable attention due to its function as the human body's primary stress response pathway (e.g., Wand, 2008; Stephens & Wand, 2012). When a person is exposed to a stressor, their body releases cortisol, the "stress hormone." Once cortisol is released, their body enacts negative feedback loops to return cortisol to homeostatic levels. Ideally, cortisol levels will increase quickly, and then drop once the stressful situation has been resolved. However, exposure to chronic or extreme stressors during childhood leads to excessive activation of these pathways and can result in blunted or exaggerated HPA function in adulthood (Tyrka, Ridout, & Parade, 2016). In addition to altering physiology through allostatic load, toxic stress can cause DNA-level changes, such as biological embedding.

Biological embedding. Some researchers have described *biological embedding* as the process through which "stress gets under the skin" (Shonkoff et al., 2012). The field of epigenetics has greatly expanded our understanding of how stress impacts developing minds and bodies. A particular process that has been extensively studied is DNA methylation, which can result in altered gene expression (McEwen, 2015). Through methylation, a methyl group is added to DNA, essentially turning genes "off." Researchers have linked childhood adversity (i.e., toxic stress) to the methylation of specific genes, such as *NR3C1* and *FKBP5*, both of which play an essential role in regulating the HPA axis. Although this is an emerging field, evidence for the biological embedding of ACEs is clear (Tyrka, Ridout, & Parade, 2016). This effect may have the capacity to influence future generations as well (i.e., intergenerational transmission of

toxic stress). For example, researchers have found that methylation with Holocaust survivors and their offspring has provided evidence for the intergenerational transmission of the epigenetic effects of trauma (Yehuda et al., 2015).

ACEs, Health, and Health-risk Behaviors

As described above, ACEs can become toxic stressors (National Scientific Council on the Developing Child, 2005/2014) that alter physiological changes in the body via allostatic load or biological embedding. Through these toxic stressors, a person is at risk for a wide range of negative health outcomes across the lifespan. For example, children who experience ACEs are more likely than children without ACEs to underperform at school (Kiesel, Piescher, & Edleson, 2016). Baiden, Stewart, and Fallon (2017) found that ACEs significantly increase the likelihood of adolescents engaging in self-harm. Furthermore, ACEs have a dose-response, whereby the greater number of ACEs a person has experienced, the greater their likelihood of endorsing health risk behaviors (e.g., substance use and moderate to heavy drinking) and negative health outcomes (e.g., depression and suicide attempts; Merrick et al., 2017). Notably, in Merrick et al.'s (2017) study, people who reported six or more ACEs had 24.36 times increased odds of attempting suicide. Among adolescents, the odds of prescription drug abuse in the past year increased by approximately 50% for each additional ACE (Forster, Gower, Borowsky, & McMorris, 2017). The effects of ACEs are present in older adults as well. Choi, DiNitto, Marti, and Choi (2017) found that in adults 50 and older, ACEs were predictive of lifetime major depressive disorder, anxiety disorder, PTSD, alcohol use disorder, drug use disorder, and nicotine use disorder. Additionally, people with six or more ACEs may even have a lifespan 20 years shorter than people without ACEs (Brown et al., 2009). While many of the

aforementioned health conditions and outcomes are connected to ACEs via health-risk behaviors, there is evidence that directly links ACEs to negative health effects.

Cortisol, a glucocorticoid, plays a vital role in how the human body responds to stress and prolonged exposure can set in motion the processes of allostatic load and biological embedding (Shonkoff et al., 2012; Stephens & Wand, 2012). However, glucocorticoids are commonly used to treat a number of health conditions, such as asthma, which can enable researchers to observe the impact of glucocorticoids on health, without the presence of ACEs, in a controlled way. For instance, long-term exposure to glucocorticoid medications among children is associated with lower bone density, which can result in bone demineralization (thereby increasing the likelihood for fractures) and increased glucose in the blood stream (even without dietary changes, intensifying the risk for diabetes; Brown & Zacharin, 2005; Kapadia et al., 2016; Sutter & Stein, 2016). Chronic elevated cortisol levels due to ACEs and toxic stress can function in a similar way, providing a direct pathway between ACEs and negative health outcomes without the adoption of health-risk behaviors. Taken together, these findings indicate that ACEs, via the constructs proposed by the theory of toxic stress, are relevant to the health and health-risk behaviors of the general population and essential for military mission readiness.

Military Personnel and ACEs

ACEs research with military populations has tended to focus on veterans, though there is a growing body of literature on toxic stressors with active duty personnel. This research has consistently found that people who have served in the military (inclusive of active duty personnel and veterans) have higher ACE scores than people who have not (Blosnich, Dichter, Cerulli, Batten, & Bossarte, 2014; Katon et al., 2015; McCauley, Blosnich, & Dichter, 2015). Compared to civilians, men who have served in the military had a higher prevalence of each of the 11 ACE

categories, whereas women who have served in the military were significantly more likely to report household physical abuse, exposure to domestic violence, emotional abuse, and sexual abuse (Blosnich et al., 2014). However, there is evidence that the effect of ACEs on health related quality of life may be weaker for those with military experience than for civilians (Katon et al., 2015). Although researchers are unclear about why this effect is weaker in military populations compared to civilians, it is hypothesized that it may be due to the fact that people in the military have greater access to trauma interventions or because the physical and psychological requirements to join the military have contributed to greater resilience (Katon et al., 2015). Additionally, the authors found that the association between ACEs and poorer health related quality of life might be stronger for women than for men (Katon et al., 2015). In these population-based studies, the ACEs most frequently endorsed by military populations include living with someone who abused alcohol or drugs (37.4% of women, 31.2% of men), verbal abuse (41.5% of women, 31.8% of men), and parental separation (33.2% of women, 31.0% of men; Katon et al., 2015). Although much of the ACE literature tends to focus on child abuse (e.g., physical, sexual, emotional), rather than a broader definition of adversity reflected by ACEs, there is evidence that childhood trauma does impact neurodevelopment of military personnel.

Disrupted Neurodevelopment

In an exploration of the relationship between childhood maltreatment and veterans' resting brain function, Insana, Banihashemi, Herringa, Kolko, and Germain (2016) found evidence of altered frontolimbic neurobiological activity. Veterans who had experienced childhood maltreatment (e.g., emotional abuse, physical abuse, emotional abuse, physical neglect, emotional neglect, etc.) had increased metabolic activity in brain areas associated with

executive control (e.g., the frontal cortex), but decreased activity in areas associated with emotion, autonomic, and sleep regulation. Cumulative childhood and adulthood trauma exposure were associated with dorsal anterior cingulate cortex activation (dACC; Herringa, Phillips, Fournier, Kronhaus, & Germain, 2013), which impacts threat appraisal. Watkins et al. (2016) linked four *FKBP5* single-nucleotide polymorphisms to childhood abuse in a nationally representative sample of veterans. Through this connection, the authors found that childhood abuse was predictive of hyperarousal PTSD symptoms and concluded that childhood abuse may increase vulnerability for PTSD. Disrupted neurodevelopment can lead to impairment in many areas; one area that has received attention in the literature for the active duty population is social/relational functioning.

Social, Emotional, and Cognitive Impairment

Among soldiers seeking behavioral healthcare during a combat deployment, 83% had at least one ACE and the mean and median score was three experiences (Applewhite, Arincorayan, & Adams, 2016). Although the authors are unable to make inferences about the role of ACEs in seeking care because they did not collect data on those who did not seek treatment during deployment, certain themes were prevalent among those who sought care. A majority of the soldiers who had combat and operational stress reactions (i.e., acute stress due to deployment; 85%), expressed threat of harm to self or others (88%), or experienced relational problems with their partner (89%) also had a positive ACE score. Comparatively, only 4% sought care to cope with post-traumatic stress after involvement in direct combat. This trend indicates that ACEs may negatively influence military personnel's ability to cope with stress of deployment. In a study of members of the Canadian military, Lee, Phinney, Watkins, and Zamorski (2016) found that personnel with higher ACE scores reported that they were lacking current social support.

Additionally, in a study of military family typologies, Oshri et al. (2015) found that current family functioning can serve to shield or amplify the effects of ACEs. Thus, protective social factors can deter health-risk behaviors and difficulty in coping with social and occupational stressors can lead to the adoption of health-risk behaviors as a way to self-soothe.

Adoption of Health-risk Behaviors

In 2016, the Army identified substance use and tobacco use, along with chlamydia (i.e., unprotected sex), as among the primary health risk behaviors impacting the health of active duty soldiers (U.S. Department of the Army, 2016a). In a study of soldiers three- to six-months postdeployment from Operation Iraqi Freedom/Operation Enduring Freedom, Clarke-Walper, Riviere, and Wilke (2014) found that ACEs were associated with alcohol misuse, both with and without risky behaviors (e.g., driving under the influence). Slightly less than a third of soldiers had a positive screening for alcohol misuse. Further, the researchers found that independent of combat exposure and the presence of a mental health problem, three particular ACEs (household mental illness, household problematic drinker, and sexual abuse) significantly increased soldiers' risk of alcohol misuse. Additionally, ACEs are predictive of current smoking among women veterans (McCauley et al., 2015). Although literature on the relationship between ACEs and risky sexual behaviors is lacking in the active duty population, civilian research has linked ACEs to sexually transmitted infections during adulthood (Wade et al., 2016). According to toxic stress theory these risk behaviors, as well as the biological embedding of trauma, can lead to disease, disability, and social problems.

Disease, Disability, and Social Problems

Among active duty soldiers, the presence of ACEs has been shown to be predictive of positive screening for depression and PTSD (Gahm, Lucenko, Retzlaff, & Fukuda, 2007). In a

population-based study of active duty personnel, Sareen et al. (2013) found that exposure to ACEs and deployment-related traumatic events were associated with increased odds of mood and anxiety disorders for men and women. The authors found independent effects for deployment-related traumatic events and ACEs on mental health outcomes, but not a significant interaction, suggesting a potential additive effect, and concluded that ACEs may have an independent effect on mental disorders after adjusting for the effects of deployment. In a study of Operation Desert Storm veterans, Hammond et al. (2015) found significant positive associations between ACE scores and an array of health conditions, including heart disease, diabetes mellitus, tobacco use, depression, stroke, chronic obstructive pulmonary disease, alcoholism, fracture, hepatitis, depression, PTSD, and anxiety, as well as lifetime suicide attempts. Due to the strong connection between ACEs and health, the authors recommended that routine assessment of ACEs become the standard of care for Service members entering the military, as well as for veterans. These health conditions, as well as suicide attempts, can result in early death.

Early Death

Heightened mortality rates via suicide remains a significant concern for military populations (U.S. Army, 2016). Blosnich and Bossarte (2017) found that ACEs were associated with recent suicidal ideation (within the past 12 months) among veterans, while serving in a combat zone and traumatic brain injury were not associated with suicidal ideation. For male veterans, higher ACE scores are associated with increased suicidality (Carroll, Currier, McCormick, & Drescher, 2017). Specifically, veterans' risk of suicidal ideation increased by 23% and risk of suicide attempts increased by 24% for every 1-point increase in ACE score.

Military Trauma + ACEs

Military-related trauma has received considerably more attention in the literature than pre-military factors, such as ACEs, in relation to health. As such, it is essential to mention the relevance of military trauma in tandem with the presence or absence of ACEs in military populations. According to the theory of toxic stress (Shern et al., 2016), people who have experienced ACEs are more likely to report experiencing trauma during adulthood. This is supported in the limited research that compares childhood and military trauma. Two primary areas of military trauma research are military sexual trauma and combat exposure (e.g., Mercado, Wiltsey-Stirman, & Iverson, 2015; Watkins et al., 2016; Fritch et al., 2010). Women veterans with a history of childhood physical or sexual abuse are significantly more likely to report experiencing military sexual trauma (Mercado et al., 2015) in their lifetime. Some researchers have found that child abuse contributes to PTSD vulnerability (e.g., Watkins et al., 2016). However, others have found that ACEs, such as childhood physical abuse, and combat exposure both uniquely predict mental health symptoms, but do not interact (Fritch et al., 2010).

As discussed previously in this paper, ACEs and other pre-military factors are associated with negative health outcomes for military personnel, and this can be independent of or amplified by military trauma (e.g., Blosnich & Bossarte, 2017; Sareen et al., 2013). While the impact of pre-military factors on health outcomes has been explored for a number of conditions, less is known about their relationship to disordered eating. In a recent study of civilian college students, childhood maltreatment was significantly associated with disordered eating symptoms (Hasselle, Howell, Dormois, & Miller-Graff, 2017). Further, the authors posited that participants utilized disordered eating to cope with emotion regulation difficulties stemming from ACEs. These findings warrant further exploration of disordered eating in the active duty population.

Disordered Eating and Active Duty Personnel

Among civilians, eating disorders are widespread, with an estimated 20 million women and 10 million men in the United States experiencing a clinically significant eating disorder during their lifetime (Wade, Keski-Rahkonen, & Hudson, 2011). Comparatively, the prevalence of disordered eating among military populations is less certain. There is a lack of consensus regarding the degree of prevalence of eating disorders in the military, though in a systematic review of eating disorders in the military, Bartlett and Mitchell (2015) concluded that rates are comparable to the civilian population, and may be increasing. This discrepancy can be attributed to the method of data collection, with self-report data yielding a significantly higher prevalence than medical record reviews (Bodell, Forney, Keel, Gutierrez, & Joiner, 2014). Despite these discrepancies, there is a consensus that large numbers of women and men in the military are at risk for eating disorders, engage in purging behaviors to lose weight, and may have undiagnosed clinically significant eating disorders (Bodell et al., 2014; Bartlett & Mitchell, 2015).

Scope of Disordered Eating

In a study of disordered eating in the military, McNulty (2001) examined the prevalence of anorexia nervosa (AN), bulimia nervosa (BN), and eating disorder not otherwise specified (EDNOS) among service women from the total population of three major medical centers from the Army, Navy, and Air Force, as well as the total population of Marine women serving in Okinawa, Japan. The overall prevalence estimates reflected that 1.1% of participants met the criteria for AN, 8.1% for BN, and 62.8% for EDNOS. The rates among Marines were significantly higher than any other branch, with 4.9% meeting the criteria for AN, 15.9% for BN, and 76.7% for EDNOS. In a similar study among Navy nurses from randomly selected healthcare facilities, McNulty (1997a) found that 1.1% met the criteria for AN, 12.5% for BN,

and 36% for EDNOS. Among active duty Navy men, 2.5% met the criteria for AN, 6.8% for BN, and 40.8% for EDNOS (McNulty, 1997b). These self-reported prevalence estimates indicate that disordered eating may be widespread across branches, for both men and women. Although this research is now two decades old, McNulty's (1997a, 1997b, 2001) work has some of the highest prevalence estimates of disordered eating in the active duty population and includes one of the only studies on disordered eating among active duty men to date (McNulty, 1997b).

Despite the high prevalence of self-reported disordered eating found by McNulty (1997a, 1997b, 2001), medical record data tells a different story. Antczak and Brininger (2008) examined medical record data through an epidemiological retrospective investigation to determine the incidence rates of eating disorders in the military based upon diagnoses of AN, BN, and EDNOS. Data primarily consisted of ambulatory visits for Service members in the Army, Air Force, Navy and Marines from 1998–2006. The authors determined that the average yearly incidence rate of diagnosed eating disorders in the military between the years studied was 0.30%. Women were diagnosed significantly more frequently than men and comprised 85% of diagnosed eating disorder cases. The majority of eating disorder cases diagnosed in women were categorized as BN (45%), while 52% of men were diagnosed with EDNOS. Service members who were white and female were more likely to receive an eating disorder diagnosis than those who were racial/ethnic minorities or male. Notably, 66% of Service members with a diagnosis of AN were Marines, and Marines demonstrated the highest incidence of eating disorders among female Service members. Taken together, these findings show that while many military personnel may experience disordered eating, few receive a diagnosis. Additionally, although there are discrepancies in prevalence estimates based on how the data is collected, two separate

systematic reviews of disordered eating in military populations have indicated that disordered eating is widespread (Bartlett & Mitchell, 2015; Bodell et al., 2014).

Onset

Several researchers have studied eating disorders among people who had recently joined the military in an effort to determine the role of the military in contributing to eating disorders (Beekley et al., 2009; Garber et al., 2008, Lauder & Campbell, 2001). The findings of these studies tend to show that many recruits join the military with established disordered eating or thought patterns, raising the issue of self-selection. However, these findings also show a trend of increased eating pathology with time in the service for military personnel in both enlisted and officer career tracks. Additionally, the literature on eating disorders among military personnel explores the role of known eating disorder risk factors and issues for civilian populations, including trauma and weight and fitness standards (Forman-Hoffman et al., 2012; Jacobson et al., 2009; Antczak & Brininger, 2008).

Beekley et al. (2009) examined the incidence, prevalence, and risk of eating disorders among cadets at the United States Military Academy (USMA) from 1999 to 2005 and concluded that the prevalence of diagnosed eating disorders were comparable to the general population and less than indicated in previous studies of the military population. Over the seven-year study period, 5% of women and 0.1% of men met the criteria for an eating disorder, with an additional 19% of women and 2% of men determined to be at risk. Disordered eating and the percentage of those at risk increased after one year of attending the academy. The authors postulated factors such as required biannual weigh-ins, meal attendance, physical fitness testing, sport participation, as well as a standardized uniform may increase the risk of eating disorders at USMA. In a study of female Army ROTC cadets, Lauder and Campbell (2001) found that 20%

of cadets endorsed disordered eating behaviors, with 35% of these cadets reporting binging, 19.3% purging, 15% using laxatives, 55.2% using diet pills, and 14.8% using diuretics. Compared with data on the active duty population, these findings indicate that pressures leading to abnormal eating behaviors persist once a woman enters active duty service (Lauder, Williams, Campbell, Davis, & Sherman, 1999).

A study of female Marine recruits within 10 days of enrolling in training (primarily 17-19 years old) revealed that nearly 38% were dissatisfied with their weight and more than 77% reported previous disordered eating behavior (Garber et al., 2008). The authors concluded that many women already exhibited characteristics and behaviors that put them at risk for developing an eating disorder prior to entering the military. Additionally, BMI was most strongly related to weight dissatisfaction. Recruits with low BMIs (less than 18.5 kg/m^2) reported significant weight dissatisfaction, while those with BMIs near or greater than the Marine Corps' upper limit (23.5 kg/m^2) were six times more likely to report weight dissatisfaction than recruits with BMIs between 18.5 and 21.9 kg/m^2.

Fitness and Weight Standards

All branches of the military have fitness and weight standards, though the specific requirements vary by branch. Fitness standards require military personnel to meet certain benchmarks within a set timeframe and may include running, push-ups, sit-ups, or pull-ups. Weight standards require personnel to fall within the minimum and maximum weight range determined by their height, as well as a maximum body fat percentage (U. S. Department of the Army, 2016b). If a Service member does not meet fitness and weight standards, he or she may be placed in a remedial fitness program and given a timeframe to meet the standard. However, these programs often carry a negative stigma that can lead to the ostracism of those enrolled by

other Service members. Additionally, failure to meet these standards can have a number of adverse career effects, including placement on a non-promotable status, ineligibility for certain training programs, or discharge from service (Antczak & Brininger, 2008; U.S. Department of the Army, 2016b). McNulty (1997b) found that the rate of disordered eating behaviors increases in the weeks preceding a Service member's physical evaluation, which typically occurs twice per year. Pressure to meet standards and the stigma of not meeting standards can create considerable stress. As in the civilian population (e.g., Fischer, Stojek, & Hartzell, 2010; Hasselle et al., 2017), disordered eating behaviors, such as bingeing, purging, and fasting, may serve as methods to cope with these stressors in the absence of effective emotion regulation strategies for people with a history of ACEs.

Trauma

Trauma is a well-known risk factor for eating disorders (National Eating Disorders Association, 2015). Forman-Hoffman et al. (2012) examined lifetime eating disorders and associations with post-traumatic stress disorder (PTSD) and sexual trauma during childhood, military service, and lifetime among women veterans. While 4.7% of participants reported having an eating disorder diagnosis, an additional 11.5% self-reported suffering from an eating disorder. Sexual trauma during military service was more strongly associated with lifetime eating disorders than childhood sexual trauma, and women with PTSD were more likely to report having an eating disorder (Forman-Hoffman et al., 2012). In a study on the effect of combat exposure and eating disorder onset, Jacobson et al. (2009) found that women deployed with combat exposures were more likely to lose an extreme or moderate amount of weight, and men deployed with combat exposures were more likely to gain a moderate or extreme amount of weight when compared with both nondeployed women and men and those deployed without

combat exposure. Taken together, these findings indicate that men and women in the military are often faced with traumatic experiences that may increase their risk of developing an eating disorder. This is significant for two reasons. First, in the civilian population, childhood trauma (specifically emotional abuse) and adult trauma both uniquely contribute to disordered eating symptoms (Fischer et al., 2010). If researchers are not capturing experiences prior to military service, it is difficult to determine how military traumas influence disordered eating. Second, according to the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016), people who have experienced ACEs may be more likely to experience traumas as adults. For these reasons, it is important to be cognizant of the role of ACEs in disordered eating with military populations.

Implications

Disordered eating presents a significant risk to military readiness and health. While military-specific factors, such as physical fitness tests (Carlton, Manos, & Van Slyke, 2005), weight requirements (Peterson, Talcott, Kelleher, & Smith, 1995), combat exposure (Jacobson et al., 2009), and military sexual trauma (Blais et al., 2017) may contribute to disordered eating, there are considerable gaps in the literature. Despite evidence that as many as 20% of active duty personnel exhibit symptoms of disordered eating at the outset of their military service (Beekley et al., 2009) and a majority of personnel report engaging in disordered eating behaviors at some point prior to joining (Garber et al., 2008), there is a dearth of research on the factors that contribute to these trends. In civilian populations, ACEs have been demonstrated to contribute to disordered eating (e.g., Hasselle et al., 2017), yet in the writing of this review, the author was only able to locate one article that explores ACEs and disordered eating in active duty populations (Warner et al., 2007). The theory of toxic stress (Shern et al., 2016) and the ACE

pyramid (Anda et al., 2006; Felitti et al., 1998) present a useful framework through which to explore the connection between ACEs and disordered eating with military populations.

Recommendations

Based on the themes identified in this review, several research and clinical recommendations can be made for both ACEs in general and disordered eating, specifically among military personnel. As the military is diverse and employs personnel from across the globe (Department of Defense, 2014), ACEs research with this population should encompass the second generation ACEs (e.g., financial problems, food insecurity, homelessness, parental absence, parent/sibling death, peer victimization, and being a the victim of a violent crime; Mersky et al., 2017) to best reflect the ethnic, cultural, and ecological diversity of the force. Although research in this area is quickly evolving, it is apparent that ACEs have a significant impact on the brain and other body systems and can impact a number of health issues prevalent among Service members, independent of military trauma. Due to the prevalence of ACEs in military populations (e.g., McCauley et al., 2015), the theory of toxic stress (Shern et al., 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) should assume a more central role in the development of interventions. ACEs-informed research may include a focus on risks and reduction of health risk behaviors, such as smoking, drinking, and unprotected sex, and the strengthening of social support networks.

Although there are now a growing number of articles that explore the impact of ACEs on military Service members' health, ACEs still remain understudied in this population. In terms of the use of ACEs in health surveillance, personnel have expressed concerns about confidentiality and career impact (Robinson et al., 2008). These concerns are valid and are emblematic of the delicate nature of ACEs work with military populations. Due to the substantial evidence that

ACEs have far-reaching effects on health throughout the lifespan, a better understanding of ACEs is essential to optimize clinical care for our military. As evidenced above, disordered eating is a significant concern for this population and may be influenced by ACEs and further compounded by military-specific factors, such as military sexual trauma (Blais et al., 2017) and weight requirements (McNulty, 1997b). Research that explores the role of ACEs in disordered eating in the military is necessary to best inform treatment approaches.

To allay the concerns expressed above, a systematic review of disordered eating among military populations is recommended to best understand the breadth and depth of the existing literature. A complete, holistic understanding of the research to date on ACEs and disordered eating with this population ensures that future research and clinical decisions will be respectful of the military as a culture and accurately reflect their needs. Further, as ACEs have far-reaching effects, the theory of toxic stress (Shern et al., 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) should guide this systematic review to appropriately capture these elements in relation to disordered eating. Although there is a dearth of research on ACEs and disordered eating in the military, articles that capture obesity may be instrumental in conceptualizing the extent of the disordered eating literature for this population. In the Army alone, 17% of soldiers meet the criteria for obesity (U.S. Department of the Army, 2016a), indicating that obesity is a health concern that has the military's full attention, and therefore, a larger body of literature.

In addition to a systematic review, several research areas need to be addressed to understand the relationship between ACEs and disordered eating. Just as the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) should inform the systematic review, they should also inform original research in this area. Research that encompasses these

frameworks can shed light on the interplay between ACEs, disordered eating, and health outcomes, as well as adverse experiences during adulthood. Further, little is known about the role of protective factors in the relationship between ACEs and disordered eating. While some researchers have hypothesized more broadly about reasons for resilience for military Service members with ACEs (e.g., Blosnich et al., 2014; Katon et al., 2015), this area remains understudied and poorly understood. Lastly, there is a dearth of research on ACEs and disordered eating among the active duty population, and specifically disordered eating among active duty men. Future research projects should seek to expand an understanding of these populations.

Conclusions

The evidence is clear that (a) disordered eating is a concern for many active duty personnel as evidenced by a systematic review of research on disordered eating in military populations (Bartlett & Mitchell, 2015), (b) many personnel enter the military with disordered eating behaviors and thoughts, and (c) experiences during military service may contribute to disordered eating. Despite this evidence, very few researchers (i.e., Warner et al., 2007) have explored the relationship between disordered eating and ACEs among military personnel. The theory of toxic stress (Shern et al., 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) provide a useful framework for understanding disordered eating with the active duty population. A systematic review of the literature on ACEs and disordered eating among military populations is warranted to better understand the existing literature, as well as research projects that address the significant gaps in our knowledge of the interplay between ACEs, disordered eating, and health in the active duty population.

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CHAPTER 3: DISORDERED EATING AND MILITARY POPULATIONS: UNDERSTANDING THE ROLE OF ADVERSE CHILDHOOD EXPERIENCES

Adverse childhood experiences (ACEs; Felitti et al., 1998) have been linked to a host of health risk behaviors and conditions in adulthood (e.g., Anda et al., 2006; Chartier, Walker, & Naimark, 2009). The Centers for Disease Control and Prevention (CDC, 2016) identifies alcohol abuse, drug abuse, sexual risk behaviors, and smoking as health risk behaviors and includes cancer, heart disease, liver disease, and depression among the health conditions associated with ACEs. Disordered eating and eating disorders are absent from the CDCs list of health risk behaviors and health conditions, and obesity is represented in the CDC reference list as a health risk behavior (rather than as a health condition) with only one publication cited (Williamson, Thompson, Anda, Dietz, & Felitti, 2002), although others have referenced obesity in a more broad manner in their studies (e.g., Anda et al., 2006; Felitti et al., 1998).

In the United States, more than two-thirds of adults and one-third of children and adolescents meet the criteria for overweight or obesity (National Institute of Diabetes and Digestive and Kidney Diseases, 2012). Additionally, more than twenty million women and ten million men in the United States struggle with a clinically significant eating disorder in their lifetime (Wade, Keski-Rahkonen, & Hudson, 2011). One population whereby obesity (Reyes-Guzman, Bray, Forman-Hoffman, & Williams, 2015) may be harder to conceal and disordered eating (Bodell, Forney, Keel, Gutierrez, & Joiner, 2014) more difficult to manage is with military Service members. The role of obesity and disordered eating in a Service member's life may have roots in adverse child events (Blosnich, Dichter, Cerulli, Batten, & Bossarte, 2014) beyond any potential trauma endured within military duty expectations and as such, this article

will focus on the presence of ACEs in relation to disordered eating and obesity among military populations.

Given that men and women who have served in the military tend to report higher ACE scores than civilians (Katon et al., 2015) and the high numbers of military Service members and veterans who exhibit disordered eating (Bartlett & Mitchell, 2015), there is a critical need to explore the impact of ACEs on obesity and eating disorders for this population. The purpose of this article is three fold: to (a) provide a theoretical foundation to address the research question: How do adverse childhood experiences impact the prevalence of disordered eating, overweight, and obesity among veterans and military Service members?, (b) identify themes and gaps in the literature via a PRISMA-based systematic review in order to better understand the role of adverse experiences in childhood as well as disordered eating in Service members and veterans, and (c) offer research recommendations pertaining to ACEs and disordered eating, specific to military and veteran populations.

ACEs and Health

ACEs are defined as traumatic events experienced during childhood (0 to 18 years old) and occur in a family or social environment, which vary in severity, are often chronic, and cause harm or distress (Kalmakis & Chandler, 2014). Initially, ACEs were conceptualized in two main categories: (a) abuse and neglect, which consisted of emotional, physical, and sexual abuse, as well as emotional and physical neglect, and (b) household dysfunction, which encompassed substance abuse/misuse, mental illness/suicide, domestic violence, parental separation or divorce, or an incarcerated household member (Anda et al., 2006; Felitti et al., 1998). However, in response to criticism that ACEs research tended to focus on participants who were white and from higher socioeconomic statuses, Cronholm and colleagues (2015) identified five "expanded"

ACEs stressors, which were intended to better capture the experiences of participants from diverse sociodemographic backgrounds. The expanded ACEs definition included: (c) living in an unsafe neighborhood, experiencing racism, living in foster care, experiencing bullying, and witnessing violence.

ACEs act as toxic stressors (e.g., parental substance abuse, family violence, maternal depression, etc.; Shonkoff, Boyce, & McEwen, 2009) in a person's life and have the ability to jeopardize mental, emotional, and physical health outcomes. Although stressors are a normative part of the human experience, not all types of stressors are equivalent. The National Scientific Council on the Developing Child (2005/2014) identified toxic stressors as chronic, uncontrollable, and occurring among those who have limited access to support systems and services. Over time, these toxic stressors and adverse childhood events can alter how the body responds to events, which can result in an array of health conditions across the lifespan (Shonkoff, 2010).

In particular, ACEs have been shown to disrupt a child's neurodevelopment, which may result in social, emotional, and cognitive impairment. Health-risk behaviors are then commonly adopted to cope with these impairments, which can lead to disease, disability, stress, social or relational concerns, and even result in early death (Brown et al., 2009; Felitti et al., 1998) throughout the lifecycle. Combined (i.e., ACEs, disrupted neurodevelopment, social/emotional/cognitive impairment, adoption of health risk behaviors, disease/disability/social problems, and early death), these risks and impairments form the ACE pyramid. The ACE pyramid reflects a theoretically informed model showcasing how ACEs impact individuals from birth to death (Anda et al., 2006; Felitti et al., 1998). The pyramid's image suggests that ACEs are far-reaching and while these toxic stressors do not guarantee poor

outcomes, they commonly influence long-term health outcomes spanning throughout the lifespan. In relation to the scope of this review, ACEs and other elements of the ACE pyramid have been linked to three serious health concerns: eating disorders, disordered eating, and obesity. These connections will be discussed below.

ACEs, Eating Disorders, and Obesity

Eating disorders, such as anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), and eating disorder not otherwise specified (EDNOS), have been linked to a number of ACEs, particularly emotional abuse. Other forms of abuse, such as physical and sexual abuse, have been inconsistently linked to disordered eating among both men and women (Kennedy, Ip, Samra, & Gorzalka, 2007). Note that EDNOS reflects DSM-IV-TR diagnostic classifications (American Psychiatric Association, 2000). In the DSM-5, this category has been changed to "other specified feeding or eating disorder," which includes purging disorder (PD; American Psychiatric Association, 2013). Terminology from both versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) is reflected in this review, based on the timeframe measured in the systematic review.

When examining the etiology of eating disorders, it is important to also include obesity. Obesity is directly associated with BN and BED, and patients with AN have an increased likelihood of developing obesity later on in their recovery (Reddy, 2009). One study found that among women with BED, emotional neglect was associated with dieting at an earlier age, while physical abuse was associated with later age of onset for obesity (Becker & Grilo, 2011). Among African American women, sexual and physical abuse were associated with an increased risk of obesity (Boynton-Jarrett, Rosenberg, Palmer, Boggs, & Wise, 2012). Noll, Zeller, Trickett, and Putnam (2007) found that women who have experienced sexual abuse are more

likely to be obese as adults. Further, Ramirez and Milan (2016) found that sexual abuse had a moderating role between obesity and mental health symptoms for low-income women. Among middle-aged women, physical abuse and sexual abuse were associated with increased risk of obesity and depression (Rohde et al., 2008).

Men with a history of sexual abuse have an increased risk of overweight and obesity, whereas women are more likely to exhibit disordered eating behaviors (Fuemmeler, Dedert, McClernon, & Beckham, 2009). Researchers have also found that emotional abuse and sexual abuse are associated with body dissatisfaction (Dunkley, Masheb, & Grilo, 2010). In a study of male college students, Kinzl, Mangweth, Traweger, and Biebl (1997), found that severe physical abuse or an adverse family background was associated with an increased risk for developing an eating disorder, though this association was not found for sexual abuse; the variable "family background," encompassed several ACEs constructs, including emotional or physical neglect. In a study of women with AN, Racine and Wildes (2015) found that emotional abuse was associated with greater symptom severity and emotion dysregulation. Fewer studies have been conducted on the impact of expanded ACEs on eating disorders, but there is evidence that connects disordered eating, obesity, and/or body dissatisfaction to the presence of childhood bullying (Copeland et al., 2015), discrimination (Watson, Groteweil, Farrell, Marshik, & Schneider, 2015), foster care (Schneiderman, Arnold-Clark, Smith, Duan, & Fuentes, 2013), neighborhood safety (Larson, Wall, Story, & Neumark-Sztainer, 2013), and family violence (Brady, 2008). These experiences can cause physiological changes in children that persist through adulthood.

Disrupted Neurodevelopment

Although there is limited research on the impact of ACEs on the neurodevelopment of people with disordered eating and/or obesity, previous researchers have focused on the hypothalamic-pituitary-adrenal (HPA) axis, specifically the cortisol awakening response (CAR). Monteleone et al. (2015) studied CAR in women with AN and BN with a history of childhood trauma exposure (sexual abuse, physical abuse, physical neglect, emotional abuse, emotional neglect), women with AN and BN without a history of childhood trauma, and "healthy" controls. Women with AN and no history of childhood trauma had an elevated CAR, whereas women with BN and no history of childhood trauma had a CAR similar to that of the control group. However, the women with AN or BN and a history of childhood trauma had a significantly lower CAR than the control group, as well as the women with AN or BN without a history of childhood trauma. Although the function of CAR is not yet fully understood (Fries, Dettenborn, & Kirschbaum, 2007), Li and colleagues (2015) found a similar relationship between childhood maltreatment and CAR in adult patients with obesity. These findings lend support for the ACE pyramid and suggest that ACEs have a lasting physiological impact that persists into adulthood.

Social, Emotional, and Cognitive Impairment

A number of social, emotional, and cognitive factors are considered risks for disordered eating/obesity. Negative affect and impaired psychosocial functioning have been identified as risk factors for the development of AN, BN, BED, and purging disorder (PD; Stice et al., 2017). These researchers operationalized functional impairment via participants' self-report of impairment in relation to their family, peers, romantic partners, and/or school context. Additionally, Stice and colleagues (2017) found that cognitive impairments such as thin-ideal internalization, positive expectancies for thinness, and body dissatisfaction predicted the onset of

BN, BED, and PD. In a longitudinal study of factors that predict restrictive eating, Haynos, Watts, Loth, Pearson, and Neumark-Stzainer (2016) found that low self-esteem was associated with the initiation of disordered eating in the short- and long-term (i.e., five-year follow up). Additionally, the authors linked weight concerns and body dissatisfaction to disordered eating in the short-term and poor family communication/lack of caring to disordered eating in the long-term. Additional social, emotional, and cognitive factors include critical inner voices and high self-criticism (Noordenbos, Aliakbari, & Campbell, 2014), as well as social anxiety and perceived lack of social acceptance/self-worth (Obeid, Buchholz, Boerner, Henderson, & Norris, 2013), all of which have the capacity to lead to the adoption of health risk behaviors.

Adoption of Health Risk Behaviors

A number of health risk behaviors are associated with the onset of eating disorders/obesity. Specific behavioral risk factors include overeating, fasting, dieting, weight control behaviors, and excessive exercise (Stice et al., 2017). Among male collegiate athletes, dieting and excessive exercise are the most frequently endorsed subclinical disordered eating behaviors (Chatterton, & Petrie, 2013). Disordered eating has also been associated with binge drinking and drug use (Swanson et al., 2014), as well as the nonmedical use of prescription stimulants (Jeffers & Benotsch, 2014). Additionally, while cigarette smoking may be used for appetite suppression (Kovacs, Correa, Brandon, 2014), smoking cessation is associated with weight gain (White, Masheb, & Grilo, 2010), often triggering disordered eating behaviors. Among adolescent males, Ackard, Fedio, Neumark-Sztainer, and Britt (2008) found that disordered eating was connected to a higher number of sex partners, regardless of preferred gender. These risk behaviors can result in eating disorders and associated comorbid disorders.

Disease, Disability, and Social Problems

The aforementioned health risk behaviors can lead to prodromal and full syndrome eating disorders (e.g., AN, BN, BED, PD; Stice et al., 2017). Eating disorders are also known to be comorbid with a number of mental health disorders, including depression, anxiety, obsessive-compulsive disorder, substance use disorders, and posttraumatic stress disorder (PTSD; Grilo, White, & Masheb, 2009; Mitchell & Wolf, 2016). Eating disorders can result in medical complications that span throughout the body's systems, including the musculoskeletal and gastrointestinal systems (Forney, Buchman-Schmitt, Keel, & Frank, 2016). Such complications can lead to comorbid medical diagnoses, such as Type 2 diabetes (Raevuori et al., 2015), osteoporosis (Harris et al., 2012), and a host of cardiac conditions (Sachs, Harnke, Mehler, & Krantz, 2016), all of which also increase the likelihood for mortality.

Early Death

Previously, researchers had indicated that AN has the highest mortality rate of all mental health disorders (Harris & Barraclough, 1998). More recently, Arcelus, Mitchell, Wales, and Nielsen (2011) suggested that these findings are still relevant, in that people with eating disorders have high mortality rates (5.1 for AN, 1.7 for BN, and 3.3 for EDNOS – deaths per 1000 person years) and that one in five people with AN who died had died by suicide. Mortality is high across the range of eating disorders, particularly for BED and BN (Crow et al., 2012). Smith and colleagues (2016) found that women with BN with a history of childhood emotional or sexual abuse were at increased risk of lifetime suicide attempts.

ACEs and the Military

Much of the aforementioned ACEs-informed literature has focused on civilians. However, a population whose career is based on health fitness and mission readiness (i.e.,

military Service members) deserves to have researchers who are exploring the role of pre-service traumatic events (i.e., ACEs) and a history of/or current struggles with eating disorders, disordered eating, and/or obesity in order to protect them from a lifetime of health conditions that may result in an early death.

Suicide among military populations has received considerable attention in the literature (e.g., Bryan, Jennings, Jobes, & Bradley, 2015; Conner & Simons, 2015). ACEs can help explain this trend. Among male veterans seeking residential treatment for combat-related PTSD, Carroll, Currier, McCormick, and Drescher (2017) found that (a) a significant majority (83.4%) had experienced at least one ACE, (b) ACEs had a cumulative effect on suicidal ideation and attempts, and (c) the relationship between ACEs and suicidal ideation/attempts was independent from combat-related trauma. These findings, coupled with the findings that underweight veterans are both more likely to complete a suicide and use more lethal methods (McCarthy, Ilgen, Austin, Blow, & Katz, 2014) than their normal weight counterparts, punctuates the need for further research on the impact of ACEs on disordered eating among veterans and military personnel.

Method

The research question posed for this study is: How do ACEs impact the prevalence of disordered eating, overweight, and obesity among veterans and military Service members? While there are systematic reviews pertaining to the prevalence of eating disorders with this population (Bodell, Forney, Keel, Gutierrez, & Joiner, 2014; Bartlett & Mitchell, 2015), none have explored the role of ACEs prior to military service in relation to likelihood for disordered eating. Thus, this systematic review identifies research on eating disorders and obesity with military personnel and veterans that investigated ACEs.

Procedure

Cooper's (2010) approach to research synthesis, as well as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA) guidelines (Moher et al., 2009), grounded the methodology for this review. Cooper's (2010) approach encompassed seven steps, which include: (a) formulating the problem, (b) searching the literature, (c) gathering information from studies, (d) evaluating the quality of studies, (e) analyzing and integrating the outcomes of studies, (f) interpreting the evidence, and (g) presenting the results. The search for this systematic review included four databases: PsychINFO via EBSCOhost, CINAHL via EBSCOhost, PubMed via Medline, and Military Database via ProQuest. These databases were selected based on their foci on psychology, nursing and allied health, and the military, respectively. The following search and MeSH terms were used: "military personnel," "veteran," "overweight," "obesity," "body mass index," "weight gain," "weight loss," "body weight," "body disorder," "anorexia nervosa," "bulimia nervosa," "binge eating," "eating," "feeding," "eating disorder," "body image." Each search paired "military personnel" or "veteran" with a disordered eating term. No limit for year was set in the search parameters. The searches were conducted in January through October of 2017 and captured articles dating from 1976 to 2017. Table 1 summarizes the search terms used for each database, the total yield from each search, as well as the articles selected after a review of titles and abstracts. The inclusion and exclusion criteria are outlined in Table 2. Although dissertations were not excluded from this study, none met the inclusion criteria. Additionally, this review was not limited to the United States, though no international studies met the inclusion criteria.

After completing the searches, reviewing titles and abstracts, and removing duplicates, the remaining articles underwent a full-text review to determine whether they met the inclusion

criteria. Both a primary researcher and a secondary reviewer completed each search and reviewed each article by title, abstract, and full-text to ensure that articles that were selected met inclusion criteria. During the full text review, articles were assessed for the inclusion of ACEs variables. The primary researcher and secondary reviewer achieved agreement on each article in each wave of review. In cases where there was disagreement or uncertainty, articles were included in the next round of review for further scrutiny. Through this process, the reviewers achieved agreement on each article. The research team also screened the reference lists of relevant articles to determine whether additional studies met the inclusion criteria. Figure 1 outlines the search and review process. The initial searches yielded 1,689 articles, which were reduced to 1,528 after the reviews of title and abstract. After duplicates were removed, 212 full-text articles were examined to determine whether any measure of ACEs were used, resulting in only five final articles. Of the full-text articles excluded, only two included measures of childhood adversity; however, one study was not military or veteran-focused and one study did not have a focus on disordered eating or obesity. Citation tracking (i.e., searching the references of the final articles for new findings) and reverse searching (i.e., searching for articles that cited the selected articles) yielded an additional three articles. Presentation and interpretation of the findings are detailed below.

Results

The eight articles selected for this review explored ACEs and eating disorders or obesity among military personnel or veterans. An overview of each article is included in Table 3. The results have been divided by demographics, data collection methodology, and the categories of the whole life perspective on ACEs (Felitti et al., 1998; Weiss & Wagner, 1999), which include (a) ACEs, (b) social, emotional, and cognitive impairment, (c) health risk behaviors, and (d)

disease, disability, and social problems. No studies reported on the neurodevelopmental impact of ACEs with respect to eating disorders or obesity or on early death, so they were not included as categories below.

Demographic Factors

Military status and branch. Seven studies focused on veterans (Arditte Hall et al., 2017a, Arditte Hall et al., 2017b, Cheney et al., 2014, Forman-Hoffman et al., 2012, Kimbrel et al., 2015, McCauley et al., 2015, Weaver et al., 2014) and only one focused on the active duty population (Warner et al., 2007). Cheney et al. (2014) and Forman-Hoffman et al. (2012) utilized a subset of data that had been collected for a previous study on sexual violence and gynecological health (Sadler, Mengeling, Syrop, Torner, & Booth, 2011), so there was considerable overlap in the demographics reported in these studies. Only one study specified which branch participants served in (Army; Warner et al., 2007), though Kimbrel et al. (2015) stated that 86% of their participants were Army veterans. Additionally, two studies specifically focused on participants who were/had been enlisted (Warner et al., 2007; Cheney et al., 2014). Although Forman-Hoffman et al. (2012) mentioned that data had been collected on whether participants had served as officers or enlisted personnel, the statistics were not reported in their manuscript. The remaining studies (Arditte Hall et al., 2017a; Arditte Hall et al., 2017b; Kimbrel et al., 2015; McCauley et al., 2015; Weaver et al., 2014) did not specify whether participants served as officers or enlisted personnel. While McCauley et al.'s (2015) study was focused on veterans, the authors also included a non-veteran comparison group (n = 35,854).

Age. Participants in Warner et al.'s (2007) study were significantly younger than participants in the other studies (M = 20.9). Notably, all of these participants were in basic training, whereas the participants in the other studies were veterans (with the exception of the

non-veteran comparison group in McCauley et al.'s study). The age range in Cheney et al.'s (2014) and Forman-Hoffman et al.'s (2012) studies was constrained between 18 and 52 years. Participants in Arditte Hall et al.'s (2017b) study were the oldest, as the average participant age was more than a decade older than for participants in any other study (M = 64.11, SD = 11.20).

Gender. The articles tended to focus on women participants. Four studies focused exclusively on female veterans (Arditte Hall et al., 2017a, Cheney et al., 2014, Forman-Hoffman et al., 2012, McCauley et al., 2015). Kimbrel et al. (2015), Warner et al. (2007), and Weaver et al. (2014) had mixed gender samples, with women comprising 7%, 12.4%, and 16.5% of their participants, respectively.

Race/ethnicity. In all eight of the studies, white/Caucasian participants comprised a significant majority of the sample. Racial/ethnic minorities comprised as little as 13.4% (Arditte Hall et al., 2017a) to as high as 35.8% (Warner et al., 2007) of the samples.

Education. In three of the studies, (Cheney et al., 2014; Forman-Hoffman et al., 2012; McCauley et al., 2015), a large number of participants had completed at least some college (greater than 75.4%). McCauley et al. (2015) found that the veteran subsample was significantly more likely to have completed at least some college than the non-veteran sample. In Warner et al.'s (2007) study, 30.2% had completed some college or higher, and Weaver et al. (2014) only reported the mean number of years of education completed 13.16 (SD = 1.78). Three studies did not report statistics on participant education (Arditte Hall et al., 2017a; Arditte Hall, 2017b; Kimbrel et al., 2015).

Marital status. Five of the studies (Arditte Hall et al., 2017a; Arditte Hall et al., 2017b; Cheney et al., 2014; Kimbrel et al., 2015; Warner et al., 2007) did not report statistics for marital status, but Cheney et al. (2014) did state that it was not associated with outcome variables.

McCauley et al. (2015) designated participants as partnered (60.9%) or not partnered (39.1%). A substantial number of participants in both Forman-Hoffman et al.'s (2012) and Weaver et al.'s (2014) studies were married, 43.9% and 38.5%, respectively. Fewer participants in Weaver et al.'s (2014) study reported being divorced/separated/widowed (12.8%) than reported being divorced in Forman-Hoffman et al.'s (2012) study, 33.2%. Less than one fourth of participants in both studies identified as single.

Data Collection Methodology

The authors utilized a wide range of strategies to measure constructs. Three studies (Cheney et al., 2014; Forman-Hoffman, 2012; McCauley et al., 2015) had participants complete a computer-assisted telephone interview, two used paper surveys (Arditte Hall et al., 2017a; Warner et al., 2007), and one included an in-person interview (Weaver et al., 2014). It is unclear whether Arditte Hall et al. (2017b) and Kimbrel et al. (2015) used paper or electronic surveys, but Kimbrel et al. (2015) specified that participants in their study had also completed a clinical interview to determine PTSD diagnostic status. Themes were identified with regard to the measurement of ACEs and health variables.

Measurement of ACEs. In both Arditte Hall et al. (2017a) and Arditte Hall et al. (2017b), the authors used five items from the Trauma History Screen (Carlson et al., 2011), which included questions about childhood physical abuse and child sexual abuse, in addition to adult sexual assault, adult physical assault, and military-related trauma. For example, participants were asked to indicate whether they had been "hit or kicked hard enough to injure – as a child." Kimbrel et al. (2015) utilized the Childhood Trauma Questionnaire (Bernstein & Fink, 1998), which assessed the subscales of sexual abuse, emotional abuse, physical abuse, emotional neglect, and physical neglect during childhood.

In Cheney et al.'s (2014) and Forman-Hoffman et al.'s studies, participants were asked about sexual assault at varying time points throughout the lifespan, which was both defined for participants and distinguished from sexual harassment. Forman-Hoffman also assessed, and defined for participants, the construct of attempted sexual assault, in both childhood and adulthood. Warner et al. (2007) asked participants to check a box if they had experienced physical, sexual, and/or verbal abuse, though these types of abuse were not defined or described, leaving them open to interpretation by participants. Weaver et al. (2014) had participants identify the trauma that was most traumatic or distressing for them, which was referred to as the "index trauma." Index traumas were classified as combat, adult sexual assault, child sexual assault, and other trauma. The researchers provided an operational definition of appearance-related residual injury to respondents. The inclusion of construct definitions provides clarity to both the reader and participants. McCauley et al. (2015) utilized the ACEs module, informed by Felitti et al.'s (1998) conceptualization of ACEs, to assess the presence and frequency of ACEs, as applicable (e.g., "were your parents separated or divorced?" and "how often did a parent or adult in your home ever swear at you, insult you, or put you down?"). Although only one study (McCauley et al., 2015) employed Felitti et al.'s (1998) characterization, each study included some measure of childhood adversity for military personnel or veterans, which served as the basis for their inclusion in this review.

Measurement of health variables. All studies, with the exception of Kimbrel et al. (2015) and Weaver et al. (2014), used BMI to assess weight status. Warner and colleagues (2007) utilized the EAT-26 to assess eating attitudes and behaviors (Garner et al., 1983). Although the authors used the same cutoff score for all participants, they acknowledged a lack of consensus in the literature regarding the applicability of this cutoff score for men. Weaver et al.

(2014) included a measure of body-focused concerns, though only a subsample of participants received this measure and it is unclear why certain participants received it and others did not.

Arditte Hall et al. (2017a, 2017b) used the Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000), which assesses a number of eating disorder symptoms, including bingeing, purging, and fasting. In both studies, the authors excluded an item about amenorrhea in their analyses. Kimbrel et al. (2015) used the Psychiatric Diagnostic Screening Questionnaire (PDSQ; Zimmerman, 2002) to assess a wide range of mental health disorders, including PTSD, obsessive compulsive disorder (OCD), somatization, agoraphobia, depression, social phobia, generalized anxiety, hypochondriasis, alcohol use disorder, panic, psychosis, substance use disorder, and bulimia.

For two of the studies (Cheney et al., 2014, Forman-Hoffman et al., 2012), the researchers assessed health variables by asking participants if they had ever received a given diagnosis. Forman-Hoffman et al. (2012) attempted to differentiate diagnosed eating disorders from having experienced an eating disorder, (i.e., the women were asked "have you ever been diagnosed with an eating disorder?" and "have you ever suffered from an eating disorder?"), though this delineation was not entirely clear to this author, and may have been unclear to participants as well. McCauley and colleagues (2015) asked respondents about three domains of health outcomes, aside from diagnoses: mental health risk indicators (e.g., frequent mental distress, inadequate sleep, life satisfaction, and social or emotional support), health risk indicators (e.g., smoking, heavy alcohol use, and overweight or obese), and physical health indicators (e.g., asthma, diabetes, cardiovascular disease symptoms, and disability). Each health outcome was clearly delineated for participants in the survey questions, e.g., “during the past 30 days, for about how many days have you felt you did not get enough rest or sleep?” Disability

was defined as requiring assistive equipment (e.g., a cane, wheelchair, special telephone, etc.). How these authors defined and measured their variable informed the following results.

Study Findings

ACEs. All of the studies included in the systematic review examined childhood sexual abuse with their active duty/veteran participants. In Cheney and colleagues' (2014) study, 41.6% (n = 394) of respondents reported that they had experienced childhood sexual assault. Forman-Hoffman et al. (2012) had similar findings, but differentiated between completed rape (31.0%, n = 311) and attempted assault (10.0%, n = 100). McCauley et al. (2015) distinguished being touched sexually (24.4%, n = 120) from being made to touch another sexually (14.8%, n = 82), and being forced to have sex (10.0%, n = 49). Warner found that 24.4% of women and 3.2% of men reported childhood sexual abuse, whereas Arditte Hall et al. (2017a), Arditte Hall et al. (2017b), and Weaver et al. (2014) found prevalence rates of 26.9%, 5.9%, and 5.2%, respectively. Although Kimbrel et al. (2015) examined a number of ACEs, including sexual abuse, physical abuse, emotional abuse, physical neglect, and emotional neglect, the authors summed these subscales in their analysis, so prevalence rates are not available for any individual subscale.

In addition to Kimbrel et al. (2015), four studies examined other types of abuse/adversity during childhood (Arditte Hall et al., 2017a; Arditte Hall et al., 2017b; McCauley et al., 2015; Warner et al., 2007). All four studies examined physical abuse, two examined verbal/emotional abuse (Warner et al., 2007; McCauley et al., 2015), and one (McCauley et al., 2015) examined all ten ACEs as defined by Felitti et al. (1998). Prevalence rates for physical abuse vary from 18.3% (Arditte Hall et al., 2017a) and 15.6% (Arditte Hall et al., 2017b) to 27.7% (n = 149; McCauley et al., 2015). Warner et al. (2007) found that 12.6% of men and 33.3% of women

reported experiencing physical abuse during childhood. With regard to verbal/emotional abuse, Warner et al. (2007) found that 22.4% of men and 46.7% of women reported experiencing verbal abuse, while McCauley et al. (2015) found that 40.0% (n = 214) had experienced emotional abuse.

Beyond their findings on sexual, physical, and emotional abuse, in McCauley et al.'s (2015) study, 24.1% (n = 118) of veterans had endorsed growing up with household mental illness (compared with 19.8% of non-veterans), 20.9% (n = 136) had experienced parental separation or divorce, 12.7% (n = 49) had experienced household drug use, 31.5% (n = 184) had experienced household alcohol abuse, 4.8% (n = 26) had an incarcerated household member, 23.4% (n = 130) had been exposed to domestic violence. Notably, veterans were significantly more likely than non-veterans to report having experienced household alcohol abuse, exposure to domestic violence, physical abuse, emotional abuse during childhood, and all three types of sexual abuse measured in this study. Additionally, veterans were significantly more likely than non-veterans (34.3% vs. 26.8%) to have experienced both household dysfunction and abuse (rather than independently) and had higher mean ACE scores than non-veterans (2.32 vs. 1.72).

Social, emotional, and cognitive impairment. Only one study explored social, emotional and cognitive impairment in relation to ACEs. McCauley et al. (2015) examined "mental health risk indicators," which included frequent mental distress, inadequate sleep, low satisfaction with life, and poor social or emotional support. The authors found that although a higher percentage of veterans than non-veterans endorsed all categories, the outcomes were comparable (low social support: 19.1% vs. 17.2%, inadequate sleep: 30.1% vs. 29.2%, low satisfaction with life: 6.2% vs. 5.5%, and mental distress: 23.6% vs. 18.0%).

Health risk behaviors. In McCauley et al.'s (2015) study, veterans (24.9%) were significantly more likely than non-veterans (17.4%) to be current smokers. After controlling for age, race/ethnicity, education, income, and partner status, this relationship persisted, though veteran status was not significant after controlling for ACEs. Although a higher percentage of veterans than non-veterans endorsed heavy alcohol use and being overweight or obese, this difference was not significant (McCauley et al., 2015). In Warner et al.'s (2007) study, approximately 10% of respondents met the criteria for disordered eating. Women (29.6%) were more likely to report disordered eating than men (7.0%). Women who were overweight, men and women who had experienced any type of abuse (sexual, physical, verbal), and men and women who had a history of previous psychiatric treatment were more likely to report disordered eating. No relationship was found between disordered eating and race, education level, or obesity.

Arditte Hall et al. (2017a) found that 14.5% of the women in their study had endorsed disordered eating symptoms severe enough to indicate that they may have an eating disorder, compared with 4% of men (Arditte Hall et al., 2017b). Arditte Hall et al. (2017a) found that neither childhood sexual abuse nor childhood physical abuse were significantly associated with eating disorder symptoms. However, adult physical assault, adult sexual assault, and military-related trauma were all associated with more severe eating disorder symptoms. Many participants endorsed multiple trauma types, with 4.3% endorsing all five trauma types. When the researchers examined these trauma types simultaneously, only military-related trauma was significantly associated with eating disorder symptom severity. This relationship is consistent with Arditte Hall et al.'s (2017b) findings in their work with male veterans. The researchers further distilled this and found that "other military-related trauma," but not combat, was

associated with eating disorder symptom severity.

Disease, disability, and social problems. Two studies (McCauley et al., 2015; Weaver et al., 2014) examined disability, and only McCauley et al. (2015) explored physical health diagnoses (with the exception of obesity). Kimbrel et al. (2015) and Weaver et al. (2014) were the only studies that did not measure obesity; all other studies reported on BMI. As they used a similar sample, Cheney et al. (2014) and Forman-Hoffman et al. (2012) had similar findings for BMI; however, Forman-Hoffman identified 22 participants who were underweight, whereas Cheney identified only 10 participants who were underweight in their sample. In both studies, approximately two thirds of participants were classified as overweight or obese. Cheney et al. (2014) concluded that older women were more likely to meet the criteria for obesity than younger women and that sexual assault was strongly associated with BMI. Warner et al. (2007) found that less than 1% of men and women were underweight based on BMI, 37.6% of men and 23.0% of women were overweight (BMI 25.0-29.9), and 5% of men and 1.5% of women met the criteria for obesity (BMI > 30.0).

Four studies examined PTSD, depression, and alcohol/substance use disorders (Cheney et al., 2014; Forman-Hoffman et al., 2012; Kimbrel et al., 2015; Weaver at al., 2014). Additionally, Forman-Hoffman et al. (2012) explored eating disorders. Cheney et al. (2014) also explored anxiety, bipolar disorder, borderline personality disorder, panic disorder, and OCD, while Kimbrel et al. (2015) also explored OCD, somatization, agoraphobia, social phobia, generalized anxiety, hypochondriasis, panic, psychosis, and bulimia. Of the 14 disorders examined by Kimbrel et al. (2015), 10 were associated with childhood trauma, though bulimia was not one of them.

Weaver et al. (2014) found that one third of participants had appearance-related residual

injuries, such as scarring; some participants also endorsed appearance-related functional impairment, such as paralysis and having a limp. Participants with an appearance-related residual injury were more likely than those without to endorse body image distress. Body image distress was positively and significantly correlated with depression symptom severity ($r = 0.61$, $p < 0.01$), but not for those without. A trend relationship emerged between body image distress and PTSD symptom severity ($r = 0.40$, $p = 0.07$) and body image distress and avoidance/numbing symptoms ($r = 0.37$, $p = 0.09$). Body image distress predicted significant variance in depression symptom severity, compared with residual injury status, though this relationship was not present when examining PTSD.

McCauley et al. (2015) found that women veterans (14.0%) were more likely than non-veteran women (8.2%) to report a disability ($p = 0.003$), though this relationship was not significant after controlling for ACEs. McCauley et al. (2015) concluded that higher numbers of ACEs were associated with increased odds of diabetes, cardiovascular disease symptoms, asthma, disability, smoking, heavy alcohol use, and overweight/obesity. Forman-Hoffman et al. (2012) found that participants with higher levels of education, who had been divorced, had a lifetime depression diagnosis, or drug or alcohol abuse or dependence were more likely to report an eating disorder. Further, Forman-Hoffman et al. (2012) concluded that women veterans with a completed rape during childhood were three times as likely to be diagnosed with an eating disorder as those without a trauma history. Cheney et al. (2014), who used the same dataset, did not find an association between marital status and poorer health (e.g., high/low BMI). Cheney et al. (2014) concluded that BPD and depression mediated the relationship between lifetime sexual assault and BMI and that lifetime sexual assault, childhood sexual assault, sexual assault in the military, and post-military sexual assault were associated with higher BMI. Taken together,

these findings highlight the complex relationship between childhood adversity and future relational, mental, and physical health particularly in military and veteran populations.

Discussion

This systematic review is the first of its kind to review research studies examining ACEs in the context of eating disorders and obesity and apply this framework to military and veteran research. Of 379 unique studies considered for this review, only eight examined at least one ACE (Cronholm et al., 2015; Felitti et al., 1998) in relation to disordered eating in military or veteran populations. This review contributes valuable information regarding the chasm that exists in this literature and as such affords an opportunity to expand and enhance ACEs research in the context of disordered eating among military and veteran populations. Key areas of contribution include operationalization of ACEs concepts in relation to disordered eating and identification of gaps in ACEs research with military personnel and veterans.

Implications

This review highlights the extensive gaps in ACEs research on eating disorders and obesity among military Service members and veterans and punctuates numerous recommendations for future research. These gaps encompass diversity, measurement of disordered eating, and utilization of the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) in the conceptualization and execution of research. First, researchers should seek out more diverse samples; a majority of participants in this review were veterans, female, white, and had at least some college education. Due to societal misconceptions about *who* is at risk for disordered eating and eating disorders, men and racial/ethnic minorities are less likely than their female and white counterparts to be assessed for these health risk behaviors and health conditions (MacCaughelty, Wagner, & Rufino, 2016; Gordon, Perez, & Joiner, 2002). As the military is

comprised of a large percentage of men and racial/ethnic minorities, (Department of Defense, 2014), future studies with ACEs should include samples that are reflective of both our current military population and current disordered eating research.

An interesting finding was in relation to marital status. Although there was no association between marital status and poorer health in Cheney et al.'s (2014) analysis, Forman-Hoffman et al. (2012) found a significant positive relationship between eating disorders and divorce. This trend reflects findings in civilian populations in which women with eating disorders reported worse lower marital satisfaction and higher rates of negative interactions than people with other mental disorders (Whisman, Dementyeva, Baucom, & Bulik, 2012). In addition to employing more inclusive samples, researchers should measure and report on demographic variables beyond just age, gender, and race/ethnicity, such as marital/relationship status. As parental separation or divorce is identified as an ACE (Felitti et al., 1998), measuring marital/relationship status would also give researchers a better understanding of intergenerational relational patterns. Furthermore, given that LGBT civilians tend to experience greater health disparities in contrast to their heterosexual counterparts (Blosnich & Andersen, 2015), it is also important that the health of diverse sexual orientations and gender identities is considered in context of military/veteran populations.

Another recommendation for future research is with regard to measurement of disordered eating. Because as little as 10% of men and women with eating disorders receive treatment (Noordenbos et al., 2002), it is potentially problematic to assess for eating disorders by only asking participants to respond "yes" or "no" to whether they had previously been diagnosed with an eating disorder or "suffered from an eating disorder." Additionally, people tend to have difficulty recognizing their own eating behaviors as disordered (Mond, Hay, Rodgers, & Owen,

2014). These findings underscore the need for assessment tools that measure a broad range of disordered eating behaviors. The EDDS (Stice et al., 2000), which was employed by both Arditte Hall et al. (2017a) and Arditte Hall et al. (2017b), may provide greater specificity with regard to the typology and severity of symptoms. Although the studies included in this review tended to focus on women, assessment tools for disinhibited and binge eating tend to have poor to mediocre reliability in men (Forbush, Hilderbrand, Bohrer, & Chapa, 2017), which should be a consideration in future research on disordered eating with military populations.

With regard to measurement of ACEs, many studies focused on abuse. However, "abuse" can carry a wide range of meanings and interpretations, and this term was not consistently defined in the studies included in this review. It is imperative to operationalize ACEs constructs for participants (as a part of assessments or surveys), in order to ensure validity of findings. It is concerning that sexual abuse was often the only type of abuse measured in our review. Research among civilians indicates that emotional abuse may have a stronger association with eating disorders than other forms of abuse (Racine & Wildes, 2015). When only one type of abuse is measured, it is problematic to attribute observed effects to that *one* form of abuse, as ACEs tend to occur in clusters (e.g., when physical abuse is present, emotional abuse often is, too; Felitti et al., 1998).

While the inclusion of other ACEs will vastly increase the evidence base in this area, it is also important to explore outcome variables beyond mental health and risk behaviors. ACEs are known to impact neurodevelopment, emotional/social/cognitive functioning, and physical health, as well. Ignoring these other risk areas results in missed opportunities for prevention and intervention. Inclusion of the ACEs pyramid (Anda et al., 2006; Felitti et al., 1998) in research design can better capture the cascade of long-term effects of ACEs.

Although all of the studies included in this review explored childhood adversity and trauma, many of the participants also experienced trauma associated with their military service (i.e., combat trauma, military sexual assault). Future researchers should explore the cumulative effect of these traumas, as well as tease out the impact of pre-service traumas. While there is some value in aggregating trauma across the lifespan for certain types of analyses (e.g., small sample sizes), it is important to report on the unique impact of adversity during childhood as well. As there is a growing evidence base exploring the neurobiological impact of ACEs on adults (Monteleone et al., 2015), veterans and Service members who have experienced ACEs and service-related traumas may require different interventions and support services than their counterparts without ACEs.

Limitations

A primary limitation of this review is associated with the dearth of research on this topic. As only eight studies met the criteria, the generalizability of our findings is limited. Of the eight studies included, two used the same dataset. However, each study offered important findings into the current state of research in this area. Secondly, though several steps were taken to increase the rigor of this review, some relevant studies may have been missed due to human error or scope of search terms; a common risk when conducting a systematic review. To minimize the chance of error, two independent reviewers searched the databases using military and eating disorder variables, and then independently screened articles based on study criteria. Furthermore, this review only included research that was indexed, so findings that are unpublished were not included in this analysis.

Summary

The purpose of this study was to use Felitti et al.'s (1998) ACEs framework to explore the state of eating disorder and obesity research among military personnel and veterans through a systematic review. Additional research with this population is important due to the high prevalence of disordered eating, high prevalence of ACEs, and physical fitness/body composition requirements particularly in military and veteran populations. It is essential that researchers clearly define their constructs, include diverse samples, and collect data on multiple ACEs and an array of demographic variables in context of disordered eating and military and veteran populations. Using the operationalized levels of the ACE framework (Anda et al., 2006; Felitti et al., 1998) defined in this review can ensure that future studies capture variables to best measure the complex and far-reaching impact of ACEs.

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Note: * *represents articles included from the systematic review searches*

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Williamson, D. F., Thompson, T. J., Anda, R. F., Dietz, W. H., & Felitti, V. J. (2002). Body weight, obesity, and self-reported abuse in childhood. *International Journal of Obesity, 2*(26), 1075-1082. doi:10.1038/sj.ijo.0802038

Table 1

Search Terms and Outcomes of Searches

* Note: due to differences between databases, there are slight differences in the terms and number of searches in each database; database search terms are equivalent

PsycInfo via EBSCO	**Military Database via ProQuest**	**Medline via PubMed**	**CINAHL via EBSCO**
Military Personnel DE AND *Obesity* DE Total Articles Found: 14 After Title Screen: 14 After Abstract Screen: 13	"*Military Personnel*" SE AND "*Obesity*" SE Total Articles Found: 12 After Title Screen: 11 After Abstract Screen: 11	"*Military Personnel*" AND *Obesity* Total Articles Found: 34 After Title Screen: 32 After Abstract Screen: 32	*"Military Personnel"* AND *Obesity* Total Articles Found: 21 After Title Screen: 19 After Abstract Screen: 16
Military Personnel DE AND *Overweight* DE Total Articles Found: 6 After Titles Screened: 6 After Abstract Screen: 5	*Military* AND *Overweight* Total Articles Found: 36 After Title Screen: 31 After Abstract Screen: 31	"*Military Personnel*" AND *Overweight* Total Articles Found: 34 After Title Screen: 31 After Abstract Screen: 24	*"Military Personnel"* AND *Body Mass Index* Total Articles Found: 33 After Title Screen: 32 After Abstract Screen: 32
Military Personnel DE AND *Body Mass Index* DE Total Articles Found: 11 After Titles Screened: 11 After Abstract Screen: 8	"*Eating disorders*" SE AND *"Military personnel"* SE Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5	"*Military Personnel*" AND *Body Mass Index* Total Articles Found: 40 After Title Screen: 37 After Abstract Screen: 37	*"Military Personnel"* AND *Weight Gain* Total Articles Found: 8 After Title Screen: 7 After Abstract Screen: 7
Military Personnel DE AND *Weight Gain* DE Total Articles Found: 5 After Titles Screened: 5 After Abstract Screen: 5	*Obesity* AND *Military* Total Articles Found: 33 After Title Screen: 31 After Abstract Screen: 31	"*Military Personnel*" AND *Weight Gain* Total Articles Found: 10 After Title Screen: 10 After Abstract Screen: 10	*"Military Personnel"* AND *"Weight Loss"* Total Articles Found: 10 After Title Screen: 10 After Abstract Screen: 10

Military Personnel [DE] AND *Weight Loss* [DE]	"*Body Mass Index*" [SE] AND "*Military Personnel*" [SE]	"*Military Personnel*" AND "*Weight Loss*"	*"Military Personnel"* AND *"Body Weight"* OR *"Body Weight Change"*
Total Articles Found: 10 After Titles Screened: 10 After Abstract Screen: 8	Total Articles Found: 15 After Title Screen: 15 After Abstract Screen: 15	Total Articles Found: 20 After Title Screen: 19 After Abstract Screen: 19	Total Articles Found: 14 After Title Screen: 14 After Abstract Screen: 14
Military Personnel [DE] AND *"Body Weight"* [DE]	"*Body Mass Index*" AND *Military*	"*Military Personnel*" AND "*Body Weight*"	*Military Personnel* AND *Anorexia* OR *Anorexia Nervosa*
Total Articles Found: 12 After Titles Screened: 12 After Abstract Screen: 12	Total Articles Found: 35 After Title Screen: 32 After Abstract Screen: 32	Total Articles Found: 68 After Title Screen: 63 After Abstract Screen: 63	Total Articles Found: 1 After Title Screen: 1 After Abstract Screen: 1
Military Personnel [DE] AND *"Anorexia Nervosa"* [DE]	*Weight Gain* AND *Military*	*Military Personnel* AND "*Anorexia*" [M] OR "*Anorexia Nervosa*" [M]	*Military Personnel* AND *Bulimia Nervosa* OR *Bulimia*
Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5	Total Articles Found: 20 After Title Screen: 20 After Abstract Screen: 20	Total Articles Found: 4 After Title Screen: 4 After Abstract Screen: 4	Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5
Military Personnel [DE] *AND "Bulimia"* [DE]	*Weight Loss* AND *Military*	*"Military Personnel"* [M] AND *"Bulimia Nervosa"* [M]	*Military Personnel* AND *Binge Eating Disorder*
Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5	Total Articles Found: 35 After Title Screen: 32 After Abstract Screen: 32	Total Articles Found: 3 After Title Screen: 3 After Abstract Screen: 3	Total Articles Found: 0 After Title Screen: 0 After Abstract Screen: 0
Military Personnel [DE] *AND "Binge Eating Disorder"* [DE]	*Body Weight* AND *Military*	*"Military Personnel"* [M] AND *"Binge-Eating Disorder"* [M]	*Military Personnel* AND *Eating Disorder*
Total Articles Found: 1 After Title Screen: 1	Total Articles Found: 28 After Title Screen: 25	Total Articles Found: 1 After Title Screen: 1	Total Articles Found: 10 After Title Screen: 9

After Abstract Screen: 1	After Abstract Screen: 25	After Abstract Screen: 1	After Abstract Screen: 9
Military Personnel [DE] *AND "Eating Disorders"* [DE] Total Articles Found: 9 After Title Screen: 9 After Abstract Screen: 9	*Anorexia* AND *"Military"* Total Articles Found: 10 After Title Screen: 10 After Abstract Screen: 10	*Military Personnel* AND *Eating* Total Articles Found: 3 After Title Screen: 3 After Abstract Screen: 3	*Military Personnel* AND *Body Image* Total Articles Found: 6 After Title Screen: 5 After Abstract Screen: 5
Military Personnel [DE] *AND "Body Image"* [DE] Total Articles Found: 6 After Title Screen: 6 After Abstract Screen: 6	*Bulimia* AND *Military* Total Articles Found: 10 After Title Screen: 9 After Abstract Screen: 9	"*Feeding and Eating Disorders*" [M] AND "*Military Personnel*" [M] Total Articles Found: 10 After Title Screen: 10 After Abstract Screen: 10	*Military Personnel* AND *Body Weight* Total Articles Found: 9 After Title Screen: 9 After Abstract Screen: 9
Military AND *Obesity* Total Articles Found: 67 After Titles Screened: 63 After Abstract Screen: 59	*Bingeing* AND *Military* Total Articles Found: 2 After Title Screen: 2 After Abstract Screen: 2	"*Military Personnel*" AND *Body Image* Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5	*Veteran* AND *Obesity* Total Articles Found: 36 After Title Screen: 34 After Abstract Screen: 34
Military AND *Overweight* Total Articles Found: 41 After Titles Screened: 39 After Abstract Screen: 36	*Eating Disorder* AND *Military* Total Articles Found: 6 After Title Screen: 6 After Abstract Screen: 6	"*Veteran*" AND "*Body Image*" Total Articles Found: 1 After Title Screen: 1 After Abstract Screen: 1	*Veteran* AND *Body Mass Index* Total Articles Found: 27 After Title Screen: 24 After Abstract Screen: 24
Military AND *Body Mass Index* Total Articles Found: 26 After Titles Screened: 24 After Abstract	*Obesity* AND *Veteran* Total Articles Found: 15 After Title Screen: 13 After Abstract Screen: 13	"*Veteran*" AND "*Over Weight*" Total Articles Found: 51 After Title Screen: 48 After Abstract Screen: 48	*Veteran* AND *Weight Gain* Total Articles Found: 4 After Title Screen: 4 After Abstract Screen: 4

Screen: 21			
Military AND *Weight Gain* Total Articles Found: 11 After Titles Screened: 10 After Abstract Screen: 10	*Overweight* AND *Veteran* Total Articles Found: 17 After Title Screen: 16 After Abstract Screen:16	*Veteran* AND *Obesity* Total Articles Found: 45 After Title Screen: 42 After Abstract Screen: 42	*Veteran* AND *Weight Loss* Total Articles Found: 20 After Title Screen: 18 After Abstract Screen: 18
Military AND *Weight Loss* Total Articles Found: 34 After Titles Screened: 32 After Abstract Screen: 31	"*Body Mass Index*" AND *Veteran* Total Articles Found: 16 After Title Screen: 15 After Abstract Screen: 15	*Veteran* AND *Body Mass Index* Total Articles Found: 42 After Title Screen: 37 After Abstract Screen: 37	*Veteran* AND *"Body Weight"* OR *"Body Weight Change"* Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5
Military AND *Body Weight* Total Articles Found: 46 After Titles Screened: 45 After Abstract Screen: 40	*Weight Gain* AND *Veteran* Total Articles Found: 9 After Title Screen: 9 After Abstract Screen: 9	*Veteran* AND *Weight Gain* Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5	*Veteran* AND *Anorexia* OR *Anorexia Nervosa* Total Articles Found: 2 After Title Screen: 2 After Abstract Screen: 2
Military AND *Anorexia* Total Articles Found: 11 After Titles Screened: 11 After Abstract Screen: 10	*Weight Loss* AND *Veteran* Total Articles Found: 12 After Title Screen: 10 After Abstract Screen: 10	*Veteran* AND *Weight Loss* Total Articles Found: 25 After Title Screen: 22 After Abstract Screen: 22	*Veteran* AND *Bulimia Nervosa* OR *Bulimia* Total Articles Found: 3 After Title Screen: 3 After Abstract Screen: 3
Military AND *Bulimia* Total Articles Found: 8 After Titles Screened:	*Body Weight* AND *Veteran* Total Articles Found: 14 After Title Screen: 13	*Veteran* AND *Body Weight* Total Articles Found: 72 After Title Screen: 65	*Veteran* AND *Binge Eating Disorder* Total Articles Found: 1 After Title Screen: 1

8 After Abstract Screen: 8	After Abstract Screen: 13	After Abstract Screen: 65	After Abstract Screen: 1
Military AND *Binge Eating Disorder* Total Articles Found: 9 After Titles Screened: 8 After Abstract Screen: 8	*Anorexia* AND *Veteran* Total Articles Found: 4 After Title Screen: 4 After Abstract Screen: 4	*Veteran* AND *"Anorexia"*[M] OR *"Anorexia Nervosa"*[M] Total Articles Found: 0 After Title Screen: 0 After Abstract Screen: 0	*Veteran* AND *Eating Disorder* Total Articles Found: 7 After Title Screen: 6 After Abstract Screen: 6
Military AND *Eating Disorder* Total Articles Found: 21 After Titles Screened: 20 After Abstract Screen: 19	*Bulimia* AND *Veteran* Total Articles Found: 5 After Title Screen: 5 After Abstract Screen: 5	*Veteran* AND *"Bulimia Nervosa"*[M] OR *Bulimia* Total Articles Found: 3 After Title Screen: 3 After Abstract Screen: 3	*Veteran* AND *Body Image* Total Articles Found: 2 After Title Screen: 1 After Abstract Screen: 1
Military AND *Body Image* Total Articles Found: 7 After Titles Screened: 7 After Abstract Screen: 7	*Bingeing* AND *Veteran* Total Articles Found: 1 After Title Screen: 1 After Abstract Screen: 1	*Veteran* AND *Binge Eating Disorder* Total Articles Found: 3 After Title Screen: 2 After Abstract Screen: 2	*Veteran* AND *Body Weight* Total Articles Found: 6 After Title Screen: 6 After Abstract Screen: 6
Veteran AND *Obesity* Total Articles Found: 49 After Titles Screened: 47 After Abstract Screen: 45	*Eating Disorder* AND *Veteran* Total Articles Found: 8 After Title Screen: 8 After Abstract Screen: 8	*Veteran* AND *Eating* Total Articles Found: 0 After Title Screen: 0 After Abstract Screen: 0	
Veteran AND *Overweight* Total Articles Found: 34 After Titles Screened:	*Eating Disorder* AND *Military* Total Articles Found: 15 After Title Screen: 13	*Veteran* AND "Feeding" AND "*Eating Disorders*" [M] Total Articles Found: 8 After Title Screen: 7	

32 After Abstract Screen: 29	After Abstract Screen: 13	After Abstract Screen: 7
Veteran AND *Body Mass Index* Total Articles Found: 21 After Titles Screened: 16 After Abstract Screen: 13	*Body Image* AND *Military* Total Articles Found: 7 After Title Screen: 7 After Abstract Screen: 7	
Veteran AND *Weight Gain* Total Articles Found: 12 After Titles Screened: 10 After Abstract Screen: 9	*Body Image* AND *Veteran* Total Articles Found: 3 After Title Screen: 3 After Abstract Screen: 3	
Veteran AND *Weight Loss* Total Articles Found: 30 After Titles Screened: 28 After Abstract Screen: 25	*Fat Mass* AND *Veteran* Total Articles Found: 4 After Title Screen: 4 After Abstract Screen: 4	
Veteran AND *Body Weight* Total Articles Found: 32 After Titles Screened: 29 After Abstract Screen: 25	*Fat Mass* AND *Military* Total Articles Found: 12 After Title Screen: 12 After Abstract Screen: 12	
Veteran AND *Anorexia* Total Articles Found: 2 After Titles Screened: 2		

	After Abstract Screen: 2
Veteran AND *Bulimia*	Total Articles Found: 4 After Titles Screened: 4 After Abstract Screen: 4
Veteran AND *Binge Eating Disorder*	Total Articles Found: 8 After Titles Screened: 7 After Abstract Screen: 7
Veteran AND *Eating Disorder*	Total Articles Found: 25 After Titles Screened: 24 After Abstract Screen: 23
Veteran AND *Body Image*	Total Articles Found: 3 After Titles Screened: 3 After Abstract Screen: 3

[DE] Performs an exact search for the subject heading or the first part of a subject heading.
[SE] "Subject Exact" search.
[M] Provides the Medical Subject Headings as assigned by PubMed.

Table 2

Inclusion and Exclusion Criteria for Selection of Articles

Inclusion Criteria	**Exclusion Criteria**
Research question/outcome variables were related to eating disorders, overweight, and/or obesity	Study did not pertain to eating disorders, overweight, and/or obesity; study was focused on participants with significant medical comorbidities (e.g., cancer, schizophrenia)
Population of interest was military personnel and/or veterans	Study was focused on civilians or military dependents
Human participants	Study was focused on animals or biochemistry
Individual was unit of analysis	Study was focused on program evaluation or cost utilization
Study was from an English language journal or database	Study was from a non-English language journal or database
Measures psychosocial variables	Study only included measures of biomarkers (e.g., BMI)
Was considered quantitative or qualitative research.	Study was as a literature review, systematic review, theoretical paper, policy brief, or editorial/opinion piece
Study included at least one measure of ACEs, as defined by Felitti et al. (1998) and Cronholm et al. (2015)	Study did not measure ACEs

Figure 1

Literature Synthesis Methodology

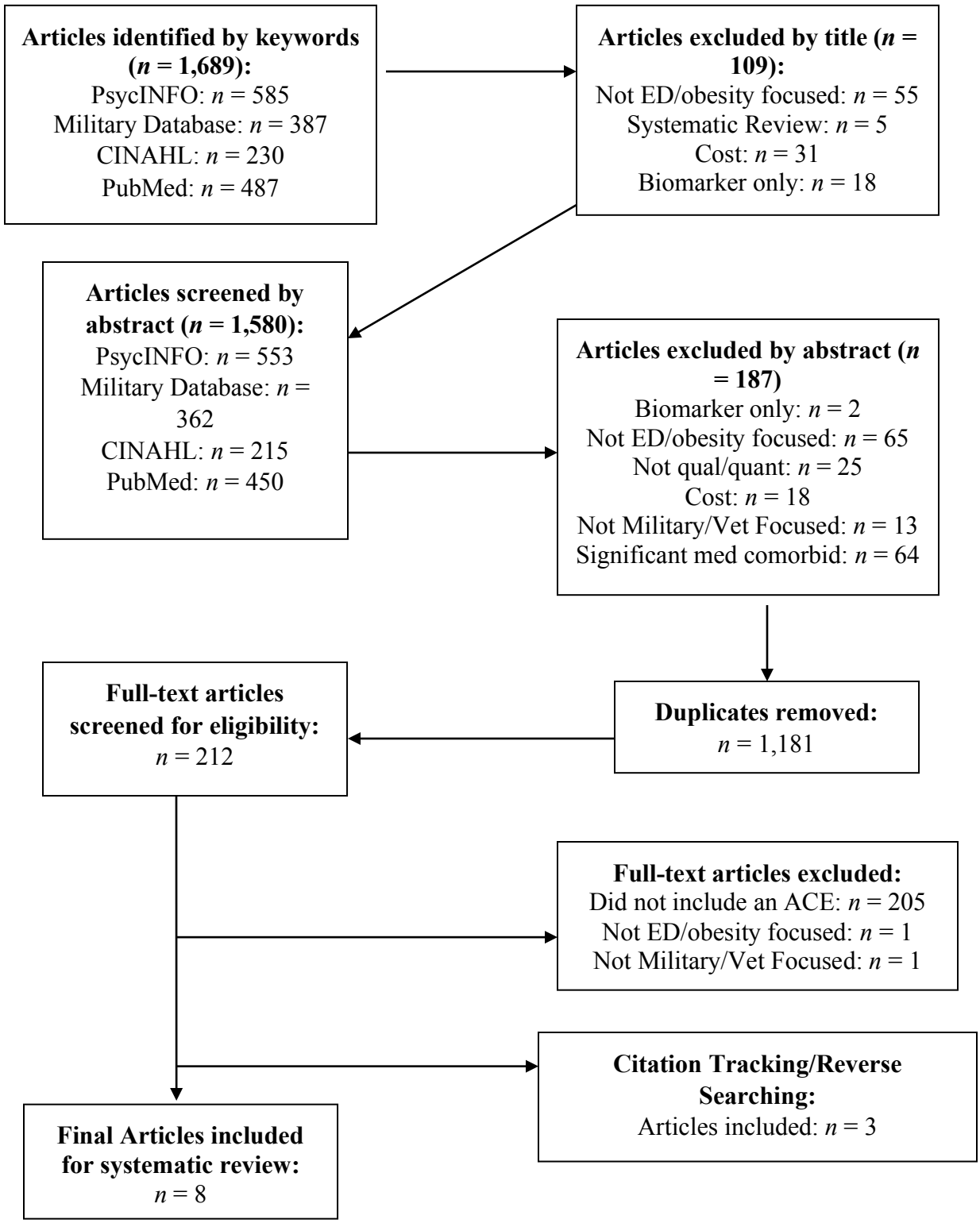

Table 3

Findings

Name, year	Sample	Findings	Psychosocial Assessments	ACEs
Arditte Hall, 2017a	Female veterans (*n* = 186, *M* age = 53.51, *SD* 14.29); 13.4% racial/ethnic minority; average BMI = 28.77 (*SD* = 6.93)	Women with a history of childhood physical or sexual abuse were not more likely to report disordered eating; military-related trauma was the only trauma type significantly associated with ED symptom severity	THS; EDDS	Childhood sexual abuse Childhood physical abuse
Arditte Hall, 2017b	Trauma-exposed male veterans (*n* = 642, *M* age = 64.11, *SD* = 11.20); 14.5% racial/ethnic minority; average BMI = 29.35 (*SD* = 5.57)	Men with a history of childhood physical or sexual abuse were not more likely to report disordered eating; military-related trauma, other than combat, was significantly associated with ED symptom severity	THS; NSES; EDDS	Childhood sexual abuse Childhood physical abuse
Cheney, 2014	Female enlisted veterans (*n* = 948, *M* age = 38.2, *SD* = 8.9); 20.4% racial/ethnic minority; 84.1% some college or higher	BPD and DEP mediated the relationship between LSA and BMI; Greater age was associated with higher BMI; LSA, CSA, SAIM, and post-military sexual assault were associated with higher BMI; there was not a significant relationship between current depression or PTSD and BMI	CATI; PSS-I; Survey of trauma and mental health history; CIDI-SF; SAOM	Childhood sexual assault
Forman-Hoffman, 2012	Female veterans (*n* = 1,004); 33.3% were 20-34 years old, 34.5% were 35-44 years old,	Women with a completed rape during childhood were more likely to have been diagnosed with an EDO than women with no	CATI (demographics, a series of "yes" or "no" questions –	Completed rape Attempted sexual assault

	32.3% were 45-52 years old; 20.1% racial/ethnic minority; 43.9% married; 84.8% some college or higher	childhood sexual trauma; women with lifetime completed rape or attempted sexual assault were more likely to have an EDO; Women with higher levels of education and who had been divorced were more likely to have an EDO	e.g., "have you ever suffered from an eating disorder?")	
Kimbrel, 2015	Iraq/Afghanistan veterans (*n* = 155, *M* age 40, *SD* = 10); 7% female; 34% racial/ethnic minority	Veterans who met the criteria for PTSD were significantly more likely than veterans who did not meet the criteria for PTSD to have positive screens for DEP, bulimia/binge eating, OCD, panic disorder, agoraphobia, psychosis, social phobia, somatization, and hypochondriasis; childhood trauma was predictive of psychiatric symptoms among veterans who did not meet the criteria for PTSD, but not for veterans who met the criteria for PTSD; critical warzone experiences were predictive of bulimia/binge eating, but childhood trauma was not	PDSQ, CWE, CTQ	Sexual abuse Physical abuse Emotional abuse Physical neglect Emotional neglect
McCauley, 2015	Female veterans (*n* = 631, *M* age = 50.5, *SD* = 1.14) and non-veteran (*n* = 35,854 *M* age = 49.4, *SD* = 0.18) comparison group; Veteran group: 15.1% racial/ethnic minority; 60.9% partnered;	Veterans were significantly more likely than non-veterans to have experienced household alcohol abuse, exposure to domestic violence, physical abuse, and sexual abuse (touched sexually, made to touch another sexually, forced to have sex); veterans had a higher mean ACE score than non-	BRFSS ACE Module (demographics, ACEs, health)	Household mental illness Parental separation or divorce Household drug use Household alcohol abuse Incarcerated household member Exposure to domestic violence

	75.4% some college or higher	veterans; veterans were more likely to be current smokers and have a disability; the number of ACEs was associated with increased odds of all health outcomes		Physical abuse Emotional abuse Touched sexually Made to touch another sexually Forced to have sex
Warner, 2007	Entry-level enlisted U.S. Army soldiers (*N* = 1,090, *M* age = 20.9, *SD* = 3.53); 12.4% female; 35.8% racial/ethnic minority; 5% college degree	Participants who were female, overweight, had a history of verbal abuse, or a history of psychiatric treatment had an increased risk of disordered eating; women were more likely than men to report any type of abuse	Demographic/history survey EAT-26	Verbal abuse Physical abuse Sexual abuse
Weaver, 2014	Treatment-seeking veterans (*N* = 91, *M* age = 44.86, *SD* = 13.27); 16.5% female; 30.8% racial/ethnic minority; 38.5% married	Body image distress was significantly correlated with DEP symptom severity for those with an appearance-related residual injury; body image distress was not a unique predictor of PTSD; body image distress had a trend relationship with PTSD for veterans with an appearance-related residual injury	CAPS PCL-S BDI-II DCQ Health Assessment questionnaire developed for study	Childhood sexual assault

Key: ACE = Adverse Childhood Experience, BDI-II = Beck Depression Inventory, BMI = Body Mass Index, BPD = Borderline Personality Disorder, BRFSS = Behavioral Risk Factor Surveillance System, CATI = Computer-Assisted Telephone Interview, CIDI-SF = Composite International Diagnostic Interview-Short Form, CAPS = Clinician Administered PTSD Scale for DSM-IV, CSA = Childhood Sexual Assault, Childhood Trauma Questionnaire = CTQ, CWE = Critical Warzone Experiences scale, Dysmorphic Concerns Questionnaire = DCQ, DEP = Depression, EAT-26 = Eating Attitudes Test, EDDS = Eating Disorder Diagnostic Scale, EDO = Eating Disorder, GAD = Generalized Anxiety Disorder, LSA = Lifetime Sexual Assault, NSES = National Stressful Events Survey, OCD = Obsessive Compulsive Disorder, PCL-S = PTSD Checklist – Stressor-Specific Version, PDSQ = Psychiatric Diagnostic Screening Questionnaire, PSS-I = Posttraumatic Symptom Scale, PTSD = Posttraumatic Stress Disorder, SAIM = Sexual Assault in Military, SAOM = Substance Abuse Outcomes Module, THS = Trauma History Screen

CHAPTER 4: METHODOLOGY

Eating disorders and disordered eating behavior among the military population have been studied in men and women across branches and at different stages of their military career, ranging from recruits at basic training to veteran status (e.g., Garber, Boyer, Pollack, Chang, & Shafer, 2008; Forman-Hoffman, Mengeling, Booth, Torner, & Sadler, 2012). There is a lack of consensus regarding the prevalence of eating disorders in the military, however a recent systematic review concluded that rates of eating disorders among military Service members and veterans are comparable to the civilian population, and may be increasing (Bartlett & Mitchell, 2015). Existing research has attributed the prevalence of disordered eating behaviors to a number of factors, including preparation for physical fitness tests (McNulty, 1997; Carlton, Manos, & Van Slyke, 2005), pressure to meet weight requirements (Peterson, Talcott, Kelleher, & Smith, 1995), combat exposure (Jacobson et al., 2009), and military sexual trauma (Blais et al., 2017). Yet, numerous authors have highlighted that many personnel enter the military with preexisting disordered eating thoughts and behaviors (Garber et al., 2008; Lauder & Campbell, 2001; Warner et al., 2007). Although few personnel may meet the criteria for an eating disorder diagnosis (Beekley et al., 2009), those who engage in disordered eating behaviors are at risk for developing a clinically significant eating disorder. This trend indicates that factors occurring prior to enlistment, such as child abuse (Warner et al., 2007), may influence disordered eating.

The relationship between childhood adversity (e.g., emotional abuse, physical abuse, and sexual abuse) and disordered eating has been well documented in the civilian literature (e.g., Dunkley, Masheb, & Grilo, 2010; Fuemmeler, Dedert, McClernon, & Beckham, 2009; Racine & Wildes, 2015). Despite evidence that people who have served in the military have adverse childhood experiences (ACEs) at higher rates than their civilian counterparts (Blosnich, Dichter,

Cerulli, Batten, & Bossarte, 2014; Katon et al., 2015), few authors have explored the role of childhood adversity in disordered eating for this population (Cobb, Lamson, Schoemann, Didericksen, & Steffey, 2018). Thus, the purpose of this study was to explore the connection between ACEs (operationalized below) and disordered eating among active duty military personnel. The study design was informed by the ACE pyramid and the theory of toxic stress (Anda et al., 2006; Felitti et al., 1998; National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016), which depict the lifespan impact of ACEs on individuals. The ACE pyramid encompasses ACEs, disrupted neurodevelopment, social/cognitive/emotional impairment, adoption of health-risk behaviors, disease/disability/social problems, and early death. Due to the selected methodology for this study, disrupted neurodevelopment and early death were not captured. This project aims to connect the findings of the systematic review in chapter three (Cobb et al., 2018) with an exploration of the impact of ACEs on disordered eating among military personnel, as well as the protective factors that can prevent or mitigate the impact of ACEs. This paper highlights the hypotheses, study design, measures, and procedures for the study.

Hypotheses

This exploratory study examined the interplay between ACEs, disordered eating, health behaviors, health outcomes, and social support/protective factors for active duty military Service members. It was hypothesized that:

1) Disordered eating symptoms will be positively correlated with health risk behaviors, such as smoking, drinking, and condom use.
2) There will be a positive relationship between the number of ACEs and the number of negative health outcomes endorsed by participants

3) There will be a positive relationship between the number of ACEs and severity of disordered eating symptoms endorsed by participants.
    a. This positive relationship will be present even when controlling for Adverse Adult Experiences.
4) Protective factors will moderate the relationship between ACEs, disordered eating, and other health behaviors/outcomes.

Study Design

The purpose of this study was to examine the relationship between ACEs and disordered eating. The measures selected for this study (Appendix C) were grounded in the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016) and the ACE pyramid (ACEs, social/emotional/cognitive impairment, risk behaviors, and disease/disability/social problems; Anda et al., 2006; Felitti et al., 1998) and the systematic review provided in chapter three. The survey was comprised of questions with a variety of dichotomous, Likert, and open-ended response options. Study data was collected and managed using REDCap electronic data capture tools hosted at East Carolina University (Harris et al., 2009). REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing a) an intuitive interface for validated data entry; b) audit trails for tracking data manipulation and export procedures; c) automated export procedures for seamless data downloads to common statistical packages; and d) procedures for importing data from external sources. Due to the sensitive nature of the data and the desire to recruit military populations across the globe, this HIPAA (2010) compliant modality is optimal.

Participants

The inclusion criteria for this study included: a) currently serves in the military, c) is over 18 years old, and c) has access to the Internet. These criteria were chosen because the population of interest is military Service members and the survey was distributed online. The researcher recruited 135 active duty participants.

Recruitment

After IRB approval (Appendix A), participants were recruited via social media sites (e.g., Facebook), professional resources (e.g., the newsletter for the Alliance of Military and Veteran Family Behavioral Health Providers), and existing relationships with stakeholders at military bases across the country. For each medium, the principal investigator provided a brief description of the purpose of the study, inclusion criteria, disclosure of IRB approval, and a link to the REDCap (Harris et al., 2009) survey (see Appendix E for recruitment material).

Measures

The measures selected for this study (Appendix C) were intended to capture elements of the ACE pyramid (Anda et al., 2006; Felitti et al., 1998), including ACEs, social/emotional/cognitive impairment, risk behaviors, and disease/disability/social problems. Participants, who were both active duty men and women, completed self-report measures of demographics, adversity in childhood and adulthood, social support, disordered eating behaviors, and general health.

Demographic Questionnaire

The demographic questionnaire ($k = 21$) was developed for this study, but was modeled after questionnaires commonly used with this population (e.g., National Institute for Occupational Safety and Health, 2017). The questionnaire included general questions ($k = 6$),

such as about participant age, sex, ethnicity, religious affiliation, sexual orientation, and education, as well as military-specific questions (k = 10), such as branch, highest rank/grade achieved, length of service, job category, era of service, and deployment history. Notably, the response options for rank/grade are presented in ranges (e.g., O1 – O3) to ensure participant confidentiality. Lastly, this questionnaire included a subsection about relationships (k = 5), including relationship status, cohabitation, children, pets/companion animals, and familial military service.

Adverse Childhood Experiences

The Childhood Experiences Survey (CES; Mersky et al., 2017) was used to measure ACEs. The CES measures Felitti et al.'s (1998) ten conventional ACEs, which examined abuse and neglect (physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect) and household dysfunction (alcohol/drug problem, mental illness, domestic violence, incarceration, and divorce/separation), as well as seven "potential" ACEs (i.e., family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, and violent crime victimization; Mersky et al., 2017). The "potential" ACEs were selected to increase the cross-cultural and ecological validity of ACEs measures. A total ACE score is determined by summing the number of affirmative responses. In a study of 1,241 low-income women, Mersky and colleagues (2017) found that the CES had excellent internal consistency (ICC = .91), and item-level reliability ranged from .41 to .82, indicating acceptability for each item. Although the CES is a newer measure and has yet to be tested with military populations, conventional ACEs measures have been widely used with military populations (e.g., McCauley et al., 2015). We were granted permission from the author to use this measure (J. Mersky, personal communication, July 14, 2017; Appendix D).

Adverse Adult Experiences

Adverse experiences during adulthood were measured with the Adult Experiences Survey (J. Mersky, personal communication, October 31, 2017; Appendix D). This 19-item survey explores the ACEs identified in the CES from the standpoint of experiences after age 18, with the addition of items on pregnancy loss and discrimination. Though the publication of the psychometrics of this survey is forthcoming, it has high face validity and per communication with the author, has an alpha of .81 on a 10-item scale (physical abuse, emotional abuse, alcohol misuse or drug use, mental health problem, incarceration or jail, forced sexual activity, crime victimization, homelessness, chronic financial problems, and discrimination; J. Mersky, personal communication, October 31, 2017).

Disordered Eating

The 23-item Eating Disorder Diagnostic Scale – DSM-5 Version (EDDS-DSM-5; Stice, 2014) was used to measure disordered eating symptoms. This measure has been adapted from the original version (EDDS; Stice, Telch, & Rizvi, 2000), which has good internal consistency and test-retest reliability (α = .89, r = .87; Stice, Fisher, & Martinez, 2004), to reflect DSM-5 (American Psychiatric Association, 2013) criteria and has yet to be validated. Key differences between the DSM-5 version and the DSM-IV (American Psychiatric Association, 2000) version are the inclusion of questions about night eating and the impact of disordered eating/body image concerns on relationships and school/work performance, as well as the removal of questions about amenorrhea and birth control pills (Stice, 2014). The EDDS-DSM-5 has symptom composite scores for anorexia nervosa, bulimia nervosa, binge eating disorder, atypical anorexia nervosa, low frequency bulimia nervosa, low frequency binge eating disorder, purging disorder, and night eating syndrome. The EDDS-DSM-5 includes Likert scale and dichotomous items, as

well as items about the frequency of disordered eating behaviors. The EDDS has been used with both male and female veterans (Mitchell & Wolf, 2016; Arditte Hall, Bartlett, Iverson, & Mitchell, 2017a; Arditte Hall, Bartlett, Iverson, & Mitchell, 2017b), with Chronbach's alphas of .86, .92, and .89, respectively. Eric Stice, the author of both versions of the EDDS, granted permission to use this survey (E. Stice, personal communication; Appendix D).

Health Outcomes

Health outcomes were assessed via a questionnaire created for this study. Participants will be asked about mental health conditions (anxiety, depression, eating disorders, headaches, posttraumatic stress disorder, sleep disorder, substance use disorder, and traumatic brain injury), physical health conditions (arthritis, asthma, autoimmune disorders, cardiovascular disease, cancer, chronic obstructive pulmonary disease, diabetes, liver disease, musculoskeletal injury, osteoporosis, problems with menstrual cycle, and stress fractures), disability, treatment, and tobacco use For the items regarding mental and physical health conditions, participants will be presented with a list of diagnoses and will identify which diagnoses, if any, they have received. Participants will also be asked if they have sought treatment for any of the diagnoses in the past 12 months (i.e., counseling, medication, self-help, support group, or other). Lastly, participants were asked a series of "yes" or "no" and Likert-style questions about the presence of a disability and smoking/tobacco, drinking, and sexual behaviors.

Protective and Compensatory Experiences

Just as ACEs can lead to negative health outcomes in adulthood (Felitti et al., 1998), supportive experiences during childhood, such as having friends and hobbies, can mitigate the effects of adversity and lead to better outcomes (Morris et al., 2016). Termed protective and compensatory experiences (PACEs), these experiences are associated with fewer ACEs, better

parenting attitudes, and fewer depressive symptoms (Morris et al., 2016). The PACEs survey (Morris et al., 2014) includes 10 items about experiences during childhood, such as the presence of a trustworthy adult, clear and fair administration of rules, and participation in activities such as sports. In local (n = 109) and nationwide (n = 900) samples of parents diverse in ethnicity, relationship status, education level, and age (Morris et al., 2016), the PACEs survey had a reliability of .76. Additional publications on the validity of this measure are forthcoming (A. Morris, personal communication, November 6, 2017) and it has not yet been used with military populations. The authors' permission to use this survey is reflected in Appendix D.

Procedures

After obtaining IRB approval (Appendix A), the principal investigator disseminated the survey link and study description to various social media sites, professional resources, and stakeholders at military bases across the country using the script presented in Appendix E. The survey was created using REDCap (Harris et al., 2009). No incentive was offered to participants, as active duty Service members cannot be incentivized for research purposes. Throughout the data collection window, which was February through March 2018, reminders were sent out via each recruitment modality to increase the likelihood for participation. The surveys did not elicit any identifying information. Data from the completed surveys were downloaded from REDCap and stored in a protected drive for analysis.

Analyses

The researcher used structural equation modeling (SEM) to analyze the data collected from this project. As this research design is grounded in the theory of toxic stress and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998; National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016), SEM is ideal to determine how well the

constructs reflect the actual data (Kline, 2011). SEM models were estimated in R using the lavaan package (Rosseel, 2012). Missing data was accounted for using full information maximum likelihood. For model convergence, the minimum sample size required for a single group is 100 (MacCallum, Brown, & Kai, 2006). However, an a priori power analysis conducted using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007) to determine minimum sample size indicated that at least 138 participants are required to have adequate power (d = .15, α = .05).

Ethical Considerations

The researchers were mindful of the sensitive nature of ACEs and took several steps to ensure participant safety and comfort. Previous researchers have found that when it comes to ACEs in health surveillance, military personnel are concerned about confidentiality and potential career impact (Robinson et al., 2008). Additionally, some participants expressed concern about the availability of ACE-specific interventions. To address these concerns, researchers will commited to the following steps: (a) construct and disseminate informed consent materials (Appendix B) that will clearly identify that the survey is HIPAA-compliant (2010), ensure that no identifiable information will be shared in any publications, and all results will be shared through aggregate, non-identifiable statistics, (b) identify themselves as researchers from East Carolina University and state that they have no affiliation with the Department of Defense or the Department of Veterans Affairs, and (c) provide participants with resources in their area that can address behavioral health concerns that may arise.

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CHAPTER 5: CHILDHOOD EXPERIENCES AND HEALTH BEHAVIORS IN THE MILITARY

In an overview of practice, policy, and research on military and veteran health, Haibach and colleagues (2017) noted that although military personnel tend to enter military service in better health than the civilian population, veterans tend to have health outcomes equivalent to or worse than their civilian counterparts. The authors speculated that health behaviors during or after military service, such as physical activity and nutrition, as well as alcohol and tobacco use, might explain this difference. Echoing concerns conveyed in a 2004 report by the Institute of Medicine, Haibach et al. (2017) identified the prevalence of disordered eating among the active duty population as a potential contributing factor to veteran health disparities. Researchers have frequently attributed the prevalence of disordered eating behaviors with attempts to meet military standards, such as passing physical fitness tests (Carlton, Manos, & Van Slyke, 2005; McNulty, 1997) and weight requirements (Peterson, Talcott, Kelleher, & Smith, 1995), as well as a response to stressors, such as combat exposure (Jacobson et al., 2009) and military sexual trauma (Blais et al., 2017). While most researchers have focused on disordered eating among active duty populations, many personnel enter the military with preexisting disordered eating thoughts and behaviors (Garber et al., 2008; Lauder & Campbell, 2001; Warner et al., 2007), which raises questions about influential factors prior to military service.

The relationship between childhood adversity (e.g., emotional abuse, physical abuse, and sexual abuse) and disordered eating has been well documented in the civilian literature (e.g., Dunkley, Masheb, & Grilo, 2010; Fuemmeler, Dedert, McClernon, & Beckham, 2009; Racine & Wildes, 2015). Despite evidence that people who have served in the military have adverse childhood experiences (ACEs) at higher rates than their civilian counterparts (Blosnich, Dichter, Cerulli, Batten, & Bossarte, 2014; Katon et al., 2015), few authors have explored the role of

childhood adversity in disordered eating for this population (Cobb, Lamson, Schoemann, Didericksen, & Steffey, 2018). To date, Warner et al. (2007) is the only known study to explore the connection between disordered eating and abuse (i.e., one of several adverse experiences) during childhood for the active duty population. The current study seeks to explore the connection between ACEs and disordered eating among active duty military personnel.

Theoretical Orientation

This study's design was informed by the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998), which depict the lifespan impact of ACEs on individuals. The ACE pyramid encompasses ACEs, disrupted neurodevelopment, social/cognitive/emotional impairment, adoption of health-risk behaviors, disease/disability/social problems, and early death, whereas the theory of toxic stress describes *how* ACEs impact health. This project aims to connect the findings from a systematic review by Cobb et al. (2018) with an exploration of the impact of ACEs on disordered eating among military personnel, as well as the protective factors that can prevent or mitigate the impact of ACEs on biopsychosocial outcomes.

ACEs are traumatic events experienced during childhood (0 to 18-years-old) that occur in a family or social environment, vary in severity, are often chronic, and result in harm or distress (Kalmakis & Chandler, 2014). ACEs act as toxic stressors (e.g., parental substance abuse, family violence, maternal depression, etc.; Shonkoff, Boyce, & McEwen, 2009) and have the ability to jeopardize mental, emotional, and physical health outcomes. Although stressors are a normative part of the human experience, not all types of stressors are equivalent. The National Scientific Council on the Developing Child (2005/2014) identified toxic stressors as chronic and

uncontrollable, but stated that their effects can be buffered by access to support systems and services. Over time, these toxic stressors and adverse childhood events can alter how the body responds to events, which can result in an array of health conditions across the lifespan (Shonkoff, 2010), including depression, anxiety, posttraumatic stress disorder, chronic obstructive pulmonary disease (COPD) and heart disease (Hammond, Ben-Ari, Launtry, Boyko, & Samore, 2015).

In particular, ACEs have been shown to disrupt a child's neurodevelopment, which may result in social, emotional, and cognitive impairment. Health-risk behaviors, such as alcohol misuse (Clarke-Walper, Riviere, & Wilke, 2014) and smoking (McCauley et al., 2015) are then commonly adopted to cope with these impairments, which can lead to disease, disability, stress, social or relational concerns, and even result in early death (Brown et al., 2009; Felitti et al., 1998) throughout the lifecycle. Combined (i.e., ACEs, disrupted neurodevelopment, social/emotional/cognitive impairment, adoption of health risk behaviors, disease/disability/social problems, and early death), these risks and impairments form the ACE pyramid. The ACE pyramid reflects a theoretically informed model showcasing how ACEs impact individuals from birth to death (Anda et al., 2006; Felitti et al., 1998). The pyramid suggests that ACEs are far-reaching and while these toxic stressors do not guarantee poor outcomes, they commonly influence long-term health outcomes spanning throughout a lifetime. While health conditions and health-risk behaviors, including disordered eating, are well documented in the active duty literature (Bartlett & Mitchell, 2015; U.S. Department of the Army, 2016) almost no literature exists on the role of ACEs with this population, particularly in relation to disordered eating.

Method

The purpose of this study was to examine the interplay between ACEs, disordered eating, health behaviors, health outcomes, and social support/protective factors for active duty military Service members. In particular, the researchers were interested in the relationship between ACEs and disordered eating. To address this, the researchers employed a quantitative, cross-sectional research design and used REDCap (Harris et al., 2009) to disseminate an electronic self-report survey. Four hypotheses were tested:

1) Disordered eating symptoms will be positively correlated with health risk behaviors, such as smoking, drinking, and lack of condom use.
2) There will be a positive relationship between the number of ACEs and the number of negative health outcomes endorsed by participants.
3) There will be a positive relationship between the number of ACEs and severity of disordered eating symptoms endorsed by participants.
    a. This positive relationship will be present even when controlling for Adverse Adult Experiences.
4) Protective factors will moderate the relationship between ACEs, disordered eating, and other health behaviors/outcomes.

Participants

The inclusion criteria for this study included: a) currently serves in the military, b) is over 18-years-old, and c) has access to the Internet. These criteria were chosen because the population of interest is military Service members and the survey was distributed online in order to make the survey accessible from anywhere in the world.

Procedures

After obtaining IRB approval (Appendix A), the first and second authors disseminated the survey link and study description to various social media sites (e.g., Facebook), professional resources (e.g., the newsletter for the Alliance of Military and Veteran Family Behavioral Health Providers), and stakeholders at military installations across the country. Although efforts were made to connect with Service members from each branch, personnel in the Army were more responsive to sharing the survey, which may have resulted in a higher number of participants from the Army. For each medium, the principal investigator provided a brief description of the purpose of the study, inclusion criteria, disclosure of IRB approval, and a link to the REDCap (Harris et al., 2009) survey. No incentive was offered to participants. Study data were collected and managed using REDCap electronic data capture tools hosted at East Carolina University (Harris et al., 2009). REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing a) an intuitive interface for validated data entry; b) audit trails for tracking data manipulation and export procedures; c) automated export procedures for seamless data downloads to common statistical packages; and d) procedures for importing data from external sources. Due to the sensitive nature of the data and the desire to recruit military populations across the globe, this HIPAA (2010) compliant modality is optimal.

Ethical considerations. The researchers were mindful of the sensitive nature of ACEs and thus took several steps to ensure participant safety and comfort. Previous researchers found that when it comes to ACEs in health surveillance, military personnel are concerned about confidentiality and potential career impact (Robinson et al., 2008). To address these concerns, researchers took steps to: (a) construct and disseminate informed consent materials (Appendix B)

that clearly identified that the survey was HIPAA-compliant (2010), ensuring that no identifiable information would be shared in any publications, and all results would be shared through aggregate, non-identifiable statistics, (b) identify themselves as researchers from East Carolina University and state that they have no affiliation with the Department of Defense or the Department of Veterans Affairs, and (c) provide participants with resources in their area that can address behavioral health concerns that may arise through answering survey questions.

Measures

The measures selected for this study (Appendix C) captured elements of the ACE pyramid (Anda et al., 2006; Felitti et al., 1998), including ACEs, social/emotional/cognitive impairment, risk behaviors, and disease/disability/social problems. Participants completed self-report measures of demographics, adversity in childhood and adulthood, social support, disordered eating behaviors, and general health.

Demographic questionnaire. The demographic questionnaire ($k = 21$) was uniquely developed for this study, but was modeled after questionnaires commonly used with this population (e.g., National Institute for Occupational Safety and Health, 2017). The questionnaire included general questions ($k = 6$), such as about participant age, sex, ethnicity, religious affiliation, sexual orientation, and education, as well as military-specific questions ($k = 10$), such as branch, highest rank/grade achieved, length of service, job category, era of service, and deployment history. Notably, the response options for rank/grade were presented in ranges (e.g., O1 – O3) to ensure participant confidentiality. Lastly, this questionnaire included a subsection about relationships ($k = 5$), including relationship status, cohabitation, children, pets/companion animals, and familial military service.

Adverse childhood experiences. The Childhood Experiences Survey (CES; Mersky et al., 2017) was used to measure ACEs. The CES measures Felitti et al.'s (1998) ten conventional, or "first generation" ACEs, which examined abuse and neglect (i.e., physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect) and household dysfunction (i.e., alcohol/drug problem, mental illness, domestic violence, incarceration, and divorce/separation), as well as seven "second generation" ACEs (i.e., family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, and violent crime victimization; Mersky et al., 2017)**.** The second generation ACEs were selected to increase the cross-cultural and ecological validity of ACEs measures. A total ACE score is determined by summing the number of affirmative responses. In a study of 1,241 low-income women, Mersky and colleagues (2017) found that the CES had excellent internal consistency (*ICC* = .91), and item-level reliability ranged from .41 to .82, indicating acceptability for each item. Although the CES is a newer measure and has yet to be tested with military populations, conventional ACEs measures have been widely used with military populations (e.g., McCauley et al., 2015).

Adverse adult experiences. Adverse experiences during adulthood were measured with the Adult Experiences Survey (AES; J. Mersky, personal communication, October 31, 2017; Appendix D). This 19-item survey explored the ACEs identified in the CES from the standpoint of experiences after age 18, with the addition of items on pregnancy loss and discrimination. Though the publication of the psychometrics of this survey is forthcoming, it has high face validity and per communication with the measure's author, has an alpha of .81 on a 10-item scale (i.e., physical abuse, emotional abuse, alcohol misuse or drug use, mental health problem, incarceration or jail, forced sexual activity, crime victimization, homelessness, chronic financial problems, and discrimination; J. Mersky, personal communication, October 31, 2017).

Disordered eating. The 23-item Eating Disorder Diagnostic Scale – DSM-5 Version (EDDS-DSM-5; Stice, 2014) was used to measure disordered eating symptoms. This measure was adapted from the original version (Stice, Telch, & Rizvi, 2000), to reflect DSM-5 (American Psychiatric Association, (2013) criteria, which has good internal consistency and test-retest reliability (α = .89, r = .87; Stice, Fisher, & Martinez, 2004), but has yet to be validated. Key differences between the DSM-5 version and the DSM-IV (American Psychiatric Association, 2000) version are the inclusion of questions about night eating and the impact of disordered eating/body image concerns on relationships and school/work performance, as well as the removal of questions about amenorrhea and birth control pills (Stice, 2014). The DSM-5 version of the EDDS has symptom composite scores for anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), atypical AN, low frequency BN, low frequency BED, purging disorder, and night eating syndrome. The EDDS-DSM-5 includes Likert scale and dichotomous items, as well as items about the frequency of disordered eating behaviors. The EDDS has been used with both male and female veterans (Arditte Hall, Bartlett, Iverson, & Mitchell, 2017a; Arditte Hall, Bartlett, Iverson, & Mitchell, 2017b; Mitchell & Wolf, 2016), with Chronbach's alphas of .86, .92, and .89, respectively. Eric Stice, the author of both versions of the EDDS, granted permission to use this survey (E. Stice, personal communication; Appendix D).

Health outcomes and health-risk behaviors. Health outcomes were assessed via a questionnaire created specifically for this study. Participants were asked about mental health conditions (i.e., anxiety, depression, eating disorders, headaches, posttraumatic stress disorder, sleep disorder, substance use disorder, and traumatic brain injury), physical health conditions (i.e., arthritis, asthma, autoimmune disorders, cardiovascular disease, cancer, chronic obstructive pulmonary disease, diabetes, liver disease, musculoskeletal injury, osteoporosis, problems with

menstrual cycle, and stress fractures), disability, treatment, and tobacco use. For the items regarding mental and physical health conditions, participants were presented with a list of diagnoses and then asked to identify which diagnoses, if any, they have received. Participants were then asked if they had sought treatment for any of the diagnoses in the past 12 months (i.e., counseling, medication, self-help, support group, or other). Lastly, participants were asked a series of "yes" or "no" and Likert-style questions about whether they engaged in health-risk behaviors, such as smoking/tobacco, drinking, and sexual behaviors (e.g., "Are you a current smoker?").

Protective and compensatory experiences. Just as ACEs can lead to negative health outcomes and behaviors in adulthood (Felitti et al., 1998), supportive experiences during childhood, such as having friends and hobbies, can mitigate the effects of adversity and lead to better health outcomes (Morris et al., 2016). Termed protective and compensatory experiences (PACEs), these experiences are associated with fewer ACEs, better parenting attitudes, and fewer depressive symptoms (Morris et al., 2016). The PACEs survey (Morris et al., 2014) includes 10 items about experiences during childhood, such as the presence of a trustworthy adult, clear and fair administration of rules, and participation in activities such as sports. In local (n = 109) and nationwide (n = 900) samples of parents diverse in ethnicity, relationship status, education level, and age (Morris et al., 2016), the PACEs survey had a reliability of .76. Additional publications on the validity of this measure are forthcoming (A. Morris, personal communication, November 6, 2017) and it has not yet been used with military populations.

Analysis

The data collected in this study were cleaned in Microsoft Excel and analyzed using R statistical software. Preliminary analysis of the data included several steps. First, using the

thresholds described by Mersky (2017, personal communication), total scores were calculated for the CES and AES (e.g., a response of "once" or "more than once" to the question "How often did your parents or adults in your home ever slap, hit, beat, kick, or physically hurt each other?" was coded as a positive response). Total scores were calculated for the first generation ACEs (for both the child abuse/neglect and household dysfunction subscales), second generation ACEs, and combined total ACEs based on these responses on the CES. Next, for the EDDS-DSM-5, the coding guide described by Stice et al. (2014) was used to determine symptom typologies. Composite scores for each Service member were calculated for AN, BN, BED, atypical AN, low frequency BED, purging disorder, and night eating syndrome typologies. For instance, participants who reported a high (four or more instances over the past three months) frequency of binge eating, endorsed three or more features of binge eating, and indicated that the binge eating episodes made them very upset, without the presence of compensatory behaviors, were determined to fit the BED typology. Body mass index (BMI) scores were calculated using the height and weight values reported by participants.

From there, the researcher obtained descriptive statistics of the participant demographics and their responses to the CES, AES, PACEs, EDDS-DSM-5, and health/health behaviors measures. Due to the positive skew of the data, disordered eating frequencies were converted into categorical variables (i.e., 0 = frequency of 0 or 1; 1 = frequency of 2 or 3; 2 = frequency of 4 or more). These cutoffs for the new categorical variables are consistent with the DSM-5 (American Psychiatric Association, 2013) diagnostic criteria. In the next part of the analysis, correlation analyses were completed to determine the relationships between ACE scores and disordered eating symptoms, disordered eating symptoms and health behaviors, and ACE scores and mental/physical health diagnoses. Then, structural equation modeling (SEM) was used to

determine whether adverse adult experiences impact the relationship between ACEs and disordered eating, as well as the moderating role of PACEs on the relationship between ACEs and health behaviors/outcomes. Correlations were measured using the cor.test function in R. SEM was ideal to determine how well the constructs reflect the actual data (Kline, 2011). SEM models were estimated in R using the lavaan package (Rosseel, 2012). A confirmatory factor analysis (CFA) model was first fit to the data, as recommended by Anderson & Gerbing (1988), using the fixed factor method of scale setting. Model fit was evaluated using comparative fit index (CFI), Tucker-Lewis index (TLI), standardized root mean square residual (SRMR), and root mean squared error of approximation (RMSEA: Hu & Bentler, 1999). Missing data was accounted for using full information maximum likelihood. An a priori power analysis was conducted using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007) to determine minimum sample size and indicated that at least 138 participants were needed to have adequate power (d = .15, α = .05); three more than what was captured in the sample size for the study (i.e., 135).

Results

Descriptives

Demographics. This study included 135 Service members who ranged in age from 19 to 52 years old (M = 30.83, SD = 6.07) and predominantly identified as male (n = 73, 54.1%), white (n = 92, 68.1%), and straight (n = 125, 92.6%). This sample was very educated, with all of the participants reporting at least a high school diploma or equivalent and 96.3% (n = 130) having completed at least some college. A majority of Service members reported that they were married or in a civil union (n = 80, 66.1%). Notably, all of the participants who are cohabiting with their partner also reported being in a dual military relationship (n = 5), and a third of

participants who were married or in a civil union reported being in a dual military relationship (*n* = 27). General demographic information is described in Table 1. With regard to military-specific demographics (Table 2), Service members' length of service ranged from less than a year to 34 years (*M* = 8.2, *SD* = 5.7) and a majority were in the Army (*n* = 97, 79.5%) and identified as officers (*n* = 84, 68.8%). Respondents were stationed in 24 U.S. states and territories (*n* = 108), as well as 3 countries outside of the U.S. (*n* = 12). Over half reported that a father, mother, brother, sister, son, and/or daughter had served in the military (*n* = 68). Additionally, with regard to BMI, a majority of participants had a BMI greater than 25.0 (*n* = 69; 62.2%), indicating that they meet the criteria for being overweight or obese.

Childhood experiences. The most frequent ACE reported by respondents was physical abuse (*n* = 58, 48.3%), followed by household drug/alcohol abuse and parental divorce/separation (*n* = 32, 26.7% for each), with physical neglect and violent crime victimization comprising the least frequent responses (*n* = 5, 4.2% for each; Table 3). Many Service members reported an ACE score of 0 (*n* = 35, 29.2% for first generation ACEs, *n* = 67, 55.8% for second generation ACEs, and *n* = 29, 24.2% for combined total ACE score). For first generation ACEs, 24.2% of participants (*n* = 29) reported experiencing four or more ACEs. The average number of PACEs reported was 8.56 (*SD* = 1.7; Table 4), with 40.2% of the sample endorsing all ten PACEs (*n* = 47). The lowest number of total PACEs reported was two (*n* =1). The most frequent PACE was having a clean and safe home (*n* = 113, 96.3%) and the least frequent PACE was membership in a civic/social group (*n* = 77, 65.8%).

Adult experiences. A greater number of Service members reported experiencing adversity during adulthood (30%, *n* = 35, endorsed four or more), compared with childhood (*n* 20, 24.2%). Twelve participants (10.3%) did not endorse any of the adverse adult experiences

presented on the survey, while one participant endorsed 14 experiences, with an average of 3.55 (*SD* = 2.96) experiences reported. The most frequent experience reported was death of someone close (*n* = 74, 63.8%) and the least frequent experience reported was food insecurity (*n* = 1, 0.9%; Table 5).

Disordered eating. A large proportion of Service members reported a moderate or high fear of gaining weight (*n* = 83, 65.1%) and/or concern about weight/shape (*n* = 70, 62.7%). However, most reported no/low engagement in binge eating (*n* =87, 75.2%) or compensatory behaviors (*n* = 69, 63.3). Of those who did engage in binge eating or compensatory behaviors, more participants endorsed these behaviors at a higher frequency (i.e., four or more times per month on average over the past three months) than at a lower frequency (i.e., two or three times per month on average over the past three months; see Table 6). Additionally, several participants met the criteria for a clinically significant disordered eating typology. None of the respondents met the criteria for the AN, low frequency BED, or purging disorder typologies. However, some met the criteria for the BN (*n* = 7, 7.2%), BED (*n* = 2, 1.8%), atypical AN (*n* = 7, 6.3%), low frequency BN (*n* = 1, 0.9%), and night eating syndrome (*n* = 7, 6.3%) typologies. Of note, five participants met the criteria for multiple typologies; a majority of participants (*n* = 93, 83.8%) did not meet the criteria for a disordered eating typology.

Diagnoses. Most Service members did not endorse receiving a diagnosis for any of the eight mental health (*n* = 73, 65.8%) or thirteen physical health (*n* = 70, 63.1%) conditions asked about on the survey. Several respondents endorsed multiple mental health (*n* = 17, 15.3%) and physical health (*n* = 16, 14.4%) diagnoses, with a maximum of five and three diagnoses, respectively. The most frequent mental health diagnoses reported were anxiety (*n* = 17, 15.3%) and depression (*n* = 16, 14.4%) and the least likely were substance use disorder (*n* = 2, 1.8%)

and eating disorder (*n* = 1, 0.9%). The most frequent physical health diagnoses reported were musculoskeletal injury (*n* = 16, 14.4%) and asthma (*n* = 14, 12.6%) and the least frequent were COPD, autoimmune disorders, and hepatitis (*n* = 1, 0.9% for each). None of the participants reported a diagnosis of cancer, diabetes, liver disease, or cancer (See Table 7 for mental health and Table 8 for physical health frequencies).

Health behaviors. A majority of Service members were nonsmokers (*n* = 100, 90.9%), did not use other tobacco products (*n* = 95, 86.4%), and did not have a disability (*n* = 106, 97.2%). About a third of participants consumed alcohol multiple times per week (*n* = 36) and four (3.7%) reported binge drinking at least once per week. Most participants reported that they were sexually active (*n* = 98, 89%) and 72 (70.6%) reported that they did not use condoms. The average number of sexual partners in the past month was 1.01(*SD* = 0.72) and ranged from zero to six (see Table 9).

Open-ended responses. Table 10 depicts Service member responses to open-ended questions about relationships/experiences that influenced their decision to join the military as well as other information they thought was important for the researchers to know. Of those who discussed the factors that influenced their decision to join, most endorsed positive relationships/experiences (*n* = 40), compared with negative relationships/experiences (*n* = 6). The most commonly cited positive influence was a family member (*n* = 35) and the most commonly cited negative influence was negative childhood experiences (*n* = 5). Eleven Service members offered insight to the researchers about items they thought the researchers should know. Notably, three respondents discussed their experience growing up in a military family and the importance of exploring the impact of military service across multiple generations.

Hypothesis 1

The first hypothesis predicted that disordered eating symptoms would be positively correlated with health risk behaviors, such as smoking, drinking, and lack of condom use and was partially supported. This hypothesis was tested using both Pearson and Spearman correlations, as appropriate (see table 11). Significant positive correlations were found between smoking and fasting, binge eating, excessive exercise, and summed total of compensatory behaviors. Binge drinking was positively and significantly associated with binge eating and excessive exercise. Alcohol amount, on the other hand was significantly and positively correlated with excessive exercise. The number of sexual partners was positively associated with fasting and using laxatives/diuretics. Night eating and number of binge eating features were not significantly correlated with any of the health behaviors; use of tobacco products (not smoking) and condom use were not significantly correlated with any of the disordered eating behaviors. Additionally, health risk behaviors tended to cluster together (e.g., smoking was significantly correlated with using other tobacco products; alcohol frequency was significantly correlated with alcohol amount).

Hypothesis 2

The second hypothesis predicted that there would be a positive relationship between the number of ACEs and the number of negative health outcomes endorsed by participants (see Tables 12 and 13) and was supported. First generation, second generation, and total ACEs were each significantly correlated with total number of both mental and physical health diagnoses. ACEs were broken down into first generation, second generation, and total ACEs, and then compared to each mental and physical health diagnosis, as well as the total number of diagnoses, using both Pearson and Spearman correlations, as appropriate. Note that cancer, diabetes, liver

disease, and osteoporosis were excluded from this analysis because they were not endorsed by any of the participants. First generation ACEs were significantly and positively correlated with anxiety, sleep disorder, asthma, cardiovascular disease, stress fractures, PTSD, and stress fractures. Second generation ACEs were significantly and positively correlated with PTSD, traumatic brain injury (TBI), stress fractures, frequent headaches, sleep disorder, and anxiety. Total ACEs were significantly and positively correlated with stress fractures, anxiety, PTSD, sleep disorder, asthma, and TBI.

Hypothesis 3

The third hypothesis predicted that there would be a positive relationship between the number of ACEs and severity of disordered eating symptoms endorsed by participants (see table 14) and was supported. First generation, second generation, and total ACEs were compared with disordered eating behaviors, using both Pearson and Spearman correlations, as appropriate. First generation ACEs were significantly correlated with using laxatives/diuretics, fasting, summed purging behaviors, and summed compensatory behaviors. Second generation ACEs were significantly correlated with summed compensatory behaviors, excessive exercise, night eating, and summed purging behaviors. Total ACEs were significantly correlated with summed purging behaviors, summed compensatory behaviors, fasting, using laxatives/diuretics, and binge eating. Vomiting and number of binge eating features were not significantly correlated with any of the ACE categories.

Hypothesis 3a. An offshoot of the third hypothesis was that the positive relationship between the number of ACEs and disordered eating would be present even when controlling for adverse adult experiences. To test this, we fit a confirmatory factor analysis model to the data using all study measures. However, the initial model would not converge due to positive skew

on some of the disordered eating subscales. Therefore, each participant's responses to items 1-17 on the disordered eating scale were summed to create a total symptom score. The fixed factor method was used to set the scale for this model. Additionally, to simplify the model, scale scores were computed for lower order latent variables and used as indicators for higher order variables (e.g., the items for the abuse/neglect, household dysfunction, and second generation subscales were summed for each subscale, and these scale scores were then used to create the ACEs latent variable). Due to the distribution of the data, participant responses to the smoking/tobacco and condom use questions were not included in the model. For sexual behaviors, a single-item indicator – "How many sexual partners have you had in the past month?" was used. Ultimately, a model including ACEs, PACEs, adverse adult experiences, disordered eating, alcohol use, and sexual behaviors was used. The final model is depicted in Figure 1. Model fit was good X^2 (52, N = 122) = 81.645, *CFI* = .917, *TLI* = .875, *SRMR* = .062, *RMSEA* = .068, 90% *CI* = .083 - .096. *CFI, SRMR,* and *RMSEA* indicated acceptable fit and *TLI* indicated mediocre fit, meaning that overall, the model is an acceptable fit for the data.

To explore the relationship between ACEs and disordered eating, the researchers conducted a latent regression using this model. The effect of ACEs on disordered eating was significant, .552 (*SE* = .118, p = 0.06). ACEs were significantly correlated with PACEs (-.501, p < .001), AESs (-.662, p < .001), and moderately correlated with alcohol consumption (.204, p = .057) and number of sexual partners (.213, p = .053). PACEs were significantly correlated with adverse adult experiences (-.565, p < .001) and number of sexual partners (.213, p < .05). Adverse adult experiences were significantly correlated with number of sexual partners (-.255, p < .05), as was alcohol consumption (.281, p < .05). However, when the researchers controlled for the effect of adverse adult experiences, the effect of ACEs on disordered eating was not

significant (b = -.152, SE = .191, p = .43), indicating that adverse adult experiences may have more of an impact on disordered eating than ACEs. In this model, PACEs were significantly correlated with ACEs (-.551, SE = .132, p < .001) and adverse adult experiences (-.530, SE = .115, p < .001), indicating a negative relationship between PACEs and ACEs and adverse adult experiences. Although there is a significant relationship between ACEs and disordered eating, this relationship is not significant when adversity in adulthood is considered; therefore, the hypothesis was not supported. Despite this, the correlations provide support for further exploration of the role of PACEs, or protective factors.

Hypothesis 4

The fourth hypothesis predicted that protective factors would moderate the relationship between ACEs, disordered eating, and other health behaviors/outcomes. To test this, the researchers modified the model used in the previous hypothesis to create an interaction variable between ACEs and PACEs. In the initial model, lavaan could not compute standard errors. Therefore, the interaction variables were removed and the model was simplified to allow for lavaan defaults to control for redundancy in the model (i.e., the single indicators were removed as latent variables and used for the latent regression in the model). With these revisions, model fit was good, X^2 (15, N = 121) = 27, CFI = .942, TLI = .892, $SRMR$ = .049, $RMSEA$ = .082, 90% CI = .027 - .130. CFI and $SRMR$ indicated acceptable fit and TLI and $RMSEA$ indicated mediocre fit. From there, the interaction variable between ACEs and PACEs was created using double mean centering (Lin, Wen, March, & Lin, 2010). In this model, the relationship between ACEs and disordered eating symptoms was not moderated by PACEs. In a model exploring alcohol use, the relationship between ACEs and alcohol use was not moderated by PACEs, however, there was significant covariance (p < .01) between ACEs and PACEs, ACEs and

adverse adult experiences, and PACEs and adverse adult experiences. In a model exploring sexual behaviors, the relationship between ACEs and number of sexual partners was not moderated by PACEs, though there was a significant relationship between PACEs and number of sexual partners (b = -.28, SE = .122, $p < .05$), signaling that people with more protective factors had fewer sexual partners. The fourth hypothesis was not supported, indicating that in the models explored, PACEs do not significantly impact the relationship between ACEs and health-risk behaviors. Perhaps what is considered "protective" differs for military Service members, compared with civilian populations.

Discussion

The purpose of this study was to examine the relationship between ACEs and disordered eating in an active duty military population using the ACE pyramid (Anda et al., 2006; Felitti et al., 1998). This study described patterns of disordered eating behavior, the prevalence of ACEs, PACEs, adverse adult experiences, health behaviors/diagnoses, and the relationships between these variables. This study is now one of only two studies to explore the relationship between childhood experiences and disordered eating in an active duty population (Cobb et al., 2018; Warner et al., 2007), and is the first of its kind to explore these behaviors through the ACE pyramid. The results of this study can contribute to a greater understanding of the health needs of military Service members and provide several implications for future research.

ACE Pyramid

Broadly, this study demonstrated that the ACE pyramid is a useful framework for conceptualizing health for military populations. In our sample, our participants reported a higher prevalence and greater frequency of ACEs than civilian samples (e.g., Felitti et al., 1998). This is consistent with previous research with military populations (Blosnich et al., 2014; Katon et al.,

2015). It is important to note that when comparing the ACEs in our active duty sample to previous research, we are not counting the second generation ACEs. Due to this high prevalence, and evidence that cumulative ACEs (i.e., four or more; Felitti et al., 1998) have a dose response relationship to negative health outcomes (e.g., alcoholism, suicide attempts, COPD, etc.), ACEs should be used to inform military healthcare. In our sample, ACEs were associated with compensatory behaviors, particularly purging (i.e., vomiting, using laxatives/diuretics), as well as a number of mental and physical health diagnoses. Interestingly, TBI was highly correlated with second generation ACEs, but not first generation ACEs, while cardiovascular disease was correlated with first generation ACEs, but not second generation ACEs. Future research should seek to better understand these pathways.

Of particular interest is the connection between ACEs and stress fractures. A common problem in the military community, stress fractures affect 3% of male and 9% of female recruits (Uniformed Services University Human Performance Resource Center, 2016). While the original ACEs study connected ACEs to skeletal fracture (Felitti et al., 1998), there is no known literature (until now) that explicitly associates ACEs with stress fractures. Given that stress fractures are common in this population and have the potential to significantly impact military readiness, this relationship should be further explored. Without using the ACEs framework, it is unlikely that this connection would have been identified.

Disordered Eating

In our sample, the prevalence of disordered eating typologies tended to be higher than national prevalence rates. Our sample had a high rate of BN (7.2%), compared with 12-month prevalence rates in the general population (.3%) though the rates of BED were similar (1.8% in our sample, versus 1.2% in the general population; Hudson, Hiripi, Pope, & Kessler, 2007). In

the literature, night eating syndrome, atypical AN, low frequency BN, and low frequency BED are often studied under the umbrella term, eating disorder not otherwise specified (ENDOS), which has a lifetime prevalence rate of 4.46% for adults (Le Grange, Swanson, Crow, & Merikangas, 2012). In our sample, the prevalence was 11.7%. Although prevalence estimates of disordered eating in military populations vary greatly, our findings are comparable to those of previous researchers who have studied military populations (Bartlett & Mitchell, 2015).

Although there were high rates of disordered eating across the sample (compared with civilians), most Service members did not endorse disordered eating behaviors. However, a majority of participants reported that they have a fear of gaining weight and were concerned about their weight/shape. Though this trend may be due to weight and body fat standards in the military (Bodell, Forney, Keel, Gutierrez, & Joiner, 2014), it indicates that large numbers of personnel may be at risk of developing disordered eating behaviors. Further, over a quarter of our sample reported that they engage in a high frequency of compensatory behaviors, which can contribute to a number of health risks, particularly in relation to the musculoskeletal, gastrointestinal, and cardiovascular systems (Forney, Buchman-Schmitt, Keel, & Frank, 2016).

Only one participant reported having an eating disorder diagnosis, but many participants met the criteria for an eating disorder, namely BN, BED, atypical AN, low frequency BN, and night eating syndrome. This trend raises questions about military providers' training or awareness around disordered eating. In civilian samples, providers have indicated a lack of knowledge and training about eating disorders (Linville, Benton, O'Neill, & Sturm, 2010) and that patients typically get flagged when they are underweight, as opposed to when they are in the normal or overweight ranges (Linville, Brown, O'Neill, 2012). However, of the diagnoses captured in this survey, only AN requires that patients be underweight (American Psychiatric

Association, 2013) and none of the participants in our sample were underweight. This suggests that military providers may benefit from targeted training around identifying and treating disordered eating.

Disordered eating and ACEs. In our analyses, we found that ACEs do impact disordered eating, but that this effect is not significant when adverse experiences in adulthood are factored in. This finding is consistent with other researchers' findings connecting military-related trauma to disordered eating (Arditte Hall, Bartlett, Iverson & Mitchell, 2017a; Arditte Hall, Bartlett, Iverson, & Mitchell, 2017b; Kimbrel et al., 2015). However, according to Shern et al.'s (2016) theory of toxic stress, people with high ACE scores may be more likely to experience adversity in adulthood. Taken together, these findings lend support for the potential additive effect of adult adversity and ACEs.

Protective Factors

Although our study did not find that PACEs moderated the effect of ACEs on health behaviors, there is support for continuing to explore these factors in research and clinical work with military populations. PACEs were consistently negatively correlated and covaried with ACEs and adverse experiences in adulthood, indicating that PACEs may indeed serve to buffer the effects of adversity in both childhood and adulthood. All of the PACEs examined in this study were connected to relationship or community/environment factors (e.g., having a trusted adult, membership in a social group, etc.); all important to explore further with both military families and within military units.

Limitations

There were a few limitations related to the sample, recruitment methods, and analysis that are important to acknowledge in context of the findings. First, a majority of our participants

were junior officers and in the Army, which limits the generalizability of our findings to other pay grades and branches. This trend may be due to recruitment methods, which were primarily based on the first and second author's professional outlets. Additionally, due to a combination of the structure of some of our scales and the positive skew of many of the disordered eating questions, it was not possible to study the relationship of composite symptoms to ACEs, which may have provided different results than looking at the total symptom score. Further, for the health outcomes questions, we only asked people whether they had been diagnosed with a given condition; it is likely that far more Service members met the criteria for conditions than had been diagnosed, as evidenced by our disordered eating typology findings. Also, all of our questions relied on self-report, which may have limited the depth or accuracy of responses. With regard to the childhood questions, we asked adults to remember experiences from their childhood, which may have impacted the accuracy of findings due to a tendency for participants to underreport traumatic events in childhood (Hardt & Rutter, 2004). Lastly, a majority of the Service members in our sample reported that they had experienced many, if not all, of the PACEs, which restricted the range of responses. This restricted range may have impacted the researchers' ability to find moderation with respect to PACEs.

Implications

This research has significant implications for researchers, clinicians, policy makers, and trainers who work with military populations in relation to ACEs, protective factors, and disordered eating. Practice recommendations, as well as suggestions for areas of growth, are detailed below.

Researchers

ACEs are connected to a number of physical and mental health concerns in the active duty population. As such, military healthcare researchers should include ACEs in order to better identify ways in which Service members and their families are influenced by ACES and forms of adversity that occur in adulthood. Since this is a newer area of study in this population, there are many gaps in the literature that need to be addressed. Researchers need to understand how to effectively measure ACEs in this population. Attention should also be given to ways in which ACEs may be hidden (intentionally or non-intentionally) by Service members due to the physical and emotional nature of military life (i.e. Service members may have high ACE scores, yet are in good biopsychosocial health). As more is learned about ACEs, researchers will need to identify how military-specific stressors, such as combat trauma and military sexual assault influence health over the lifespan. While so much still needs to be learned about ACEs, equally important is the investment in protective factors for military personnel and their families. These are just a few of the many ACEs-related questions generated from this study. With regard to disordered eating, this is also an area that needs to be further explored with military populations, both in relation to ACEs and adverse experiences in adulthood.

Clinicians

Clinicians who work with military populations should be aware that (a) ACEs, PACEs, and disordered eating behaviors are very prevalent, and (b) ACEs impact both mental and physical health outcomes, as well as health-risk behaviors. The connection between physical and mental health supports the need for interdisciplinary collaboration to treat ACEs and the wide array of conditions (e.g., eating disorders) and behaviors that are impacted by them. More healthcare providers should consider the role of ACEs when they are treating a Service member,

particularly now that the research from this study highlights the correlation between ACEs and stress fractures. Mental and behavioral health clinicians should consider the physical health correlates (e.g., asthma) as well as mental health correlates (e.g., depression) when treating a Service member with trauma, particularly given the findings from this study. Further, as many of our participants were married, in committed relationships, and/or had children, it is important for clinicians to consider the family-level impact of ACEs and utilize a relational approach to treatment/interventions. This research provides additional support for the biopsychosocial effects of ACEs, meaning that interdisciplinary collaboration is likely necessary for effective screening, prevention, and treatment of the physical and psychosocial markers associated with ACEs.

Policy Makers

While the impact of ACEs on the health of military Service members should be relevant to policy makers, many issues related to Service members' well-being remain. Policy makers should determine whether the military should screen for ACEs. If the military does screen for ACEs, military leaders will need to decide what do with that information and who should have access to that information. Those charged with record keeping would need to determine where ACEs content is stored (i.e., with family advocacy charts or electronic health records). In the civilian world, there are efforts to make ACEs screening a standard practice in primary care (e.g., Glowa, Olson, & Johnson, 2016; Tink, Tink, Turin, & Kelly, 2017); military leaders and policy makers will need to decide if that same standard should also be considered for military Service members. In relation to surveillance of ACEs, military personnel tend to have concerns about confidentiality and potential career impact (Robinson et al., 2008) and as such, policies will need to be put into place so that the ACE status for Service members is protected and monitored

properly. To provide safe and effective ACEs-informed care and research, these are conversations that need to be had amongst military leadership and policy makers.

Training

The high prevalence and frequency of ACEs necessitate training on and education about ACEs for providers of military medical and mental health care, as well as for those in leadership roles. They should receive training on ACEs-informed resources and programs available to military Service members and their families so that they can ensure that information is appropriately disseminated. Based on findings from this study, in relation to disordered eating, the contrast between the number of participants who reported having an eating disorder diagnosis and the number of participants who met the criteria for a clinically significant disordered eating typology was striking. Therefore, in addition to training on ACEs, military medical and mental health providers may benefit from training on identifying disordered eating. These trainings will ensure that Service members get the care they deserve and providers can increase their competence in identifying protective factors that may help in improving the physical and psychosocial health of Service members.

Summary

This study used the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) to examine the relationship between ACEs and disordered eating in an active duty military population. This study showed that there is a high prevalence of ACEs and disordered eating in the military and that there is a complex relationship between these variables. Additionally, this dissertation supports previous research in connecting ACEs to a number of mental and physical health conditions, and found a connection between ACEs and stress fractures, which has not been explicitly articulated in the literature until now. These findings demonstrate the multifaceted

interplay between ACEs and biopsychosocial health and lend support for efforts to screen, prevent, and treat ACEs for military Service members and their families.

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Table 1

Demographic Information for Service Members

Indicator	Frequency (%) or Mean*(SD)*
Age	30.8(6.07)
Sex	
Male	73(54.1)
Female	62(45.9)
Race/Ethnicity	
American Indian/Alaska Native	1(0.7)
Asian/Pacific Islander	11(8.1)
Black/African American	11(8.1)
Hispanic/Latino	15(11.1)
White	92(68.1)
Other	5(3.7)
Religion	
Agnostic	18(13.4)
Atheist	11(8.2)
Buddhist	1(0.7)
Catholic	26(19.4)
Jewish	2(1.5)
Mormon	2(1.5)
Muslim	1(0.7)
Protestant	32(23.9)
I don't know	8(6.0)
Prefer not to answer	13(9.7)
Other	20(14.9)
Sexual Orientation	
Bisexual	5(3.7)
Gay or Lesbian	1(0.7)
Straight	125(92.6)
Other	1(0.7)
Prefer not to answer	3(2.2)
Education	
High School Graduate	5(3.7)
Some College	24(17.8)
College Degree	60(44.4)
Graduate Degree	46(34.1)
Relationship Status	
Single (never married)	27(22.3)
Married or Civil Union	80(66.1)
Cohabiting	5(4.1)
Divorced	5(4.1)
Legally Separated	3(2.5)
Other	1(0.8)

Table 2

Military-Specific Information for Service Members

Indicator	Frequency (%) or Mean*(SD)*
Branch	
Air Force	5(4.1)
Army	97(79.5)
Coast Guard	4(3.3)
Marine Corps	5(4.1)
Navy	11(9.0)
Rank	
E1-E4	9(7.4)
E5-E6	26(21.3)
E7-E9	3(2.5)
W1-W5	1(0.8)
O1-O3	67(54.9)
O4-O5	15(12.3)
General or Flag Officer	1(0.8)
Length of Service (years)	8.2(5.7)
Lives on Base	28(23.0)
Where Stationed	
U.S. States/Territories	108(90.0)
Abroad	12(10.0)
Deployment History	
Currently Deployed	3(2.5)
Combat Zone	13(10.7)
Number of Combat Deployments	1.6(.85)
Non-Combat Zone	46(38.0)
Number of Non-Combat Deployments	2.3(2.5)
Family Military History	
Father	48(39.7)
Mother	9(7.4)
Brother	26(21.5)
Sister	12(9.9)
Son	2(1.7)
Daughter	1(0.8)
Body Mass Index	
Normal (18.5 – 24.9)	42(37.8)
Overweight (25.0 – 29.9)	59(53.2)
Obese (30.0+)	10(9.0)

Table 3

Adverse Childhood Experience Frequencies

Adverse Childhood Experiences	Frequency (%) or Mean*(SD)*
Physical Abuse	58(48.3)
Household Drug/Alcohol Abuse	32(26.7)
Parental Divorce/Separation	32(26.7)
Domestic Violence	29(24.4)
Household Mental Illness	26(21.7)
Parental Absence	26(21.7)
Family Financial Problems	20(16.7)
Psychological Abuse	19(15.8)
Peer Victimization	17(14.2)
Household Crime	15(12.5)
Sexual Abuse	13(10.8)
Food Insecurity	12(10.0)
Parent/Sibling Death	11(9.2)
Homelessness	8(6.7)
Emotional Neglect	6(5.0)
Physical Neglect	5(4.2)
Violent Crime Victimization	5(4.2)
1st Gen. ACEs Total	1.96(2.00)
2nd Gen. ACEs Total	0.83(1.24)
Total ACEs	2.78(2.91)

Key: 1st Generation ACEs = physical abuse, sexual abuse, psychological abuse, physical neglect, emotional neglect, household drug/alcohol abuse, household mental illness, domestic violence, household crime, parental divorce/separation; 2nd Generation ACEs = family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, violent crime victimization; Total ACEs = sum of 1st and 2nd Generation ACEs

Table 4

Protective and Compensatory Experiences (PACES) Frequencies

PACEs	**Frequency (%) or Mean*(SD)***
Clean and Safe Home	113(96.3)
School Resources	112(95.7)
Unconditional Love	111(94.9)
Clear and Fair Rules	109(93.2)
Best Friend	104(88.8)
Trusted Adult	98(83.8)
Physical Activity	98(83.8)
Hobby	93(79.5)
Help Others	80(69.0)
Membership in Civic/Social Group	77(65.8)
Total	8.56(1.70)

Table 5

Adverse Adult Experience Frequencies

Adverse Adult Experience	**Frequency (%) or Mean*(SD)***
Death	74(63.8)
Non-Violent Crime	48(41.7)
Household Drug Abuse	48(41.4)
Emotional Abuse	36(31.0)
Discrimination	34(29.8)
Verbal Abuse	31(26.7)
Pregnancy Loss	29(25.0)
Domestic Violence	23(19.8)
Household Alcohol Abuse	18(15.5)
Divorce/Separation	18(15.5)
Physical Abuse	15(12.9)
Household Mental Illness	15(12.9)
Violent Crime	14(12.1)
Household Prison/Jail	12(10.3)
Sexual Abuse	11(9.1)
Financial Problems	8(7.0)
Homelessness	6(5.3)
Prison/Jail – Self	4(3.4)
Food Insecurity	1(0.9)
Total	3.55(2.96)

Table 6

Disordered Eating Prevalence

Disordered Eating Symptom	**Frequency (%) or Mean*(SD)***
Fear of Gaining Weight	
None/Low	39(34.8)
Moderate	23(20.5)
High	50(44.6)
Concern About Weight/Shape	
None/Low	42(37.5)
Moderate	25(22.5)
High	45(40.2)
Binge Eating	
None/Low	87(75.2)
Moderate	5(4.8)
High	13(12.4)
Number of Features	1.02(1.62)
Compensatory Behaviors	
None/Low	69(63.3)
Moderate	11(10.1)
High	29(26.6)
Purging	0.56(2.44)
Night Eating	0.66(2.57)
Meets Diagnostic Criteria	
Anorexia Nervosa	0(0.0)
Bulimia Nervosa	8(7.2)
Binge Eating Disorder	2(1.8)
Atypical Anorexia Nervosa	7(6.3)
Low Frequency Bulimia Nervosa	1(0.9)
Low Frequency Binge Eating Disorder	0(0.0)
Purging Disorder	0(0.0)
Night Eating Syndrome	7(6.3)

Table 7

Service Member Mental Health Diagnoses

Mental Health Condition	**Frequency (%) or Mean*(SD)***
Anxiety	17(15.3)
Depression	16(14.4)
Posttraumatic Stress Disorder	11(9.9)
Frequent Headaches	8(7.2)
Traumatic Brain Injury	7(6.3)
Sleep Disorder	6(5.4)
Substance Use Disorder	2(1.8)
Eating Disorder	1(0.9)
Number of Diagnoses	0.61(1.05)

Table 8

Service Member Physical Health Diagnoses

Physical Health Condition	**Frequency (%) or Mean*(SD)***
Musculoskeletal Injury	16(14.4)
Asthma	14(12.6)
Problems with Menstrual Cycle	11(9.9)
Arthritis	9(8.1)
Stress Fractures	8(7.2)
Cardiovascular Disease	2(1.8)
COPD	1(0.9)
Autoimmune Disorders	1(0.9)
Hepatitis	1(0.9)
Cancer	0(0.0)
Diabetes	0(0.0)
Liver Disease	0(0.0)
Osteoporosis	0(0.0)
Number of Diagnoses	0.57(0.87)

Table 9

Service Member Health Behaviors

Health Behaviors	Frequency (%) or Mean(*SD*)
Disability	3(2.8)
Current Smoker	10(9.1)
Other Tobacco Products	15(13.6)
Tried to Quit Tobacco	9(8.6)
Alcohol Frequency	
Never	10(9.1)
Monthly or less	31(28.2)
2-4 times per month	33(30.0)
2-3 times per week	26(23.6)
4+ times per week	10(9.1)
Typical Alcohol Amount (drinks)	
0	10(9.2)
1-2	70(64.2)
3-4	16(14.7)
5-6	9(8.3)
7-9	2(1.8)
10+	2(1.8)
Binge Drinking	
Never	56(51.4)
Less than monthly	38(34.9)
Monthly	11(10.1)
Weekly	3(2.8)
Daily or almost daily	1(0.9)
Sexually Active	98(89.9)
Number of Sexual Partners	1.01(0.72)
Condom Use	
Never	72(70.6)
Sometimes	9(8.8)
About half the time	1(1.0)
Usually	3(2.9)
Always	17(16.7)

Table 10

Service Member Responses to Open-Ended Questions

Question	Responses/Themes
Was something or someone from your childhood influential in your decision to join the military?	Yes, a positive experience/relationship (*n* = 40*) Family member (*n* = 35) Friends (*n* = 8) Educational Opportunities (*n* = 6) Mentor (*n* = 3) "Do something bigger than myself (*n* = 1) Yes, a negative experience/relationship (*n* = 6*) Negative childhood experiences (*n* = 5) Wanted a new life/fresh start/way out (*n* = 4) Negative school experiences (*n* = 1)
Is there anything we haven't asked about that you think is important for us to know?	Yes (*n* = 11*) Recommendations for future research (*n* = 5) • Impact of parental military service on children (e.g., frequently changing schools, new friend groups, parental deployment, *n* = 3) • Impact of teen dating violence (*n* =1) • Impact of caffeine on weight/health (*n* = 1) Clarification about weight/body fat response (*n* = 2) Explanation of how ACEs have impacted Service member (*n* = 1) Military as a family business (*n* = 1) Positive impact of educational opportunities granted by the military (*n* = 1) Frustration with Army leadership (*n* = 1) Views on corporal punishment (*n* = 1)

**Note:* Some Service members discussed multiple themes in their responses

Table 11

Bivariate Correlations Between Disordered Eating and Health Behaviors

	1	2	3	4	5	6	7
1. Smoking	-						
2. Tobacco Use	*.43***	-					
3. Binge Drinking	*.16**	*.27****	-				
4. Alcohol. Frequency	*.04*	*-.03*	.44***	-			
5. Alcohol Amount	*.20***	*.27****	.73***	.42***	-		
6. Sexual Partners	*.23***	*-.09*	.29***	.22**	.15	-	
7. Condom Use	*.07*	*-.01*	*.05*	*.11*	*-.05*	*-.03*	-
8. Binge Eating	*.17**	*.03*	*.21***	*.03*	*.13*	*.07*	*.10*
9. Binge Features	*.10*	*-.03*	.13	.08	.07	.13	*-.03*
10. Vomiting	*.14*	*.10*	.04	-.07	.20**	-.07	*.00*
11. Laxatives/Diuretics	*.03*	*-.01*	.07	.08	.12	.28***	*.20***
12. Fasting	*.26****	*.01*	.05	.05	.14	.18*	*.07*
13. Excessive Exercise	*.19**	*-.02*	.18*	.04	.26***	.07	*.02*
14. Night Eating	*.07*	*.01*	.03	-.04	.06	-.07	*.10*
15. Purging Total	*.15*	*.10*	*.12*	*.04*	*.12*	*.05*	*.05*
16. Compensatory Total	*.24***	*.01*	*.08*	*-.01*	*.09*	*.07*	*.01*

Notes: *$p < .10$. **$p < .05$. ***$p < .01$; *Italicized* = Spearman correlation.
Key: Purging total = sum of vomiting and laxatives/diuretics frequencies; Compensatory total = sum of vomiting, laxatives/diuretics, fasting, and excessive exercise frequencies.

Table 12

Bivariate Correlations Between Cumulative ACE Score and Mental Health Diagnoses

	1	2	3	4	5	6	7	8	9	10	11	12
1. 1st Gen ACEs	-											
2. 2nd Gen ACEs	.59***	-										
3. Total ACEs	.94***	.83***	-									
4. Anxiety	*.20***	*.24***	*.24****	-								
5. Depression	*.03*	*.06*	*.04*	*.47****	-							
6. Eating Disorder	*.04*	*.13*	*.08*	*.22***	*.23***	-						
7. Freq. Headaches	*.04*	*.16**	*.09*	*.07*	*.08*	*-.03*	-					
8. PTSD	*.19***	*.27****	*.23***	*.44****	*.29****	*.29****	*.02*	-				
9. Sleep Disorder	*.19***	*.17**	*.22***	*.34****	*.36****	*-.02*	*.09*	*.05*	-			
10. SUD	*.03*	*.07*	*.02*	*-.06*	*-.06*	*-.01*	*-.04*	*.18**	*-.03*	-		
11. TBI	*.10*	*.30****	*.19***	*.10*	*.10*	*.37****	*-.07*	*.29****	*-.06*	*-.04*	-	
12. Total Diagnoses	.20**	.29***	.26***	.75***	.71***	.40***	.30***	.67***	.47***	.11	.38	-

Notes: *$p < .10$. **$p < .05$. ***$p < .01$; *Italicized* = Spearman correlation

Key: 1st Generation ACEs = physical abuse, sexual abuse, psychological abuse, physical neglect, emotional neglect, household drug/alcohol abuse, household mental illness, domestic violence, household crime, parental divorce/separation; 2nd Generation ACEs = family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, violent crime victimization; Total ACEs = sum of 1st and 2nd Generation ACEs; Freq. Headaches = frequent headaches; PTSD = posttraumatic stress disorder; SUD = substance use disorder; TBI = traumatic brain injury; Tot. Diagnoses. = total number of mental health diagnoses reported by Service member.

Table 13

Bivariate Correlations Between Cumulative ACE Score and Physical Health Diagnoses

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. 1st Gen. ACEs	-												
2. 2nd Gen ACEs	.59***	-											
3. Total ACEs	.94***	.83***	-										
4. Arthritis	*.04*	*.06*	*.04*	-									
5. Asthma	*.17**	*.11*	*.16**	*-.01*	-								
6. Autoimmune	*-.03*	*-.08*	*-.05*	*-.03*	*.25****	-							
7. CVD	*.17**	*.05*	*.15*	*.21***	*-.05*	*-.01*	-						
8. COPD	*.14*	*.06*	*.12*	*-.03*	*-.04*	*-.01*	*-.01*	-					
9. Hepatitis	*-.03*	*-.08*	*-.05*	*-.03*	*-.04*	*-.01*	*-.01*	*-.01*	-				
10. Musc. Inj.	*.11*	*.07*	*.10*	*.54****	*.08*	*-.04*	*.14*	*.23***	*-.04*	-			
11. Menst. Prob.	*-.12*	*-.10*	*-.13*	*.23***	*-.04*	*.29****	*-.04*	*-.03*	*.29****	*.04*	-		
12. Stress Frac.	*.17**	*.21***	*.20***	*.04*	*.21***	*-.03*	*-.04*	*-.03*	*-.03*	*-.02*	*-.09*	-	
13. Tot. Diagn.	.21**	.18*	.23**	.64***	.47***	.27***	.22**	.16*	.16*	.65***	.44***	.34***	-

Notes: **p* < .10. ***p* < .05. ****p* < .01; *Italicized* = Spearman correlation; Cancer, diabetes, liver disease, and osteoporosis were not included in this analysis because none of the Service members reported having these diagnoses.

Key: 1st Generation ACEs = physical abuse, sexual abuse, psychological abuse, physical neglect, emotional neglect, household drug/alcohol abuse, household mental illness, domestic violence, household crime, parental divorce/separation; 2nd Generation ACEs = family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, violent crime victimization; Total ACEs = sum of 1st and 2nd Generation ACEs; CVD = cardiovascular disease; COPD = chronic obstructive pulmonary disease; Musc. Inj = musculoskeletal injury; Menst. Prob. = problems with menstrual cycle; Stress Frac. = stress fractures; Tot. Diagn. = total number of physical health diagnoses reported by Service member.

Table 14

Bivariate Correlations Between Cumulative ACE Score and Disordered Eating

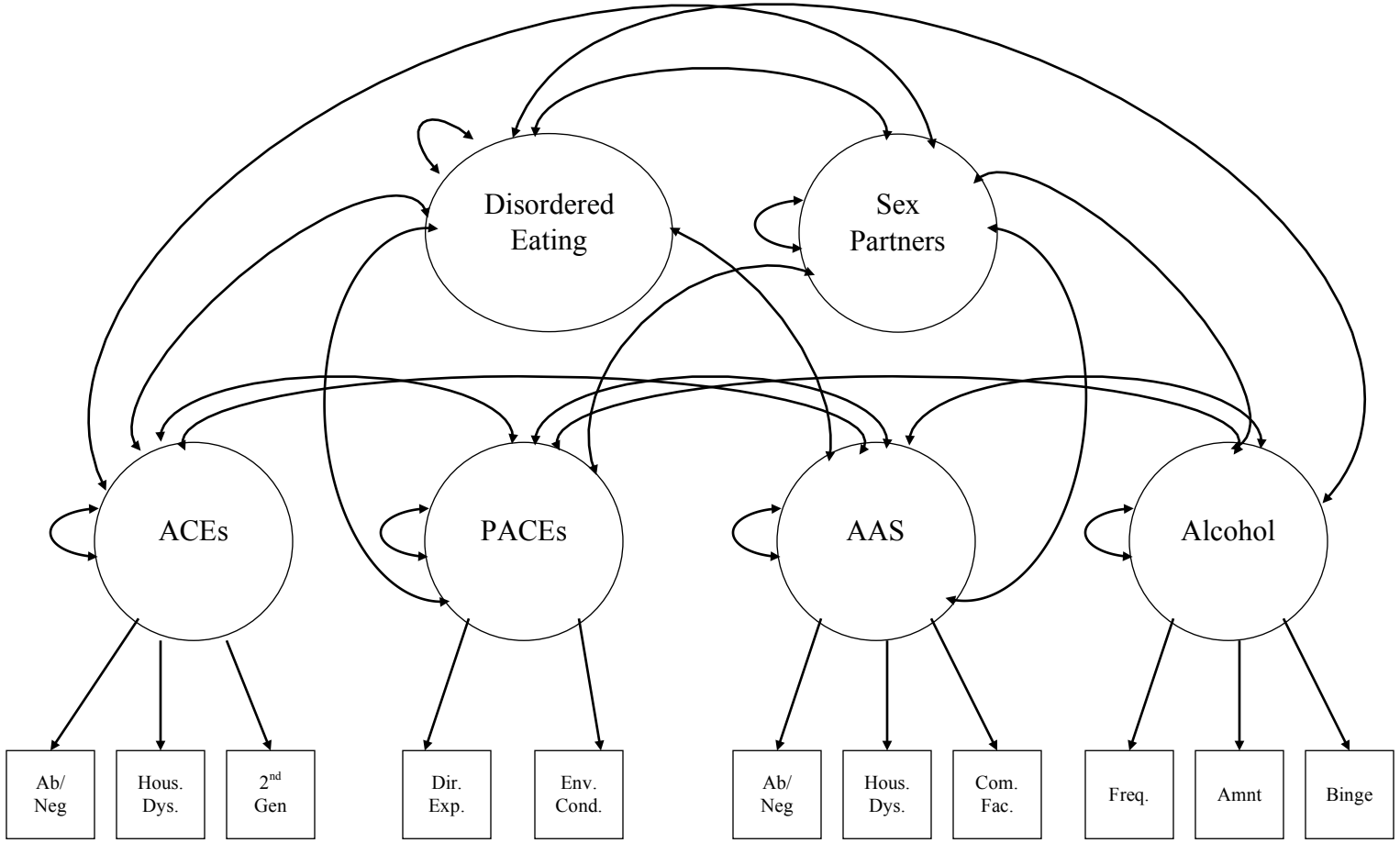
	1	2	3	4	5	6	7	8	9	10	11	12
1. 1st Gen ACEs	-											
2. 2nd Gen ACEs	.59***	-										
3. Total ACEs	.94***	.83***	-									
4. Binge Eating	*.15*	*.19**	*.19**	-								
5. Binge Features	.05	.07	.06	*.74****	-							
6. Vomiting	.11	.16	.15	*.21***	.18*	-						
7. Lax/Diuretics	.19**	.13	.19*	*.15*	.06	.02	-					
8. Fasting	.19**	.09	.17*	*.40****	.24**	.10	.54***	-				
9. Excess. Exercise	.02	.16*	.08	*.33****	.28***	.10	.21**	.28**	-			
10. Night Eating	-.07	.18*	.02	*.57****	.31***	.06	.01	.08	.32***	-		
11. Purging Total	.22**	.18*	.23**	*.25****	.14	.48***	.89***	.88***	.23**	.04	-	
12. Compen. Total	.17*	.19**	.20**	*.49****	.31***	.25***	.63***	.63***	.77***	.24**	.67***	-

Notes: **p* < .10. ***p* < .05. ****p* < .01; *Italicized* = Spearman correlation

Key: 1st Generation ACEs = physical abuse, sexual abuse, psychological abuse, physical neglect, emotional neglect, household drug/alcohol abuse, household mental illness, domestic violence, household crime, parental divorce/separation; 2nd Generation ACEs = family financial problems, food insecurity, homelessness, parental absence, peer victimization, parent/sibling death, violent crime victimization; Total ACEs = sum of 1st and 2nd Generation ACEs; Lax/Diuretics = laxatives/diuretics; Excess. Exercise = excessive exercise; Purging total = sum of vomiting and laxatives/diuretics frequencies; Compen. Total = sum of vomiting, laxatives/diuretics, fasting, and excessive exercise frequencies.

Figure 1

CFA Model



Key: ACEs = Adverse Childhood Experiences, PACEs = Protective and Compensatory Experiences; AAS = Adverse Adult Experiences; Ab/Neg = Abuse/Neglect; Hous. Dys. = Household dysfunction; Dir. Exp. = Direct Experiences; Env. Cond. = Environmental Conditions; Com. Fac. = Community Factors; Freq. = Frequency; Amnt = Amount

CHAPTER 6: IMPLICATIONS OF ADVERSE CHILDHOOD EXPERIENCES FOR MILITARY POPULATIONS

The final chapter of this dissertation punctuates the "so what" factor pertaining to adverse childhood experiences (ACEs) and disordered eating among military Service members via a culmination of research findings, and as such, offers an important contribution to the field of Medical Family Therapy. First, this chapter includes a review of previous dissertation chapters, a discussion of major findings, and a comparison of these findings to past literature. Then, a call to action is offered by which researchers, clinicians, and policy makers are urged to respond to a series of screening, prevention, and treatment recommendations for addressing adverse childhood experiences (ACEs; Felitti et al., 1998) with active duty military populations.

Dissertation in Review

Disordered eating has long been recognized as a concern among active duty military personnel (e.g., Bartlett & Mitchell, 2015; Institute of Medicine, 2004; Jacobson et al., 2009; McNulty, 2001). However, few authors have explored the impact of childhood experiences on disordered eating with this population (e.g., Warner et al., 2007), despite evidence in civilian samples that ACEs can result in persistent neurobiological changes for people with eating disorders (Monteleone et al., 2015). The purpose of this dissertation was to better understand the interplay between ACEs, disordered eating, health behaviors, health outcomes, and social support/protective factors for active duty military Service members. Grounded in the adverse childhood experience (ACE) pyramid (Anda et al., 2006; Felitti et al., 1998) and the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016), each chapter of this dissertation provided a unique contribution to increasing an understanding of these complex dynamics.

The first chapter made the case for the contribution of this dissertation to the literature and provided an overview of military weight and fitness standards and military-specific risk factors for disordered eating, and set the stage for the remainder of the dissertation by providing an overview of each successive chapter. Chapter two delved further into the literature and provided a comprehensive overview of pre-enlistment factors and their potential role in contributing to disordered eating among active duty personnel. Chapter three encompassed a systematic review of the literature on disordered eating and military populations and identified the gaps in existing research, as well as opportunities for future research. Chapter four presented a methodology to capture the interplay between ACEs, disordered eating, health behaviors, health outcomes, and social support/protective factors for active duty military Service members. Chapter five detailed the findings of the survey presented in chapter four, which indicated that ACEs impact disordered eating for this population. Significant findings from chapters three and five are summarized below.

Culmination of Major Findings

After reviewing more than 1,500 articles on disordered eating and obesity with military and veteran populations (see chapter three), only eight articles recognized the role of childhood adversity in the lives of Service members. Each of the final articles were analyzed using the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern, Blanch, & Steverman, 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) as a conceptual guide, which included (a) ACEs, (b) social, emotional, and cognitive impairment, (c) health risk behaviors, and (d) disease, disability, and social problems (disrupted neurodevelopment and early death were not captured in any of the articles, and thus were excluded from the analysis). One unique finding was with regard to demographics; most studies

included participants who were veterans, female, white, and had at least some college education. In fact, only one study used an active duty sample. Another key finding from this systematic review addressed issues in the measurement of disordered eating and childhood adversity. It was recommended (based on the findings from the review) that researchers use disordered eating measures that can capture the typology and severity of symptoms with some degree of specificity; an important message, given the complex nature of service in the military (i.e., a continuum of physical demands and engagement in behaviors that can result in symptoms that are hidden or overlooked).

A third recommendation was that researchers expand their lens of what constitutes childhood adversity (i.e., beyond physical, verbal, and sexual abuse). Given that only eight articles emerged from the systematic review within this dissertation, it is difficult to tell if ACEs research is still too new to the field (i.e., researchers are not sure what experiences to measure) or if the outcomes from ACEs screening with military populations (particularly active duty) have been protected for security purposes (i.e., mission readiness). After all, these assessments could connect pre-military trauma to a higher likelihood for post-traumatic stress while serving. The value of any ACE research with military populations is significant, but an ACEs assessment is only beneficial if there is a trauma informed prevention and intervention protocol that is available; such interventions are limited in the field and as such, are likely unavailable or minimally available on installations.

The results from the systematic review helped in capitalizing on the gaps identified in the research; particularly, the relationship between ACEs and disordered eating among military populations. The dearth of literature on ACEs and disordered eating among military populations provided justification to develop an original research study that explored the role of ACEs

among active duty Service members (see chapter five). Grounding the systematic review in the theory of toxic stress (National Scientific Council on the Developing Child, 2005/2014; Shern et al., 2016) and the ACE pyramid (Anda et al., 2006; Felitti et al., 1998) further strengthened the credibility of the findings and also formed the needed foundation for the original research manuscript (i.e., chapter five).

Exploring disordered eating through the theory of toxic stress and the ACE pyramid was important for identifying how ACEs interface with disordered eating and how ACEs and disordered eating are associated with other health-risk behaviors and diagnoses, particularly among active duty Service members. Findings from the original research study, including 135 Service members, revealed a high prevalence of ACEs and disordered eating patterns. Cumulative ACEs were significantly correlated with purging behaviors (e.g., vomiting, using laxatives/diuretics). Physical abuse, sexual abuse, domestic violence, living with someone who had been incarcerated, and parental absence were all uniquely and significantly associated with purging behaviors. Additionally, ACE scores were significantly correlated with being diagnosed with asthma, traumatic brain injury (TBI), or stress fractures; pointing to the complexity for which current physical and social health interface with previous traumas that likely influence mission readiness. ACE scores were also significantly correlated with the number of mental or physical health diagnoses. The results from the original research study demonstrated interesting connections between childhood adversity and current health/health behaviors among an active duty sample; knowing this means that military researchers, trainers, leaders, and policy makers can choose to minimize the findings or to take a stand on the need for ACEs screening, prevention, and intervention.

A Call to Action

This dissertation makes several significant contributions to the literature on ACEs and active duty military Service members. While previous researchers have connected ACEs to a number of health issues among samples of older veterans, including diabetes, cardiovascular disease symptoms, asthma, disability, smoking, heavy alcohol use, and overweight/obesity (e.g., McCauley, Blosnich, & Dichter, 2015), this study found evidence of the impact of ACEs on health among young, active duty personnel. These connections indicate that ACEs may affect Service members' mission readiness. Although the pathways between ACEs and health outcomes need to be further elucidated, it is clear that embracing the presence and potential impact of ACEs among military personnel is essential to adequately serve this population.

Embracing ACEs

Since Felitti et al.'s (1998) landmark study that highlighted the connection between adversity during childhood and adult health outcomes, researchers, clinicians, educators, and policymakers have made a concerted effort to effectively identify, prevent, and treat ACEs. These efforts have come in the form of screening tools that capture the experiences of diverse populations (e.g., Cronholm et al., 2015; Mersky, Janczewski, & Topitzes, 2017), programs that reduce risk factors and teach parenting skills to prevent the transmission of ACEs to the next generation (Morris et al., 2016), and interventions that enhance resilience and address the biopsychosocial impact of ACEs (Chandler, Roberts, & Chiodo, 2015). While the growth in this field holds considerable promise and has the capacity to improve the quality of life for countless families, the needs of military populations are often overlooked, compared with their civilian counterparts. The complexities of military life may offer unique sources of risk and resilience.

Thus, the purpose of this manuscript is to underscore the important considerations for identifying, preventing, and treating ACEs in military populations.

Identifying ACEs and Protective Factors

Previous researchers have found that ACEs are associated with relationship problems (Applewhite, Arincorayan, & Adams, 2016), limited social support (Lee, Phinney, Watkins, & Zamorski, 2016), alcohol misuse (Clarke-Walper, Riviere, & Wilke, 2014), anxiety (Sareen et al. (2013), depression, and PTSD (Gahm, Lucenko, Retzlaff, & Fukuda, 2007). Some researchers suspect that ACEs may be more prevalent among military populations than in civilian populations (e.g., Blosnich, Dichter, Cerulli, Batten, & Bossarte, 2014; Katon et al., 2015), a risk for both the potential Service member and military branch upon time of recruitment. Unfortunately, most published research pertaining to ACEs with military populations are studies with samples of retired military or veterans. Research with veteran samples has connected ACEs to smoking, heart disease, diabetes mellitus, tobacco use, depression, stroke, chronic obstructive pulmonary disease, alcoholism, fracture, hepatitis (Hammond et al., 2015), and suicidality (Carroll, Currier, McCormick, & Drescher, 2017). While the military diligently tracks many of these behaviors and conditions (U.S. Department of the Army, 2016), there is no demonstrated connection to ACEs, which raises concerns. If active duty Service members are not screened for ACEs, providers are likely focusing on the symptoms or behaviors (i.e., smoking or sleep hygiene), rather than the root cause of concern (pre-military trauma).

ACEs are associated with a greater likelihood of high school non-completion (Metzler, Merrick, Klevens, Ports, & Ford, 2017), increased risk of being a "serious, chronic, and violent" juvenile offender (Fox, Perez, Cass, Baglivio, & Epps, 2015), and suicide attempts (Duke, Pettingell, McMorris, & Borowsky, 2010) among adolescents. This collection of research offers

two opportunities of thought: (a) military accession standards may preclude prospective recruits with high ACE scores and limited coping resources from serving, thus reducing the likelihood for future adverse experiences and a strain on mission readiness for the military or (b) proper screening and intervention for those with high ACE scores may afford young adults who have struggled with ACEs throughout their childhood an opportunity to gain protective resources that can point toward a healthier future and prevent future adverse experiences from influencing their life or the life of their children/family.

Should the latter option have the opportunity to flourish, it is important to take into account the role of coping resources and other sources of resilience in tandem with screening for ACEs. In a civilian sample, resilience resources, such as exercise and social involvement, were found to significantly moderate the biological impact of exposure to multiple ACEs (Gouin, Caldwell, Woods, & Malarkey, 2017). The presence of adversity during childhood does not guarantee negative health outcomes later in life. Therefore, it is worthwhile for recruiters and the military leadership to be attentive to ACEs, as well as protective factors and resilience, at the time of enlistment or commissioning.

To be sure, the literature on protective factors is not nearly as well established as the literature on pathology. However, several recent studies from the civilian world can shed light on ACEs-informed approaches to resilience. Meng, Fleury, Xiang, and D'Arcy (2018) conducted a systematic review of resilience and protective factors among people with a history of childhood maltreatment and identified several factors at the individual, family, and societal levels that buffer the negative effects of ACEs. These protective factors included education, religiosity, family cohesion, social support, and parental care, to name a few, many of which may also be more prevalent in military populations and supported by membership in the military itself

(e.g., Blaisure, Saathoff-Wells, Pereira, MacDermid Wadsworth, & Dombro, 2016). Similarly, Jaffee, Takizawa, and Arseneault (2017) found that women who had a history of childhood maltreatment were shielded from the negative health outcomes associated with ACEs if they engaged in a safe, supportive, and nurturing relationship in adulthood. While not specific to ACEs, the research with military samples reflects the importance of social support in bolstering resilience (Hourani et al., 2012; Pietrzak et al., 2010). Taken together, these findings warrant further attention to the adverse and protective factors that exist between ACEs and safe versus unsafe relationships throughout the lifespan. Recommendations are provided below for ways to enhance screening, prevention, and intervention for both ACEs as well as for protective factors.

Recommendations for Screening

To date, the military does not have a formalized protocol to screen for ACEs. However, there appear to be several opportunities to add screening questions about ACEs within the current system. Each year, personnel in the Air Force, Army, Coast Guard, Marine Corps, and Navy are required to take the Periodic Health Assessment (PHA). The PHA consists of a web-based self-reported health status, record review, mental health review, and in-person consultation with a health care provider (Military Health System, n.d.). While the PHA is largely medically focused, it does ask about family history of mental illness and chemical dependency, which are included in Felitti et al.'s (1998) original list of ACEs. The PHA represents one avenue in which additional ACEs questions could be included. However, the PHA becomes part of military personnel's medical record (Navy and Marine Corps Public Health Center; NMCPHC, n.d.), and based on the confidentiality concerns highlighted by Robinson et al. (2008), Service members may be hesitant to discuss ACEs. Therefore, if Service members' ACEs histories are being

tracked, the intention and purpose behind doing so must be transparent and done with the intent of offering opportunities for prevention and intervention.

For those reluctant to include ACEs on their medical record, several branches have innovative, confidential mechanisms in which ACEs could be tracked (e.g., the Army, Navy, Marine Corps, and Coast Guard) and then Service members could be provided with ACE specific prevention and/or intervention resources as well as examples of protective factors. For Service members in the Navy, Marine Corps, or Coast Guard, as well as general-schedule civilians, the Workplace Health Risk Assessment may serve as an optimal place to include ACEs screening questions and resources. This anonymous, optional survey captures information about health risk behaviors (e.g., tobacco use, alcohol consumption, use of seatbelts), stress, social support, sexual health, exercise, diet, and sleep. Respondents receive a report that highlights risk areas and coinciding web-based resources (NMCPHC, n.d.). Conversely, Service members in the Army are required to take the Global Assessment Tool (GAT) every year. Open to spouses as well, the self-administered GAT is confidential and explores social, emotional, spiritual, and family fitness. Based on the results of the GAT, soldiers receive training based on their strengths and assets (Blaisure et al., 2016). The GAT would be ideal for providing personnel (and their spouses) with ACEs-informed resources; which also lends itself to the possibilities for prevention that is relevant to the Service member and his or her family.

Recommendations for Prevention

While there is a dearth of academic literature on multigenerational military families, popular media has referred to the military as a "family business" (Thompson, 2016) and used terms such as "warrior caste" (Schafer, 2017) to refer to the large numbers of personnel whose family members have also served. According to a report released by the Department of

Defense's Joint Advertising Marketing Research and Studies (JAMRS, 2013), among new recruits joining between October 2012 and March 2013, across branches, more than a quarter reported that they had a parent who had served in the military. When siblings, grandparents, aunts, uncles, and cousins were also factored in, 79% to 86% of recruits across branches indicated that a family member had served. This trend garners support for a family-focused or intergenerational approach to ACEs prevention; with a hope to improve the health for future generations of Service members and long-term health for veterans.

Leading ACEs researchers, clinicians, and policymakers have consistently emphasized the importance of the "absence of the buffering protection of a supportive, adult relationship" (p. e236) on the contribution to negative health outcomes throughout the lifespan (Shonkoff et al., 2012. Furthermore, prevention and intervention materials by ACE researchers emphasize the role of a consistent and healthy relationship (American Academy of Pediatrics, 2014). Military and veteran researchers have begun to recognize the importance of military family relationships as evidenced by initiatives such as the Millennium Cohort Family Study, which is expected to explore protective and vulnerability factors through research with more than 10,000 military personnel and their spouses over a period of at least 21 years (Crum-Cianflone, Fairbank, Marmar, & Schlenger, 2014). Although most of this research is not ACE specific, researchers are attending to the needs of multiple generations, which opens the door for opportunities that can help identify and prevent the transmission of ACEs in military families from one generation to the next. Given the prevalence of military personnel whose parents also served, preventing the transmission of ACEs today ensures a healthier force for tomorrow.

Similar to the earlier discussion of the potential for military accession standards to screen out (or better insulate) prospective recruits with high ACE scores and limited coping skills, these

standards could also serve as protective factors for military children. As noted by Hosek and MacDermid Wadsworth (2013), military children have at least one parent with a high school education or equivalent, employment, and health insurance, to name a few. These characteristics may serve as protective factors for military children (MacDermid Wadsworth et al., 2016). Additionally, Arnold, Lucier-Greer, Mancini, Ford, and Wickrama, (2017) identified specific aspects of family functioning that can serve as sources of resilience for military adolescents: feeling valued, understood, and heard within their families, feeling that they have someone in their family to turn to, talking to a parent when bothered, discussing with their parent during conflict, and doing activities with their family. These characteristics have significant overlap with the protective and compensatory factors (Morris et al., 2016) identified by Cobb, Lamson, Schoemann, Didericksen, and Steffey (2018b) and are essential to embrace in order to prevent future adverse experiences from invading a military family.

Although the military may serve as a source of resilience for military families (e.g., access to health insurance/medical care, parental employment, etc.; Hosek & MacDermid Wadsworth, 2013), military life also presents risk factors, including, but not limited to, deployment and frequent relocation (MacDermid Wadsworth et al., 2016). These risk factors can impact each member of the family in a unique way. In a study of civilian mother-adolescent dyads from military families (whereby the husband/father was deployed), Rodriguez and Margolin (2015) found that the number of important family events missed by the Service member during deployment was linked to increased adolescent depression symptoms, though more frequent contact with Service member during deployment helped to buffer the effects of long absences. For the civilian mothers, depressive symptoms were associated with cumulative duration of absence, but not with missed family events. Identifying parental mental health

symptoms and providing prevention (i.e., psychoeducation) to military and civilian parents alike is essential, particularly because military children aged ten and under who have a parent that experiences depression are more likely to encounter negative outcomes during early childhood (MacDermid Wadsworth et al., 2016). Parental mental illness is one of Felitti et al.'s (1998) original ACEs; therefore, family-focused prevention programs can serve to reduce the ACEs experienced by military children.

Prevention programs must delicately balance educational content related to ACEs (i.e., education on the prevalence and description for physical abuse in relationships) and how they influence military families while also providing insight into protective factors that can help families minimize the likelihood that ACEs will sneak into their relationships during times of change (e.g., around times of deployment, permanent change of station). Prevention programs can help military families become (a) more knowledgeable about each of the ACEs and how they influence emotional, physical, and relational health, and (b) more aware of ways to build protective factors into their relationships in order to buffer their family from future adverse experiences. For military families who find that they are already experiencing the aftermath from ACEs, interventions may be a better pathway to help their family system.

Recommendation for Intervention

The military community has several structures in place that can potentially provide ACEs-informed interventions. For instance, Family Advocacy Programs (FAPs) provide support services and interventions for families at risk for future violence, among other services. This essential program makes a difference in the lives of many families, though a recent study by Aronson, Perkins, Morgan, Cox and Robichaux (2018) identified areas for improvement. In an exploration of the implementation quality of the Army FAPs, Aronson and colleagues (2018)

examined closed family abuse cases across eleven Army bases and found that although there was overall adherence to protocols across bases, there were low levels of family participation (compared with Service member-only engagement). The authors also found that in many cases, FAP staff primarily provided case management and often did not have time to provide interventions themselves, instead providing referrals to outside programs, such as counseling or support groups. However, the effectiveness of these programs is often not tested (Perkins et al., 2016). Additionally, Aronson et al. (2018) postulated that it is unclear if FAP services reduce family violence due to the lack of outcome evaluation studies on FAP programs. Military families deserve to have access to interventions with demonstrated effectiveness; therefore, offering interventions for ACEs is not enough; evaluation of services to reduce ACEs is also necessary.

Some researchers have sought to identify trends in abuse/neglect in relation to deployment, with the hope of determining key windows for intervention. In a review of substantiated cases of child neglect across four Army bases, Cozza et al. (2015) found that neglect occurred most frequently among young children and young enlisted families. There is some disagreement with regard to the relationship between deployment and child abuse and neglect (Milner, 2015). Johnson and Ling (2013) found that the highest risk for abuse and neglect is soon after a Service member deploys and soon after he or she returns. In a study of child maltreatment in the Air Force before and after combat-related deployment, Thomsen et al. (2014) found that the overall frequency of child maltreatment was significantly lower after deployment, but the frequency of sexual abuse and severe physical neglect (particularly alcohol-related) increased. Conversely, in a review of cases of child maltreatment among Air Force families, McCarthy et al. (2015) found that during a deployment, children are at an increased risk

of maltreatment by their civilian parent, particularly in the form of neglect. Each of these studies highlights time periods when military personnel and their families may need additional support. Employing a relational, ACEs-informed approach to treatment ensures that each family member's unique needs are met.

Relational-focused interventions have a strong evidence base with military families. Families OverComing Under Stress (FOCUS) is an intervention specifically adapted for military families (Beardslee et al., 2013) which can benefit each member of the family. Core elements include: (a) a family psychological health check-in, through which parents identify family strengths and risks, (b) family-specific psychoeducation, in which parents receive psychoeducation tailored to their family's unique needs, (c) family narrative timeline, in which family members construct a unified family narrative, and (d) family level skills, which include emotional regulation, problem solving, communication, managing deployment, trauma, or loss reminders, and establishing readiness and goal setting. More recent outcome studies have provided continued support for the effectiveness of FOCUS in reducing unhealthy family functioning, child anxiety, and parental depression, anxiety, and PTSD (Lester et al., 2016; Saltzman et al., 2016). By simultaneously addressing parental mental health, child mental health, and family processes, FOCUS is ideal for providing ACEs-informed care.

Service members who are not parents or involved in a romantic relationship may also benefit from a relational approach to ACEs interventions. ACEs have significant implications for the fitness of active duty personnel and veterans. Bandoli et al. (2017) explored the effect of childhood adversity on stress sensitization for newly recruited soldiers and found that for soldiers who had experienced childhood maltreatment, high levels of recent (i.e., within the last 12 months) stressful experiences were associated with experiencing a major depressive episode or

generalized anxiety disorder within the last 30 days. In a sample of active duty, National Guard/reservists, and veterans, sexual abuse occurring prior to military service was associated with higher rates of current alcohol consumption (Hollis, Kelley, & Bravo, 2017). In these examples, interventions which increase social support and connection to others (e.g., Hourani et al., 2012; Pietrzak et al., 2010) can serve to bolster resilience, thereby improving symptoms and reducing the ramifications that ACEs may have on one's future.

Summary

ACEs are connected with a number of health conditions and health-risk behaviors that are common among military Service members. These health behaviors and diagnoses may function as smoke and mirrors, hiding the deeper-rooted concerns (i.e., ACEs). Those who serve military populations should consider ways to incorporate ACEs into their screening, prevention, and intervention efforts, thereby attending to the needs of the Service member and their family, while also honoring any protective factors that are or should be in place to strengthen their career and health for the future. Attending to ACEs will promote a healthier, more resilient force for tomorrow.

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APPENDIX A: IRB APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
www.ecu.edu/ORIC/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Erin Cobb
CC: Angela Lamson
Erin Cobb
Date: 2/9/2018
Re: UMCIRB 17-002898
Childhood Experiences and Health Behaviors in the Military

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 2/9/2018 to 2/8/2019. The research study is eligible for review under expedited category #7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Appendix C	Surveys and Questionnaires
Dissertation Proposal	Study Protocol or Grant Application
Email Script	Recruitment Documents/Scripts
Flyer	Recruitment Documents/Scripts
Informed Consent	Consent Forms
Survey	Data Collection Sheet

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: INFORMED CONSENT

East Carolina University

Informed Consent to Participate in Research

Title of Research Study: CHILDHOOD EXPERIENCES AND HEALTH BEHAVIORS IN THE MILITARY

Principal Investigator: Erin L. Cobb
Institution, Department or Division: East Carolina University: College of Health and Human Performance, Department of Human Development and Family Science
Address: 108 Rivers Building, East Carolina University
Greenville, NC 27858-4353
Telephone #: 252-328-4273

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?
You are invited to participate in a research study being conducted by doctoral candidate Erin Cobb from East Carolina University's Medical Family Therapy program. The aim of the research study is to better understand the relationship between childhood experiences and health behaviors for active duty military personnel. You are being invited to take part in this research because you are currently serving on active duty. The decision to take part in this research is yours to make. By doing this research, we hope to learn about the overall health experiences of active duty personnel. We have no affiliation with the Department of Defense or the Department of Veterans Affairs.

If you volunteer to take part in this research you will be about one in about 250 active duty personnel to do so.

Are there reasons I should not take part in this research?
I understand that I should not take part in this study if I am not on active duty service or am under 18 years of age.

What other choices do I have if I do not take part in this research?
You can choose not to participate.

Where is the research going to take place and how long will it last?
If you agree to participate, the research will take place via an online survey that you can complete at your convenience. The survey should take approximately 20 minutes to complete.

What will I be asked to do?
You will be asked to complete a survey about your childhood experiences and current health. Questions will ask about demographics (age, relationship status, ethnicity, military experiences, etc.), your childhood experiences, and your health behaviors. Your name will not be attached to the questionnaire.

What might I experience if I take part in the research?
Other people who have taken part in this type of research have experienced some increased stress or embarrassment from sharing information regarding their military experiences, health experiences, and other pertinent personal information. While there may not be physical risks from participating in this study, some of the questions asked on the questionnaire could cause some emotional distress. You are welcome to stop at any time.

If any part of this study causes you discomfort (whether during the study or in the days following), please contact any of the following resources:

- Veterans Crisis Line – 24-hour, confidential support; 1-800-273-8255, press 1 or text 838255; https://www.veteranscrisisline.net/
- Military OneSource – 24-hour support, can connect to local resources, 800-342-9647 – http://www.militaryonesource.mil/

Will I be paid for taking part in this research?
No, active duty personnel cannot be incentivized to take part in research.

Will it cost me to take part in this research?
It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?
ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- The members of the research team.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

How will you keep the information you collect about me secure? How long will you keep it?
We will not ask for your name or other identifying information. Your privacy is important to us and will be protected in several ways. Our survey is distributed via RedCAP, a HIPAA-compliant, web-based application for research studies. All study records will be kept in encrypted files and stored on a password protected server, then discarded upon generation of the report. This report will be kept for a minimum of three years after completion of the study. Only the researchers working on this project will have access to the data; however, please note that the Institutional Review Board and internal East Carolina University auditors may review the research records.

Information gathered from this study will be used to publish potential findings in scientific communities and/or report these results to government agencies, funding agencies, or manufacturers. However, strict guidelines regarding confidentiality will be enforced and no identifying information will be published.

What if I decide I don't want to continue in this research?
Your participation is voluntary. Your decision whether or not to participate will not affect any relationship you have with East Carolina University. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty.

Who should I contact if I have questions?
The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at cobbe15@students.ecu.edu. If you have questions about your rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of the ORIC, at 252-744-1971.

Are there any Conflicts of Interest I should know about?
There are no conflicts of interest.

I have decided I want to take part in this research. What should I do now?
The person obtaining informed consent will ask you to read the following and if you agree, you should select the option to participant in the current study.

- I have read all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By electronically signing this informed consent form, I am not giving up any of my rights.
- I know that I can print a copy of this consent form and it is mine to keep.
- I know I will not gain access to the survey without first confirming the following statements:

By selecting the following option I am consenting to the eligibility requirements.

○ I am over 18 years of age.

○ I am on active duty in the U.S. military.

By selecting the following option, I am consenting to participate in this study.

○ I have read all of the above information, asked questions and have received satisfactory answers in areas I did not understand.

APPENDIX C: MEASURES

Childhood Experiences and Health Survey

This research study seeks to examine the role of childhood experiences in the current health of active duty military personnel. We have put together a series of questions designed to tap into childhood experiences, health behaviors, and overall health. We estimate that it will take you about 20 minutes to complete this questionnaire.

When you answer these questions, please keep the following in mind:

1. Please answer all questions to the best of your ability.

2. Answer as honestly as possible, do not merely mark what seems "the right thing to say."

3. Remember there are no right or wrong answers. We are interested specifically in what YOU think and feel.

4. Complete the questionnaire by yourself.

We hope you enjoy filling out this questionnaire and we appreciate your time very much.

Erin Cobb, M.S.
Doctoral Candidate
East Carolina University

I. Your General Life

A. We'd like to start by asking you some general questions.

1. What is your current age? _____

2. What is your sex?
    a. Male
    b. Female
    c. I'd prefer not to answer

3. What is your ethnicity?
    a. American Indian or Alaska Native
    b. Asian/Pacific Islander
    c. Black/African American
    d. Hispanic/Latino
    e. White
    f. Other (Please specify: _____)

4. What is your religious affiliation, if any?
    a. Agnostic
    b. Atheist
    c. Buddhist
    d. Catholic
    e. Hindu
    f. Jehovah's Witness
    g. Jewish
    h. Mormon
    i. Muslim
    j. Protestant
    k. I don't know
    l. Prefer not to answer
    m. Other (Please specify: _____)

5. What is your sexual orientation?
    a. Bisexual
    b. Gay or lesbian
    c. Straight
    d. Other (Please specify: _____)
    e. I'd prefer not to answer

6. What is the highest grade you have completed in school?
    a. No formal education
    b. Grades 1-8 (elementary)
    c. Grades 9-11 (some high school)
    d. Grade 12 or GED (high school graduate)
    e. College 1 year – 3 years (some college or technical school)
    f. College 4 years (college graduate)
        i. What was your major in college?: _____
    g. Graduate School (advanced degree):
        i. What program did you receive your degree in?: _____

B. We'd like to ask you some general questions about your military service.

1. What branch of the military are you employed by?
    a. Air Force
    b. Army
    c. Coast Guard
    d. Marine Corps
    e. Navy
    f. Activated Guard or Reservists
        i. Which branch? _____
2. What is your current rank?
    a. E1 – E4
    b. E5 – E6
    c. E7 – E9
    d. W1 – W5
    e. O1 – O3
    f. O4 – O5
    g. O6
    h. General or Flag Officer
    i. I'd prefer not to answer

3. How long have you been employed by the military? _____ years

4. What is your current job in the military? _____

5. What is the month and year of your most recent physical fitness test? _____

6. Do you live on base?
    a. Yes
    b. No

7. Where are you currently stationed? _____

8. Are you currently deployed?
    a. Yes
    b. No

9. Have you ever been deployed to a combat zone?
    a. Yes
        i. How many have you experienced? _____
        ii. When was the month and year of your first deployment? _____
        iii. When was the month and year of your last deployment? _____
    b. No

10. Have you ever been deployed to a non-combat zone?
    a. Yes
        i. How many have you experienced? _____
        ii. When was the month and year of your first deployment? _____
        iii. When was the month and year of your last deployment? _____
    b. No

C. We'd like to ask you some general questions about your relationships.

1. What is your current relationship status?
    a. Single, never married
    b. Married or civil union
        i. If married, how many times? _____
        ii. How long have you been in your current relationship? _____
        iii. Are you part of dual-military relationship/marriage? _____
    c. Cohabitating with a relationship partner
        i. How long have you been in your current relationship? _____
        ii. Are you part of dual-military relationship? _____
    d. Widowed
    e. Divorced
        i. If divorced, how many times? _____
    f. Legally Separated
        i. If separated, how many times have you been married? _____
    g. Other (Please specify: _____)

2. Do you and your partner live together?
    a. Yes
    b. No

3. Do you have any children?
    a. Yes
        i. How many? _____
        ii. Do your children currently live with you?
    b. No

4. Do you have any pets or companion animals?
    a. Yes
        i. What type of pets/companion animals (e.g., dog, cat, etc.)? _____
    b. No

5. Have any of your first degree relatives served (or are currently serving) in the military? Select all that apply
    a. Father
    b. Mother
    c. Brother
    d. Sister
    e. Son
    f. Daughter

II. Childhood Experiences

A. We'd like to ask you some questions about events that happened during your childhood. This information will allow us to better understand how certain childhood experiences may affect people later in life.

These are sensitive questions that may make some people feel uncomfortable. Please keep in mind that you can skip any question you do not want to answer.

All of the following questions refer to the time before you were 18 years of age. Now, looking back before age 18…

1. *Physical abuse:* How often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?
    a. Never
    b. Once
    c. More than once

2. *Sexual abuse:* How often did an adult, or anyone at least 5 years older than you, touch you sexually, try to make you touch them sexually, or force you to have sex?
    a. Never
    b. Once
    c. More than once

3. *Emotional abuse:* How often did a parent or adult in your home ever swear at you, insult you, or put you down?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often
    e. Very often

4. *Physical neglect:* How often was there an adult in your household who tried hard to make sure your basic needs were met?

a. Never
b. Rarely
c. Sometimes
d. Most of the time
e. Always

5. *Emotional neglect:* How often was there an adult in your household who made you feel safe and protected?

a. Never
b. Rarely
c. Sometimes
d. Most of the time
e. Always

6. *Alcohol/drug problem:* Did you live with anyone who was a problem drinker or alcoholic? Did you live with anyone who used illegal street drugs or who abused prescription medications?

a. Yes
b. No (either one)

7. *Mental illness:* Did you live with anyone who was depressed, mentally ill, or suicidal?

a. Yes
b. No

8. *Domestic violence:* How often did your parents or adults in your home ever slap, hit, beat, kick, or physically hurt each other?

a. Never
b. Once
c. More than once

9. *Incarceration:* Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?

a. Yes
b. No

10. *Divorce/separation:* Were your parents separated or divorced?

a. Yes
b, No (parents were married)
c. No (parents were not married)

11. *Family financial problems:* As a child, how often did your family experience serious financial problems?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

12. *Food insecurity:* How often were you hungry because your family could not afford food?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

13. *Homelessness:* How often were you homeless when you were growing up?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

14. *Parental absence:* Was either one of your parents absent from your life for a long period of time?

a. Yes
b. No

15. *Peer victimization:* How often were you bullied or severely teased by other children or adolescents?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Very often

16. *Parent/sibling death:* Before age 18, did you experience the death of a parent, caregiver, or sibling?

a. Yes
b. No

17. *Violent crime victimization:* Before age 18, were you ever the victim of a violent crime?

a. Yes
b. No

B. We'd like to ask you a few more questions about events that happened during your childhood. This information will allow us to better understand how certain childhood experiences may affect people later in life.

Prior to age 18, did you…

1. Have someone who loved you unconditionally (you did not doubt that they cared about you)?
    a. Yes
    b. No

2. Have at least one best friend (someone you could trust, had fun with)?
    a. Yes
    b. No

3. Do anything regularly to help others or do special projects in the community to help others?
    a. Yes
    b. No

4. Were you regularly involved in sports groups or other physical activity?
    a. Yes
    b. No

5. Were you an active member of at least one civic group or a non-sport social group (e.g., a club)?
    a. Yes
    b. No

6. Have an engaging hobby – an artistic or intellectual pastime either alone or in a group?
    a. Yes
    b. No

7. Have an adult (not your parent) you trusted and could count on when you needed help or advice?
    a. Yes
    b. No

8. Live in a home that was typically clean AND safe with enough food to eat?
    a. Yes
    b. No

9. Have a school that provided the resources and experiences you needed to learn?
    a. Yes
    b. No

10. Have rules in your home that were clear and fairly administered?
    a. Yes
    b. No

III. Adulthood Experiences

A. We'd like to ask you some questions about events that happened as an adult.

These are sensitive questions that may make some people feel uncomfortable. Please keep in mind that you can skip any question you do not want to answer.

All of the following questions refer to the time after you turned 18.
Since you turned 18, how often has a romantic partner or spouse ever:

1. Slapped, hit, beat, kicked, or physically hurt you?
    a. Never
    b. Once
    c. More than once

2. Screamed at you or threatened you with harm?
    a. Never
    b. Once
    c. More than once

3. Physically abused you?
    a. Never
    b. Once
    c. More than once

4. Emotionally abused you?
    a. Never
    b. Once
    c. More than once

5. How often has anyone forced you to have sexual activities?
    a. Never
    b. Once
    c. More than once
        i. If more than once, who? Please choose all that apply.
            _____ Partner or spouse
            _____ Relative
            _____ Someone else you knew
            _____ Stranger

The following questions refer to the time since you turned 18.

6. Have you ever been the victim of a violent crime like a robbery or assault? *(This refers to any violent act by someone other than a spouse, partner, or household family member)*
    a. Yes
        i. If yes, how many times? _____
    b. No

7. Have you ever been the victim of a non-violent crime such as theft?
    a. Yes
        i. If yes, how many times? _____
    b. No

8. Have you been in prison or jail?
    a. Yes
    b. No

9. Has a spouse, partner, or someone you have lived with been in prison or jail?
    a. Yes
    b. No

10. Has a spouse, partner, or someone you have lived with been a problem drinker or alcoholic?
    a. Yes
    b. No

11. Has a spouse, partner, or someone you have lived with used illegal street drugs or abused prescription medications?
    a. Yes
    b. No

12. Has a spouse, partner, or someone you have lived with been depressed, mentally ill, or suicidal?
    a. Yes
    b. No

13. Have you ever been divorced or separated?
    a. Yes
    b. No, I'm married
    c. No, I've never been married
    d. No, my spouse is deceased

14. Have you experienced the loss of a pregnancy?
    a. Yes
        i. If yes, how many times?
    b. No

15. Have you experienced the death of someone very close to you?
    a. Yes
        i. If yes, please choose all that apply
            _____ Partner or spouse
            _____ Child
            _____ Parent
            _____ Other relative
            _____ Friend
            _____ Other
    b. No

Since you turned 18 years of age:

16. How often have you experienced serious financial problems?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often
    e. Very often

17. How often do you feel that you have been discriminated against?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often
    e. Very often

18. How often have you and your family been hungry because you could not afford food?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often
    e. Very often

19. How often have you been homeless*? *("Homeless" means having to stay somewhere like a transitional housing program, a shelter, a hotel/motel paid by voucher, someone else's home, a car or other vehicle, an abandoned building, anywhere outside, or anywhere else not meant for people to live)*
    a. Never
    b. Rarely
    c. Sometimes
    d. Often
    e. Very often

IV. Eating Behaviors

We'd like to ask you some questions about your eating behaviors.

Please carefully complete all questions, choosing NO or 0 for questions that do not apply.

Over the past 3 months…

1. Have you felt fat?

Not at all		Slightly		Moderately		Extremely
0	1	2	3	4	5	6

2. Have you had a definite fear that you might gain weight or become fat?

Not at all		Slightly		Moderately		Extremely
0	1	2	3	4	5	6

3. Has your weight or shape influenced how you judge yourself as a person?

Not at all		Slightly		Moderately		Extremely
0	1	2	3	4	5	6

4. During the past 3 months, have there been times when you have eaten what other people would regard as an unusually large amount of food (e.g., a pint of ice cream) given the circumstances?

Yes No

5. During the times when you ate an unusually large amount of food, did you experience a loss of control (e.g., felt you couldn't stop eating or control what or how much you were eating)?

Yes No

6. How many times per month on average over the past 3 months have you eaten an unusually large amount of food and experienced a loss of control?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

During episodes of overeating with a loss of control, did you…

7. Eat much more rapidly than normal?

Yes No

8. Eat until you felt uncomfortably full?

Yes No

9. Eat large amounts of food when you didn't feel physically hungry?

Yes No

10. Eat alone because you were embarrassed by how much you were eating?

Yes No

11. Feel disgusted with yourself, depressed, or very guilty after overeating?

Yes No

12. If you have episodes of uncontrollable overeating, does it make you very upset?

Yes No

In order to prevent weight gain or counteract the effects of eating, how many times per month on average over the past 3 months have you:

13. Made yourself vomit?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

14. Used laxatives or diuretics?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

15. Fasted (skipped at least 2 meals in a row)?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

16. Engaged in more intense exercise specifically to counteract the effects of overeating?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

17. How many times per month on average over the past 3 months have you eaten after awakening from sleep or eaten an unusually large amount of food after your evening meal and felt distressed by the night eating?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

18. How much do eating or body image problems impact your relationships with friends and family, work performance, and school performance?

Not at all		Slightly		Moderately		Extremely
0	1	2	3	4	5	6

19. How much do you weigh? If uncertain, please give your best estimate.
_____lbs.

20. How tall are you? _____ft. _____in.

21. What is your highest weight at your current height (not including pregnancy)? _____lbs.

V. Health Behaviors

We'd like to ask you some questions about your overall health and health behaviors.

1. Have you ever been diagnosed with any of the following mental health conditions? Check all that apply.
____ Anxiety
____ Depression
____ Eating disorder
____ Frequent headaches
____ Posttraumatic stress disorder (PTSD)
____ Sleep disorder
____ Substance use disorder
____ Traumatic brain injury (TBI)

2. In the last 12 months, have you sought treatment for any of these conditions?
    a. Yes
        i. Counseling
        ii. Medication
        iii. Self-help (e.g., reading a book, watching videos, etc.)
        iv. Support group
        v. Other _____
    b. No

3. Have you ever been diagnosed with any of the following health conditions? Check all that apply.

____ Arthritis
____ Asthma
____ Autoimmune disorders
____ Cardiovascular disease
____ Cancer
____ Chronic Obstructive Pulmonary Disease (COPD)
____ Diabetes
____ Hepatitis
____ Liver disease
____ Musculoskeletal injury
____ Osteoporosis
____ Problems with menstrual cycle
____ Stress fractures

4. In the last 12 months, have you sought treatment for any of these conditions?

a. Yes
    i. Counseling
    ii. Medication
    iii. Self-help (e.g., reading a book, watching a video, etc.)
    iv. Support group
    v. Other _____
b. No

5. Do you have a disability that requires the use of assistive devices (e.g., cane, hearing aid, etc.)?

a. Yes
b. No

6. Are you a current smoker?

a. Yes
b. No

7. Do you currently use other tobacco products, such as e-cigarettes or chewing tobacco?

a. Yes
b. No

8. Have you tried to quit using tobacco products in the past 12 months?

a. Yes
b. No

9. How often do you have a drink containing alcohol?

a. Never
b. Monthly or less
c. 2-4 times per month
d. 2-3 times per week
e. 4+ times per week

10. How many units of alcohol do you drink on a typical day when drinking? For instance, a can or bottle of beer, a glass of wine, a wine cooler, or one cocktail or a shot of hard liquor (like scotch, gin, or vodka).

a. 1-2
b. 3-4
c. 5-6
d. 7-9
e. 10+

11. How often have you had 6 or more units if female, 8 or more units if male, on a single occasion in the last year?

a. Never
b. Less than monthly
c. Monthly
d. Weekly
e. Daily or almost daily

12. Are you currently sexually active?

a. Yes
b. No

13. In the past month, how many sexual partners have you had? _____

14. During sexual encounters, how often do you use condoms?

a. Never
b. Sometimes
c. About half the time
d. Usually
e. Always

VI. Final questions

Thank you for answering our questions about childhood experiences and health. For our final questions, we would like to know:

1. Was something or someone from your childhood influential in your decision to join the military?

a. No
b. Yes, a positive experience/relationship _____
c. Yes, a negative experience/relationship_____

2. Is there anything we haven't asked about that you think is important for us to know?

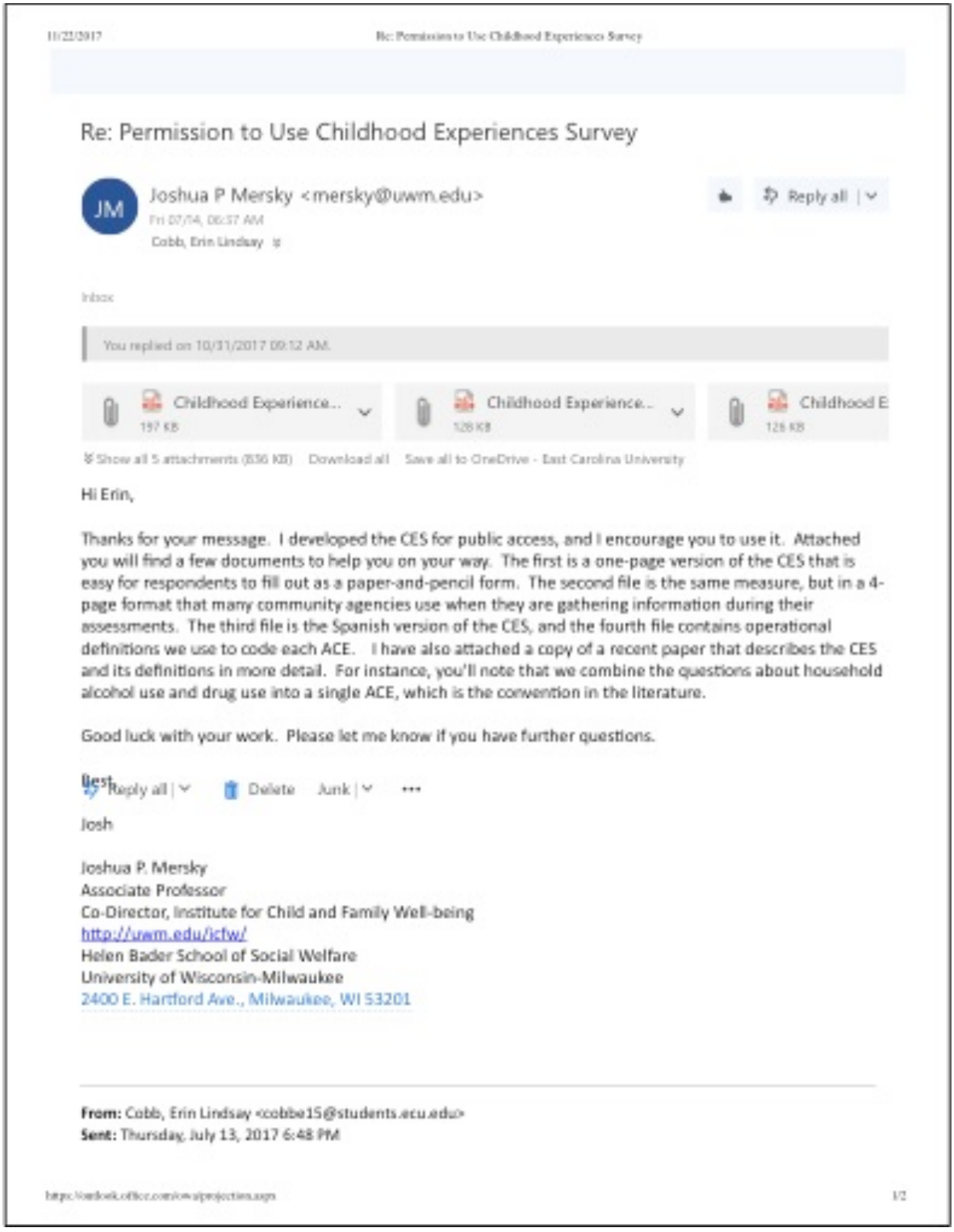
a. No
b. Yes _____

Thank you for your participation in our study. If any part of this study has caused you discomfort, please contact any of the following resources:

- Veterans Crisis Line – 24-hour, confidential support; 1-800-273-8255, press 1 or text 838255; https://www.veteranscrisisline.net/
- Military OneSource – 24-hour support, can connect to local resources, 800-342-9647 – http://www.militaryonesource.mil/

APPENDIX D: PERMISSION TO USE MEASURES

CHILDHOOD EXPERIENCES SURVEY



11/22/2017 Re: Permission to Use Childhood Experiences Survey

Re: Permission to Use Childhood Experiences Survey

JM Joshua P Mersky <mersky@uwm.edu>

Fri 07/14, 06:57 AM

Cobb, Erin Lindsay

Reply all

Inbox

You replied on 10/31/2017 09:12 AM.

Childhood Experience... 197 KB

Childhood Experience... 128 KB

Childhood E 128 KB

Show all 5 attachments (836 KB) Download all Save all to OneDrive - East Carolina University

Hi Erin,

Thanks for your message. I developed the CES for public access, and I encourage you to use it. Attached you will find a few documents to help you on your way. The first is a one-page version of the CES that is easy for respondents to fill out as a paper-and-pencil form. The second file is the same measure, but in a 4-page format that many community agencies use when they are gathering information during their assessments. The third file is the Spanish version of the CES, and the fourth file contains operational definitions we use to code each ACE. I have also attached a copy of a recent paper that describes the CES and its definitions in more detail. For instance, you'll note that we combine the questions about household alcohol use and drug use into a single ACE, which is the convention in the literature.

Good luck with your work. Please let me know if you have further questions.

Best

Reply all Delete Junk ...

Josh

Joshua P. Mersky
Associate Professor
Co-Director, Institute for Child and Family Well-being
http://uwm.edu/icfw/
Helen Bader School of Social Welfare
University of Wisconsin-Milwaukee
2400 E. Hartford Ave., Milwaukee, WI 53201

From: Cobb, Erin Lindsay <cobbe15@students.ecu.edu>
Sent: Thursday, July 13, 2017 6:48 PM

https://outlook.office.com/owa/projection.aspx 1/2

Hi Dr. Mersky,

My name is Erin Cobb and I am a doctoral candidate at East Carolina University under the direction of Dr. Angela Lamson. My dissertation will explore ACEs among military populations. I recently read your article "Rethinking the Measurement of Adversity: Moving Toward Second Generation Research on Adverse Childhood Experiences." I am very interested in looking at expanded ACEs and would really love to use the Childhood Experiences Survey that you described in your article. I was wondering if I could get your permission to use this measure. Please let me know if you have any questions or would like additional information about this research.

Thank you,
Erin

CHILDHOOD EXPERIENCES SURVEY: ADULT VERSION

All of the following questions refer to the time period before you were 18 years of age. Now, looking back before you were 18 years of age ...

	Never	Rarely	Sometimes	Often	Very often
1. As a child, how often did your family experience serious financial problems?	○	○	○	○	○
2. How often were you hungry because your family could not afford food?	○	○	○	○	○
3. How often were you homeless when you were growing up? (Note: This means having to stay somewhere like a transitional housing program, a shelter, a hotel/motel paid by voucher, someone else's home, a car or other vehicle, an abandoned building, anywhere outside, or anywhere else not meant for people to live).	○	○	○	○	○
4. How often did a parent or adult in your home ever swear at you, insult you, or put you down?	○	○	○	○	○
5. How often were you bullied or severely teased by other children or adolescents? (Note: This refers to bullying or teasing by children or adolescents of any age. They could have been older than you, younger than you, or the same age. It does not include experiences with adults or with siblings.)	○	○	○	○	○
6. Before age 18, how often was there an adult in your household who tried hard to make sure your basic needs were met? By "basic needs" we mean food, shelter, clothing, and medical care. (Note: This could be any adult in the household, not just a parent)	○	○	○	○	○
7. How often was there an adult in your household who made you feel safe and protected?	○	○	○	○	○

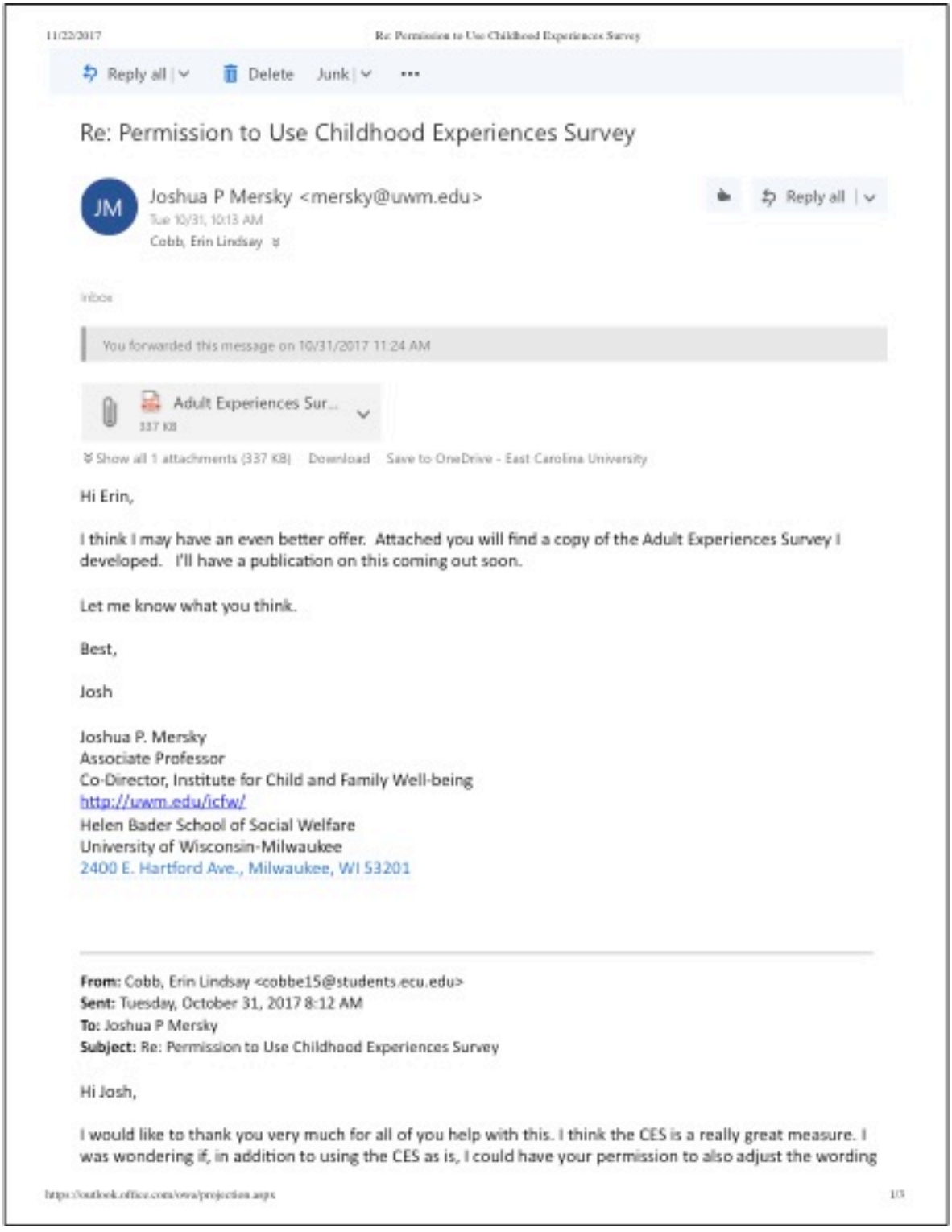
	Never	Once	More than once
8. Before age 18, how often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way? Do not include spanking.	○	○	○
9. How often did your parents or adults in your home ever slap, hit, beat, kick, or physically hurt each other?	○	○	○
10. How often did an adult, or anyone at least 5 years older than you, touch you sexually, try to make you touch them sexually, or force you to have sex?	○	○	○

	Yes	No
11. Did you live with anyone who was depressed, mentally ill, or suicidal?	○	○
12. Did you live with anyone who was a problem drinker or alcoholic?	○	○
13. Did you live with anyone who used illegal street drugs or who abused prescription medications?	○	○
14. Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?	○	○
15. Were your parents separated or divorced?	○	○
16. Was either one of your parents absent from your life for a long period of time? Do not include absence due to death of parent.	○	○
17. Before age 18, did you experience the death of a parent, caregiver, or sibling?	○	○
18. Before age 18, were you ever the victim of a violent crime? This refers to any violent act that was perpetrated by someone other than a parent or household family member.	○	○

	Not at all	Slightly	Moderately	Very	Extremely
19. Overall, how uncomfortable did you feel answering the questions on this survey?	○	○	○	○	○

Adapted from the Adverse Childhood Experience (ACE) module of the Behavioral Risk Factor Surveillance System for use by the Wisconsin Department of Children and Families, Family Foundations Comprehensive Home Visiting Program (Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Survey Questionnaire, Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012).

ADULT EXPERIENCES SURVEY



11/22/2017 Re: Permission to Use Childhood Experiences Survey

Reply all | Delete Junk | ...

Re: Permission to Use Childhood Experiences Survey

JM Joshua P Mersky <mersky@uwm.edu>
Tue 10/31, 10:13 AM
Cobb, Erin Lindsay

Reply all

Inbox

You forwarded this message on 10/31/2017 11:24 AM

Adult Experiences Sur...
337 KB

Show all 1 attachments (337 KB) Download Save to OneDrive - East Carolina University

Hi Erin,

I think I may have an even better offer. Attached you will find a copy of the Adult Experiences Survey I developed. I'll have a publication on this coming out soon.

Let me know what you think.

Best,

Josh

Joshua P. Mersky
Associate Professor
Co-Director, Institute for Child and Family Well-being
http://uwm.edu/icfw/
Helen Bader School of Social Welfare
University of Wisconsin-Milwaukee
2400 E. Hartford Ave., Milwaukee, WI 53201

From: Cobb, Erin Lindsay <cobbe15@students.ecu.edu>
Sent: Tuesday, October 31, 2017 8:12 AM
To: Joshua P Mersky
Subject: Re: Permission to Use Childhood Experiences Survey

Hi Josh,

I would like to thank you very much for all of you help with this. I think the CES is a really great measure. I was wondering if, in addition to using the CES as is, I could have your permission to also adjust the wording

https://outlook.office.com/owa/projection.aspx 1/3

ADULT EXPERIENCES SURVEY

Since you turned 18, how often has a romantic partner or spouse ever:	Never	Once	More than once
1. Slapped, hit, beat, kicked, or physically hurt you?	○	○	○
2. Screamed at you or threatened you with harm?	○	○	○
3. Physically abused you?	○	○	○
4. Emotionally abused you?	○	○	○
5. How often has anyone forced you to have sexual activities?	○	○	○

If once or more than once, who? Please choose all that apply.

☐ Partner or spouse ☐ Someone else you knew

☐ Relative ☐ Stranger

The following questions refer to the time since you turned 18.	Yes	No
6. Have you ever been the victim of a violent crime like a robbery or assault? *(This refers to any violent act by someone other than a spouse, partner, or household family member)*	○	○
If yes, how many times? _____		
7. Have you ever been the victim of a non-violent crime such as theft?	○	○
If yes, how many times? _____		
8. Have you been in prison or jail?	○	○
9. Has a spouse, partner, or someone you have lived with been in prison or jail?	○	○
10. Has a spouse, partner, or someone you have lived with been a problem drinker or alcoholic?	○	○
11. Has a spouse, partner, or someone you have lived with used illegal street drugs or abused prescription medications?	○	○
12. Has a spouse, partner, or someone you have lived with been depressed, mentally ill, or suicidal?	○	○

13. Have you ever been divorced or separated?

○ Yes ○ No, I've never been married

○ No, I'm married ○ No, my spouse is deceased

14. Have you experienced the loss of a pregnancy?	○	○
If yes, how many times? _____		
15. Have you experienced the death of someone very close to you?	○	○

If yes, please choose all that apply.

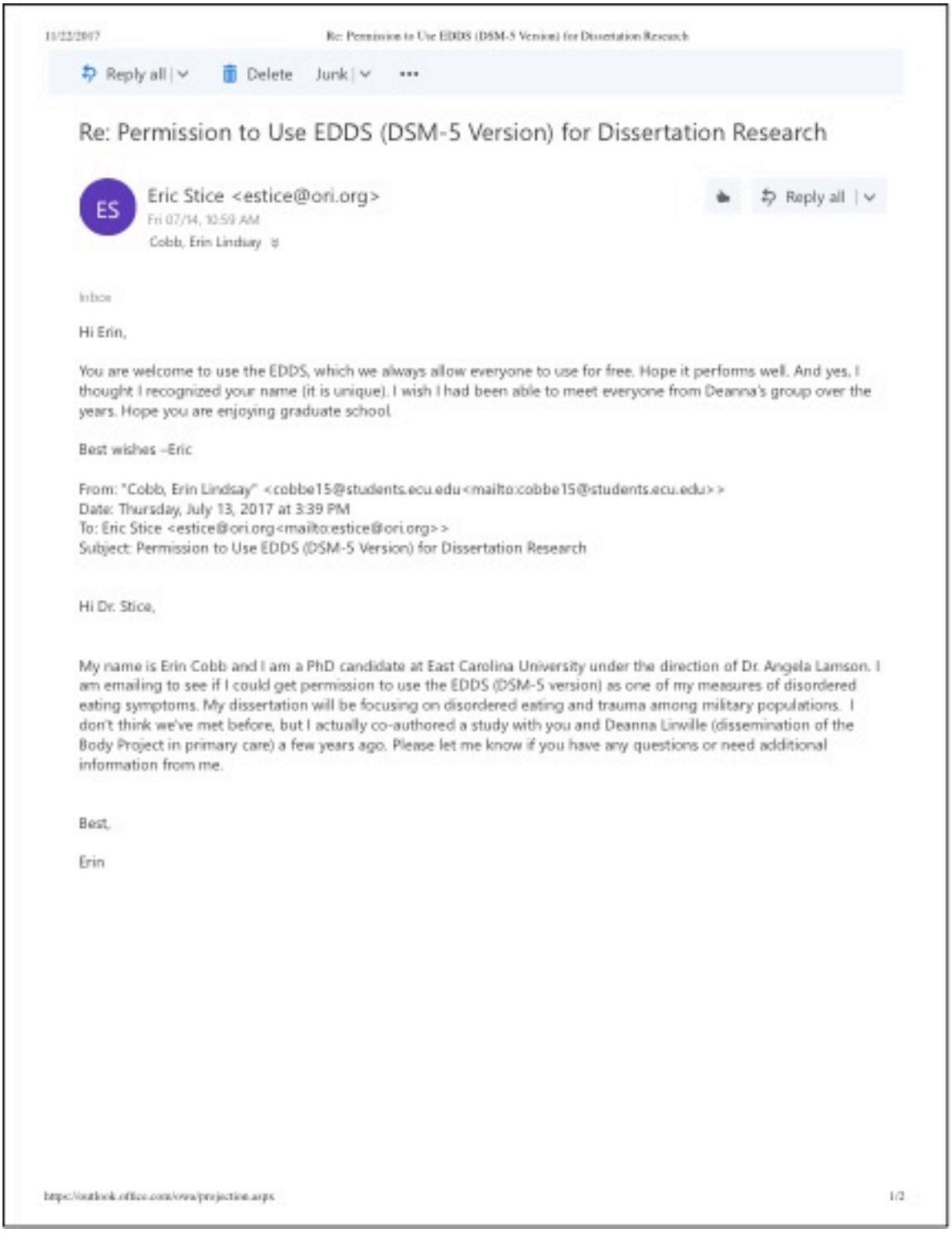
☐ Partner or spouse ☐ Child ☐ Parent

☐ Other relative ☐ Friend ☐ Other

Since you turned 18 years of age:	Never	Rarely	Sometimes	Often	Very often
16. How often have you experienced serious financial problems?	○	○	○	○	○
17. How often do you feel that you have been discriminated against?	○	○	○	○	○
18. How often have you and your family been hungry because you could not afford food?	○	○	○	○	○
19. How often have you been homeless*?	○	○	○	○	○

**"Homeless" means having to stay somewhere like a transitional housing program, a shelter, a hotel/motel paid by voucher, someone else's home, a car or other vehicle, an abandoned building, anywhere outside, or anywhere else not meant for people to live.*

For further information about this measure, contact: Dr. Joshua Mersky, University of Wisconsin-Milwaukee, mersky@uwm.edu



11/22/2017 Re: Permission to Use EDDS (DSM-5 Version) for Dissertation Research

Reply all | Delete Junk | ...

Re: Permission to Use EDDS (DSM-5 Version) for Dissertation Research

ES Eric Stice <estice@ori.org>
Fri 07/14, 10:59 AM
Cobb, Erin Lindsay

Reply all

Inbox

Hi Erin,

You are welcome to use the EDDS, which we always allow everyone to use for free. Hope it performs well. And yes, I thought I recognized your name (it is unique). I wish I had been able to meet everyone from Deanna's group over the years. Hope you are enjoying graduate school.

Best wishes –Eric

From: "Cobb, Erin Lindsay" <cobbe15@students.ecu.edu<mailto:cobbe15@students.ecu.edu>>
Date: Thursday, July 13, 2017 at 3:39 PM
To: Eric Stice <estice@ori.org<mailto:estice@ori.org>>
Subject: Permission to Use EDDS (DSM-5 Version) for Dissertation Research

Hi Dr. Stice,

My name is Erin Cobb and I am a PhD candidate at East Carolina University under the direction of Dr. Angela Lamson. I am emailing to see if I could get permission to use the EDDS (DSM-5 version) as one of my measures of disordered eating symptoms. My dissertation will be focusing on disordered eating and trauma among military populations. I don't think we've met before, but I actually co-authored a study with you and Deanna Linville (dissemination of the Body Project in primary care) a few years ago. Please let me know if you have any questions or need additional information from me.

Best,

Erin

https://outlook.office.com/owa/projection.aspx 1/2

EDDS – DSM-5 VERSION

Please carefully complete all questions, choosing NO or 0 for questions that do not apply.

Over the past 3 months…	Not at all	Slightly	Moderately	Extremely
1. Have you felt fat?	0 1 2 3	4	5	6
2. Have you had a definite fear that you might gain weight or become fat?	0 1 2 3	4	5	6
3. Has your weight or shape influenced how you judge yourself as a person?	0 1 2 3	4	5	6

4. During the past 3 months have there been times when you have eaten what other people would regard as an unusually large amount of food (e.g., a pint of ice cream) given the circumstances? . . . . . YES NO

5. During the times when you ate an unusually large amount of food, did you experience a loss of control (e.g., felt you couldn't stop eating or control what or how much you were eating? . . . . . YES NO

6. How many times per month on average over the past 3 months have you eaten an unusually large amount of food and experienced a loss of control? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

During episodes of overeating with a loss of control, did you…

7. Eat much more rapidly than normal? . . . . . YES NO

8. Eat until you felt uncomfortably full? . . . . . YES NO

9. Eat large amounts of food when you didn't feel physically hungry? . . . . . YES NO

10. Eat alone because you were embarrassed by how much you were eating? . . . . . YES NO

11. Feel disgusted with yourself, depressed, or very guilty after overeating? . . . . . YES NO

12. If you have episodes of uncontrollable overeating, does it make you very upset? . . . . . YES NO

In order to prevent weight gain or counteract the effects of eating, how many times per month on average over the past 3 months have you:

13. Made yourself vomit? . . . . . 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

14. Used laxatives or diuretics? . . . . . 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

15. Fasted (skipped at least 2 meals in a row)? . . . . 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

16. Engaged in more intense exercise specifically to counteract the effects of overeating . . . . . 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

17. How many times per month on avearge over the past 3 months have you eaten after awakening from sleep or eaten an unusually large amount of food after your evening meal and felt distressed by the night eating? . . . . . 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

18. How much do eating or body image problems impact your relationships with friends and family, work performance, and school performance?	Not at all 0	1	Slightly 2	3	Moderately 4	5	Extremely 6

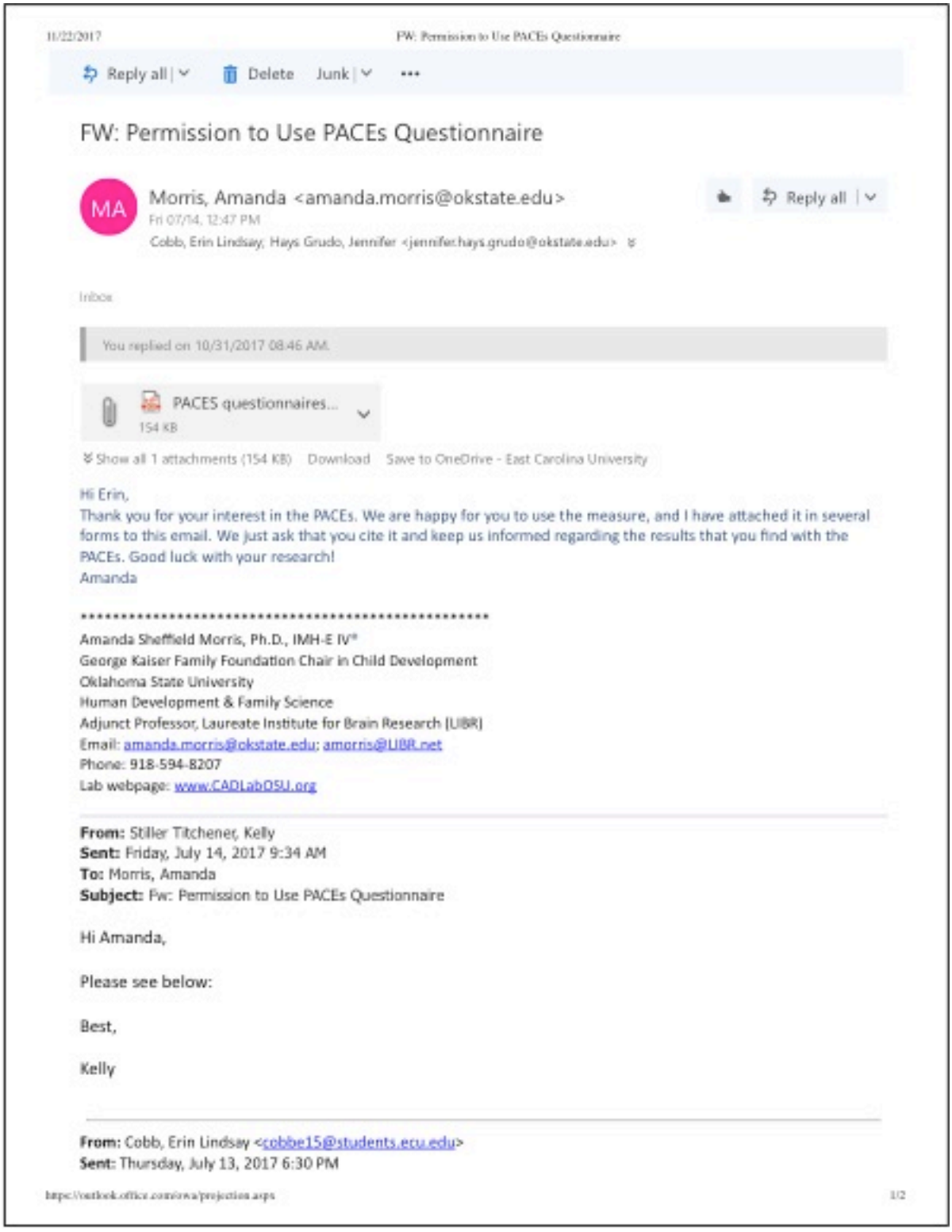
19. How much do you weigh? If uncertain, please give your best estimate. _____lbs. -or- _____kg.

20. How tall are you? _____ft. _____in. -or- _____cm.

21. What is your highest weight at your current height? _____lbs. -or- _____kg

22. What is your sex? MALE FEMALE

23. What is your age? _____



11/22/2017 FW: Permission to Use PACEs Questionnaire

Reply all | Delete Junk | ...

FW: Permission to Use PACEs Questionnaire

MA Morris, Amanda <amanda.morris@okstate.edu>
Fri 07/14, 12:47 PM
Cobb, Erin Lindsay; Hays Grudo, Jennifer <jennifer.hays.grudo@okstate.edu>

Reply all

Inbox

You replied on 10/31/2017 08:46 AM.

PACES questionnaires...
154 KB

Show all 1 attachments (154 KB) Download Save to OneDrive - East Carolina University

Hi Erin,
Thank you for your interest in the PACEs. We are happy for you to use the measure, and I have attached it in several forms to this email. We just ask that you cite it and keep us informed regarding the results that you find with the PACEs. Good luck with your research!
Amanda

****
Amanda Sheffield Morris, Ph.D., IMH-E IV®
George Kaiser Family Foundation Chair in Child Development
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From: Stiller Titchener, Kelly
Sent: Friday, July 14, 2017 9:34 AM
To: Morris, Amanda
Subject: Fw: Permission to Use PACEs Questionnaire

Hi Amanda,

Please see below:

Best,

Kelly

From: Cobb, Erin Lindsay <cobbe15@students.ecu.edu>
Sent: Thursday, July 13, 2017 6:30 PM

https://outlook.office.com/owa/projection.aspx 1/2

Hi Ms. Branch and Ms. Titchener,

I initially attempted to contact Ms. Love, but received an automatic reply directing me to you - hopefully one of you can help me! My name is Erin Cobb and I am a PhD student at East Carolina University under the direction of Dr. Angela Lamson. My dissertation will explore ACEs among military populations. Back in the spring, Ruth Slocum gave a presentation in one of my classes where she discussed the PACEs questionnaire. I would really love to use it as one of my measures of resilience. Would it be possible to get permission to use this measure in my dissertation?

Thank you,
Erin

PACES Questionnaire ID#_____

When you were growing up, prior to your 18th birthday:

1. Did you have someone who loved you unconditionally (you did not doubt that they cared about you)?	YES	NO
2. Did you have at least one best friend (someone you could trust, had fun with)?	YES	NO
3. Did you do anything regularly to help others (e.g., volunteer at a hospital, nursing home, church) or do special projects in the community to help others (food drives, Habitat for Humanity)?	YES	NO
4. Were you regularly involved in organized sports groups (e.g., soccer, basketball, track) or other physical activity (e.g., competitive cheer, gymnastics, dance, marching band)?	YES	NO
5. Were you an active member of at least one civic group or a non-sport social group such as scouts, church, or youth group?	YES	NO
6. Did you have an engaging hobby -- an artistic or intellectual pastime either alone or in a group (e.g., chess club, debate team, musical instrument or vocal group, theater, spelling bee, or did you read a lot)?	YES	NO
7. Was there an adult (not your parent) you trusted and could count on when you needed help or advice (e.g., coach, teacher, minister, neighbor, relative)?	YES	NO
8. Was your home typically clean AND safe with enough food to eat?	YES	NO
9. Overall, did your schools provide the resources and academic experiences you needed to learn?	YES	NO
10. In your home, were there rules that were clear and fairly administered?	YES	NO

Morris, Hays-Grudo et al. (2014). *Protecting parents and children from adverse childhood experiences (ACEs): Preliminary evidence for the validity of the PACEs*. Paper presented at the Society for Research in Child Development Special Topic Meeting: New Conceptualizations in the Study of Parenting- At-Risk, San Diego, CA.

APPENDIX E: EMAIL RECRUITMENT SCRIPT

To Whom It May Concern,

My name is Erin Cobb. I am a doctoral student from East Carolina University. I am conducting an anonymous survey for military personnel about childhood experiences and health behaviors. My hope is that this research will help us to better understand the connection between childhood experiences and health, and potentially improve healthcare. To participate, you must be 18 years or older and be on active duty in the U.S. military. The survey is voluntary.

Since your answers are to remain anonymous, PLEASE DO NOT PUT YOUR NAME ON THIS SURVEY.

The survey will take 20 minutes. Please answer the questions to your comfort level.

The results will be reported for the group of respondents as a whole.

Thank you for your consideration.

Please click the following link to take the survey:
https://redcap.ecu.edu/surveys/?s=LK8ML798MD

Sincerely,

Erin Cobb, MS
East Carolina University
cobbe15@students.ecu.edu