

THE ASSOCIATION BETWEEN CHILDHOOD ADVERSE LIFE EVENT HISTORY,
EATING DISTURBANCE, AND BODY MASS INDEX IN ACTIVE DUTY
MILITARY PERSONNEL

by

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Dissertation submitted to the Faculty of the
Medical and Clinical Psychology Graduate Program
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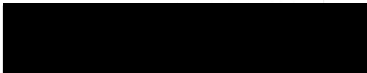
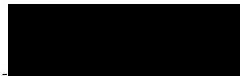
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DEDICATION

To J, J, and P – your courage gives me courage; your strength gives me strength.

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ABSTRACT

Title of Dissertation: The Association Between Childhood Adverse Life Event History, Eating Disturbance, and Body Mass Index in Active Duty Military Personnel

Jennifer L. Bakalar, M.S., 2014

Thesis directed by: Marian Tanofsky-Kraff, Ph.D., Professor, Department of Medical and Clinical Psychology

In parallel to the rising prevalence of overweight and obesity in the United States (U.S.), the U.S. military is also experiencing unprecedented rates of overweight and obesity among service members (1), which are associated with direct occupational consequences at both the individual and mission-wide levels (2; 35; 123). Additionally, U.S. service members report high rates of noncombat-related, pre-military adverse life event (ALE) exposure (e.g., child abuse, neglect, family violence) (21; 120; 130; 147; 160). Service members with such a history are significantly more likely to separate prematurely and they are at elevated risk for psychiatric morbidity (102; 108; 125; 147). However, there is a dearth of researching examining the role of ALE exposure on disturbed eating and weight in military personnel. In civilians, ALE exposure has been associated with deleterious medical and psychiatric sequelae (24; 25; 45). Further, psychosocial factors including alexithymia, impulsivity, and emotion dysregulation have been significantly associated with both ALE exposure and disturbed eating (26; 27; 33; 56; 126). Given the negative health and career implications of ALE exposure and overweight or obesity, a

cross-sectional, observational online survey study was conducted in active duty personnel to examine the association between childhood ALE history, eating disturbance, and body mass index (BMI). The final study sample consisted of 179 participants. Results revealed that total childhood ALE, interpersonally perpetrated ALE, traumatic ALE, and subjective impact of childhood ALE were positively associated with a global measure of eating disturbance, but no associations were observed for binge eating behavior specifically. Measures of alexithymia, impulsivity, and emotion regulation did not significantly mediate these associations. Traumatic childhood ALE and subjective impact were directly associated with higher BMI and these associations were mediated by global eating disturbance. Indirect effects of global eating disturbance were also observed for total childhood ALE and interpersonally perpetrated childhood ALE and BMI despite the absence of direct associations for these variables. These findings support the need to evaluate childhood ALE exposure among service members with eating and weight concerns. Moreover, these findings support the need for more sophisticated, sensitive assessments and remediation efforts for service members who fail to meet weight standards. Study results are intended to inform a more comprehensive, individualized approach to promoting duty fitness in our nation's warfighters.

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CHAPTER 1: BACKGROUND

THE SIGNIFICANCE OF OVERWEIGHT AND OBESITY IN THE U.S. MILITARY

Prevalence, Correlates and Impact of Overweight and Obesity in the U.S. Military

Upon entering the United States (U.S.) military, service members are expected to continuously adhere to a rigorous set of standards governing weight and physical fitness in order to optimize mission readiness (155). However, along with the growing public health crisis of overweight and obesity in both youth and adults nationwide (7; 106), the U.S. military is also experiencing unprecedented rates of overweight and obese among service members, with over a threefold increase in the number of active duty service members who received at least one weight-related diagnosis between 1998-2010 (1).

According to the 2011 Department of Defense (DoD) Health Related Behaviors Survey of Active Duty Personnel (15), approximately half (51%) of all service members were overweight and 12% were classified as obese, as indicated by a body mass index (BMI) of 25-30 kg/m² and >30 kg/m², respectively (6). The U.S. Coast Guard and the U.S. Army reported the highest prevalence of overweight service members with 57% of Coast Guardsmen and 52% of Soldiers reporting overweight status; the Air Force reported the lowest prevalence (48%). With regard to obesity, the Army reported the highest prevalence (16%) and the Marine Corps reported the lowest (5%).

The sociodemographic correlates of overweight and obesity in the U.S. military include higher age, being married, and Black or Hispanic/Latino race/ethnicity, which are consistent with statistics in the U.S. civilian population (131). However, active duty men are significantly more likely than women to be overweight or obese, which is contrary to civilian findings (131). Specifically, male Coast Guardsmen reported the highest

prevalence of overweight status (60%) and male Soldiers reported the highest prevalence of obesity (17%) whereas female Marines reported the lowest prevalence of overweight (14%) and obesity (1%) (15).

As compared to the general U.S. population, the rates of overweight and obesity in the military are comparatively lower (15). However, overweight and obesity in the military are associated with direct occupational consequences at the individual level as well as compromising overall mission readiness, which carry negative implications for national security. As outlined in DoD Directive 1308.1 (155), the required elements of physical readiness include healthy body composition, aerobic capacity, muscular strength, and endurance. Due to compromised cardiovascular fitness and reduced stamina, overweight and obese service members who do not meet these requirements demonstrate deficits in the ability to perform crucial physical tasks (e.g., load lifting) and these individuals may be more susceptible to environmental stressors (e.g., heat stress) (123), which would preclude optimal performance in a deployed setting or during physically demanding training exercises.

Service members who fail to meet weight standards show significantly higher rates of absenteeism and reduced productivity as compared to their healthy weight counterparts (35). Further, overweight and obese status is associated with elevated risk of premature attrition from the military, which results in the loss of the time, money, and other resources invested in recruiting, training, and caring for each service member and their dependents. Dall and colleagues (2008) determined that in 2006, approximately 1,200 first-time enlistees separated from the military prior to the end of their contract due to failure to meet weight status, which resulted in a total cost of \$61 million (2006

dollars) to the DoD (35). For obese and overweight service members who are retained, their weight status may make them susceptible to failing to make weight in the future, failing a fitness test, and it may negatively impact their annual fitness reports. These consequences may jeopardize promotion, lead to disciplinary action, and/or potentially result in eventual early separation from military service (28; 79; 141; 144).

In addition to the direct occupational consequences of overweight/obesity, U.S. military personnel are susceptible to the deleterious medical consequences including comorbidities such as coronary artery disease, diabetes mellitus, hypertension, dyslipidemia, hepatic disease, sleep apnea, and osteoarthritis (7; 141), which may impair the service member's duty fitness and contribute to lost duty time. Dall and colleagues (2008) reported that the DoD spent approximately \$1.1 billion in 2006 for the medical costs associated with being overweight and obese (35).

Combined with the medical sequelae of overweight and obesity and the resulting financial burden to the Military Health System (MHS), overweight and obese service members are at elevated risk for co-occurring psychiatric disorders. The prevalence of both overweight/obesity and psychiatric disorders has followed a similar trajectory over time, demonstrating sharp increases since the start of the Global War on Terrorism in 2001, following a period of relative stability preceding the war (1; 3). In a population-based study of active duty military personnel (N=10,040) serving between 2002-2003, Kress and colleagues (2006) found that obese men were 33% more likely to screen positive for depression and obese women were 3.4 times more likely to screen positive for depression as compared to the healthy weight comparison group (81). In addition to depression, overweight and obesity in the military has also been associated with higher

rates of posttraumatic stress disorder (PTSD) and sleep disturbance (123), which highlights the potential compounding effect of the co-occurrence of overweight status and psychiatric disorders, versus each condition alone.

Military Culture and Eating Disturbance Among U.S. Service Members

Given the emphasis on meeting rigorous physical readiness standards in the military (e.g., semiannual weigh-ins and physical fitness tests that directly impact eligibility for promotion), a constant awareness of eating behaviors, weight, and physical fitness is deeply ingrained in military culture (28; 97; 98; 148). Not surprisingly, research has revealed that rates of disordered eating are markedly elevated in this population in all service branches. Overall, the rate of eating disorders in the military is estimated to be approximately double to triple the base rates for civilian adults (i.e., approximately 10% versus 3-4%) (97; 98; 148). Additionally, the incidence of diagnosed eating disorders in the military has manifested a positive trajectory since the onset of the Global War on Terrorism in 2001, with a significant increase in formal eating disorder diagnoses documented between 1998-2006 (9).

In a sample of female sailors, McNulty (1997) found that approximately 1% met criteria for anorexia nervosa (AN), 13% met criteria for bulimia nervosa (BN), and 36% met criteria for Eating Disorder Not Otherwise Specified (EDNOS) (96). However, these findings do not appear to be service-specific. In a large tri-service sample of female service members (N = 1,278), McNulty (2001) found that approximately 1% met AN criteria, 8% met BN criteria, and 63% met EDNOS criteria (98). Eating disorder research tends to emphasize the incidence of eating disorders among females; both full threshold eating disorders and EDNOS are diagnosed more frequently among female service

members. However, in the military, eating disorders are observed at high rates in both sexes. In a large sample of male sailors (N = 1,425), McNulty (1997) found that approximately 3% met criteria for AN, 7% met criteria for BN, and 41% met criteria for EDNOS (97). Although the rates of AN and BN were not significantly different than those obtained in McNulty's female sample (74; 98), these figures are approximately 10- to 20-fold the rates of civilian adult men (22). Given that the military is approximately 85% male (9), this population is ideal for expanding the scientific literature on disordered eating in men.

Overall, the disordered eating behaviors with the highest observed prevalence among military personnel are binge eating behaviors, which are the hallmark behaviors of binge eating disorder (BED). Although BED did not become an official diagnosis in the DSM (4) until 2013, in 1997, McNulty reported that approximately 14% of male sailors endorsed binge eating at the time of participation, with approximately 25% endorsing the behavior within the previous three-months (97). In a co-ed sample of sailors (N = 489), Carlton and colleagues (2005) found that 10% endorsed binge episodes at least twice per week in the previous three months with and additional 30-40% endorsing binge-type behaviors (e.g., eating beyond satiety, eating in the absence of hunger) and 11% endorsing loss of control (LOC) eating (28).

Until the release of the DSM-5 (4) in 2013, BED was officially classified as EDNOS (currently Unspecified Feeding or Eating Disorder [UFED]), which is a heterogeneous category encompassing clinically significant eating disturbances that do not reach the threshold for a formal diagnosis. Despite not meeting diagnostic criteria for a threshold eating disorder, many individuals who receive this designation report

psychiatric and medical comorbidities and are at elevated risk for later development of a full-threshold eating disorder (136; 138). In the military, the added risk of disordered eating behaviors includes impaired operational readiness (9).

In parallel to the semiannual cycle of fitness evaluations, military personnel tend to manifest a unique cycle of disordered eating behaviors preceding and following these assessments, which distinguishes them from the civilian population. McNulty (1997) found that fasting behavior (i.e., skipping >1 meal each day for the purpose of making weight) was endorsed by approximately 15% of male sailors, with approximately one third (32%) of those sailors endorsing fasting behavior at least one month per year and 12% endorsing fasting for at least two months per year (97). Carlton and colleagues (2005) found that 25% of sailors in their sample reported fasting (28).

Research has also revealed links between anticipation of physical fitness assessments, disordered eating, and BMI. Carlton and colleagues (2005) found that 28% of their sample feared not making weight and 29% feared not passing the fitness test. Actual failure rates were 12-13% (28). Both anxiety about the physical fitness assessment and eating disturbance have been positively associated with BMI, with significant increases in both assessment-related anxiety and disordered eating observed in participants with a BMI ≥ 27.7 kg/m². With regard to specific disordered eating behaviors, participants who endorsed LOC eating and/or purging behavior reported significantly higher BMIs than those who denied LOC eating and purging behavior. Further, participants who endorsed disordered eating behaviors year-round had a significantly higher BMI on average than participants who endorsed disordered eating exclusively in anticipation for their physical fitness assessment (28).

Summary

Taken together, research to date reveals that overweight/obesity and disordered eating are significant problems for U.S. service members. The unique occupational environment of the military is likely a large contributing factor. In addition to high prevalence of overweight/obese service members and rates of disordered eating behaviors that exceed those reported for civilian populations, eating pathology appears to be positively correlated with BMI. Therefore, acquiring a better understanding of the factors that contribute to the development and maintenance of disordered eating in the military is paramount to the prevention of adverse mental and physical health outcomes in this population.

NONCOMBAT-RELATED ADVERSE LIFE EVENT EXPOSURE IN U.S. SERVICE MEMBERS

In parallel to prevalent overweight, obesity, and eating disturbances among military personnel, a substantial proportion of service members endorse a significant history of adverse life event (ALE) exposure. ALEs are a heterogeneous category of stressful, potentially traumatic events that may include, but are not limited to, experience and/or exposure to violence, abuse, familial and other interpersonal conflict, neglect, death, accidents, war, and natural disasters. The precise definition of a traumatic versus a non-traumatic ALE is an ongoing topic of considerable debate in the field of traumatic stress due to significant legal, clinical, and scientific implications (149). Based on DSM-5 criteria, a traumatic event is characterized by: *the threat or experience of death, a serious injury, or sexual violence* (4). Therefore, it is reasonable to conclude that all traumatic events fit the definition of ALEs, but ALEs may not necessarily be objectively traumatic (e.g., parental divorce).

The wide variability in how ALEs are defined as well as the temporal and situational factors associated with the events, present a logistical challenge for researchers attempting to understand the impact of these events on health and well-being. However, research to date strongly indicates that ALE exposure has important implications for both psychological and physical health. Specifically, the psychosocial stress caused by ALEs is known to be associated with a range of formal psychiatric disorders, most notably trauma and stressor-related disorders, as well as anxiety disorders, mood disorders, substance abuse disorders, among others (4; 45).

Prevalence of Childhood Adverse Life Event Exposure Among U.S. Service Members

Although combat stress and military sexual trauma are particularly salient ALEs associated with military service, childhood (i.e., pre-military), noncombat-related ALE histories are strikingly prevalent among military personnel, which has been the case for generations. The most widely studied event types reported in the empirical literature are childhood abuse (physical, sexual, and emotional), neglect, and family violence. In general, military personnel report child abuse and neglect histories ranging from comparable to markedly exceeding estimated national averages.

In civilians, findings from the population-based National Longitudinal Study of Adolescent Health (N = 15,197) (75) and the landmark Adverse Childhood Experiences study (N = 17,337) disseminated by the CDC (5) suggest that approximately 14-28% of individuals experience childhood physical abuse (CPA), 11% experience emotional abuse, 5-21% experience childhood sexual abuse (CSA), 5-10% experience physical neglect, and approximately 13% are exposed to domestic violence. Both sexes report

comparable rates of CPA and women tend to report CSA and emotional abuse 50-70% more often than men (5; 75).

In a large active duty sample (N = 7,850), Merrill and colleagues (2001) found that between 36-40% of male Navy recruits reported a history of CPA and 10-12% reported a history of CSA (100). In a sample of Navy recruits of both sexes (N=5,941), Merrill and colleagues (2004) later found that over half (55%) of the sailors they queried endorsed experiencing one or more forms of family violence during childhood, including CSA, CPA, or exposure to domestic violence (102). Similar to civilian findings, male and female recruits were about equally likely to report CPA, female recruits were more likely than male recruits to report CSA (26% vs. 10%) and exposure to domestic violence (38% vs. 28%). Further, female recruits were significantly more likely than male recruits to report exposure to more than one type of child abuse (30% vs. 19%) (102).

In a sample of Army trainees (N = 547), Patrick and colleagues (2011) found that approximately 30% of males and 56% of females reported a history of CSA or CPA (108). In a sample of active duty soldiers (N=1,378), approximately half reported CPA, 17% of males and 51% of females reported CSA, and 11% of males and 34% of females reported both (120). These consistent findings of prevalent child abuse and neglect histories among both men and women in the military highlight the necessity of acquiring a comprehensive understanding of the psychosocial and occupational implications of exposure to these stressors in order to inform efforts to optimize health, well-being, duty fitness, and retention.

Correlates and Implications of Noncombat-Related Adverse Life Event History in Military Personnel

Although current knowledge about the detailed impact of childhood adversity is limited, there is evidence to suggest that service members with ALE histories are at elevated risk for negative occupational and psychosocial consequences. Merrill and colleagues (2001) found that male sailors who endorsed exposure to any type of childhood violence were 36-67% more likely to separate from the Navy prematurely within four years; among female sailors, CSA was associated with a 29% increased likelihood of premature attrition (101). Patrick and colleagues (2011) obtained similar findings of attrition in their Army sample. Although there were no observed sex differences in rates of premature separation, males were comparatively more likely to separate for conduct infractions and females were more likely to separate for medical reasons (108).

In addition to occupational impact, a history of childhood ALE exposure appears to be associated with elevated rates of psychiatric morbidity; this finding has been observed consistently over time following deployment in support of multiple conflicts in recent U.S. history. Zaidi & Foy (1994) found that 45% of their sample of Vietnam Veterans diagnosed with PTSD had a childhood CPA history (161). Further, they found a significant positive correlation between CPA history and combat PTSD severity, suggesting a potential compounding effect of prior trauma on psychiatric morbidity following combat trauma. Bremner and colleagues (1993) found that Vietnam Veterans with PTSD reported significantly higher rates of both CPA and overall lifetime exposure to traumatic events as compared to Veterans without PTSD (23). In a sample of Desert Storm Veterans (N=297), Engel and colleagues (1993) obtained similar overall rates, but they found notable sex differences: 57% of females and 27% of males reported child

abuse histories. However, female Veterans with childhood abuse histories reported more severe PTSD symptoms than females without such a history; males with and without childhood abuse reported comparable PTSD symptomology (46).

Although findings from earlier studies are mixed with regard to the specific relationship between childhood ALE and its impact on the sequelae of ALE exposure in the line of duty, more recent research suggests that childhood adversity may independently contribute to subsequent psychiatric morbidity. Youssef and colleagues (2013) examined the differential impact of child abuse history on depression and suicidal ideation on Veterans (N = 1,488) who served in support of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Although combat exposure conferred a 1% increased likelihood of suicidal ideation, CSA doubled the likelihood of suicidal ideation and CPA increased the likelihood of suicidal ideation by 63% in their sample (160). Van Voorhees and colleagues (2012) obtained similar findings in a sample of OEF/OIF Veterans (N=1,301) such that childhood trauma independently predicted PTSD symptom severity after controlling for combat exposure (147). Furthermore, the authors found that other forms of childhood trauma beyond abuse contributed to PTSD symptoms independently from combat including non-interpersonal traumatic events (e.g., serious illness, accidents). Although the high prevalence of noncombat-related adverse life event exposure has been fairly well established in military personnel with some preliminary evidence to suggest that it impacts long-term psychological health and mission readiness, it remains largely unknown what impact these stressors have on service members' susceptibility to disturbed eating behaviors and unhealthy weight status.

Summary

Research reveals that U.S. military personnel report a higher than average rate of pre-military, noncombat ALE exposure, which appears to be associated with negative occupational and psychosocial consequences. To date, these studies have overwhelmingly emphasized the relationship between childhood abuse history and adult functioning in the military, which underscores the tremendous impact and implications of this type of adversity. However, there is some evidence suggesting that other types of pre-military ALEs also contribute to subsequent psychiatric morbidity among service members (147), which highlights the importance of expanding the examination ALE history to include other event types. Despite a growing body of literature supporting the psychosocial impact of pre-military ALE exposure in U.S. service members, the contribution of ALE history to the problem of eating disturbance and overweight/obesity in the military has yet to be explored in depth.

THE RELATIONSHIP BETWEEN ADVERSE LIFE EVENTS, EATING DISTURBANCE, AND WEIGHT IN THE CONTEXT OF A BIOPSYCHOSOCIAL CONCEPTUALIZATION

In the civilian literature, there is established empirical support for the relationship between childhood ALE exposure and subsequent medical and psychiatric morbidity. This body of literature spans multiple disciplines, which supports the conceptualization and examination of these associations using an integrated biopsychosocial framework (47).

Biologically, early chronic psychosocial adversity impairs the healthy stress response due to dysfunction in the hypothalamic-pituitary-adrenal (HPA) axis. This dysfunction results from prolonged activation and disruption of the negative feedback

loop that characterizes healthy HPA functioning. Findings from genetic and epigenetic studies, summarized by Ehlert (2013) further corroborate these relationships, revealing abnormal increases and decreases in gene expression due to hyper- or demethylation in key receptors, which deleteriously impact neurotransmission and endocrine pathways that govern the stress response (45). Ultimately, cortisol secretion is blunted and healthy stress reactivity is impaired. Long-term medical correlates of chronic ALE exposure include increased inflammatory processes, immune suppression, autoimmune disorders, coronary artery disease, hypertension, metabolic syndrome, diabetes mellitus, among others (32; 45; 95).

In parallel to medical correlates, psychosocial correlates of early adversity are observed in many domains, including disrupted attachments, affect regulation, behavioral control, and poor self-concept (32). Further, the longitudinal trajectory of these dysfunctions highlights the deleterious impact of chronic ALE exposure on typical psychosocial development. Individuals with substantial childhood ALE histories report elevated rates of interpersonal deficits, cognitive development, and psychiatric disorders including mood disorders, anxiety disorders, PTSD, personality disorders, among others (45; 56). At the interface of the psychological and physiological sequelae of childhood ALE exposure, is its relationship with eating disturbance and weight. In conjunction with literature describing the medical and psychosocial impact of ALEs, there is strong support for the longitudinal impact of early adversity on weight and eating disturbance over the life span.

Although it is beyond the scope of a single study to systematically examine the impact of ALE exposure in all relevant domains of functioning, the pervasive impact of

this exposure beyond the current focus on eating disturbance and BMI warrants mention. The breadth of the deleterious sequelae associated with early ALE exposure supports these stressors as nonspecific risk factors for a range of adverse psychological and physical health outcomes. Nonspecificity has been cited as an obstacle hindering the determination of causality between predictor and outcome variables in social sciences research. However, within integrated conceptual models, these factors still carry the potential to provide meaningful predictive value about the outcome variables in question (59). For the purposes of the current study, it will be paramount to consider the circumscribed focus on the relationship between ALE exposure, eating disturbance and overweight and obesity in the broader context of the biopsychosocial domains that affect and are affected by these phenomena.

Childhood Adverse Life Events and Overweight and Obesity

The relationship between ALE exposure and overweight/obesity has been examined across the lifespan in civilian populations and positive associations between early adversity and overweight status have been observed starting in childhood. Results from a prospective, longitudinal study of early development conducted at the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) revealed that children whose mothers reported that they sustained significant ALE exposure at ages 4-, 9-, and 11-years old were significantly more likely to be overweight by age 15 (i.e., BMI $\geq 85^{\text{th}}$ percentile). Specific factors that predicted overweight status in adolescence included number of ALEs (i.e., >4) and chronicity of ALEs (i.e., >4 ALEs endorsed at ≥ 2 time points). Age of occurrence and subjective impact of events (per parental report) were not significant predictors of overweight status at age 15 (88). These

findings are consistent with other longitudinal studies in child and adolescent populations that support childhood ALE as a risk factor for incident obesity (115; 152).

In addition to research findings describing the relatively proximal impact of early adversity on weight, there is a robust body of literature that supports the enduring effects of early ALE exposure into adulthood (67; 146; 152). Rohde and colleagues (2008) found that a self-reported history of CSA and CPA doubled the likelihood of both obesity and depression in a large sample of middle-aged women ($N = 4,641$) (116). The relationship between abuse history and obesity remained significant even after controlling for the effects of depression. However, other studies reveal that depression and PTSD mediate the relationship between childhood ALE and adult obesity (42). It should be noted that the bulk of the literature examining this relationship is conducted in female samples. Overall, given the elevated risk for a wide range of psychosocial and medical sequelae conferred by ALE exposure, it is crucial to examine the role of ALEs on weight in both sexes, in the context of potential co-occurring psychiatric disorders.

There is some evidence to suggest that obesity alone, independent of psychiatric morbidity, is predicted by a childhood history of ALE exposure. D'Argenio and colleagues (2009) compared a sample of obese participants with no DSM diagnoses, a sample of obese participants with a current DSM diagnosis, and a sample of healthy weight controls with no current or past DSM diagnoses (34). Overall, obese participants were 55-65% more likely to report a history of childhood ALE exposure than controls, but the authors also found that childhood trauma history predicted adult obesity independently of psychiatric morbidity. Further, this relationship remained significant when examining only non-maltreatment event types (e.g., severe parental marital

discord), highlighting the importance of examining the psychosocial impact of non-traumatic ALEs in obesity research. These findings are consistent with other studies of overweight and obese adults that obtained significant results for both traumatic and non-traumatic events (66; 115), although results remain mixed. In a prospective longitudinal study of the 1958 British birth cohort (N = 9,310), Thomas and colleagues (2012) report similar findings of childhood ALE exposure as a significant predictor of adult obesity after controlling for a range of socioeconomic variables. However, the authors did not find significant relationships between non-maltreatment ALEs and adult obesity. Overall the heterogeneity in the scientific literature with regard to the predictive value of early ALE for subsequent overweight and obesity highlights the complex interplay of psychosocial factors that determine long-term health and well-being.

In military personnel, although there is a dearth of research examining the association between ALE history and weight, the Millennium Cohort Study (76) revealed that ALE exposure was associated with moderate to extreme weight gain following deployment in both male and female service members. Specifically, female service members with a history of moderate ALE exposure at baseline (2001-2003) manifested a 30% increased chance of extreme weight gain (i.e., $\geq 10\%$) at follow-up (2004-2006) and a history of major ALE exposure was associated with a 54% increased chance of extreme weight gain, as compared to service members with mild or no ALE history at baseline. In male service members, both a moderate and major ALE history at baseline predicted a 30% increased chance of extreme weight gain at follow-up. In contrast, neither deployment nor combat exposure was a significant predictor of moderate or extreme weight gain in service members of either sex (76). These findings raise the question of

what role noncombat-related ALE exposure plays in eating behavior and excess weight gain in U.S. service members.

Childhood Adverse Life Events and Eating Disturbance

In order to better understand the relationship between ALE history and weight, an examination of disturbed eating beliefs and behaviors is necessary. Similar to research on ALE history and weight, the literature addressing the relationship between ALEs and eating disturbance is complex, which obscures the identification of causal mechanisms. Additionally, research to date has been conducted almost exclusively in civilians with an overrepresentation of females. Overall, a wide array of trauma types have been associated with disordered eating including but not limited to CPA, CSA, emotional abuse, bullying or teasing, parent divorce or separation, and death of a family member (78; 117; 118; 132; 140).

Although all three formal eating disorders have been linked to a significant ALE history, BN and BED appear to be the most strongly associated with ALE exposure (103; 132; 137). Further, similar to relationships between early ALE and weight, there is a high rate of co-occurrence of eating disorders and other psychiatric disorders among individuals with significant ALE histories. In an examination of trauma and eating disorders in the National Comorbidity Survey Replication Study, Mitchell and colleagues (2012) found that both men and women with AN, BN, and BED were significantly more likely to report trauma exposure than participants with no eating disorder history (103). Further, interpersonal trauma types (e.g., abuse) were especially prevalent among participants with eating disorders. Despite the high prevalence of trauma exposure in this sample (80-84%), the rate of PTSD was fairly low (4-10%) (103). Other studies

examining the formal PTSD diagnosis among eating disorder patients reveal a similarly wide range of PTSD prevalence that is typically discrepant from ALE exposure, ranging from 4-52% of participants with ALE histories meeting criteria for PTSD (61; 114; 140). Taken together, these findings reveal the wide array of negative psychosocial outcomes associated with an ALE history, beyond trauma and stressor-related disorders, that are deserving of focused research and clinical attention.

Although examining ALE history in individuals with eating disorders provides valuable information, the base rates of full threshold eating disorders are low; this means that in population based studies, these data are drawn from a very small subset of the study sample and have limited generalizability to subclinical populations. Therefore, the examination of eating disorder symptoms and sub-threshold eating disorders among individuals with and without a history of early ALE exposure is simultaneously needed. This body of research is growing; however, findings are inconsistent with respect to which ALE types confer risk for specific types of eating pathology and psychiatric outcomes.

Wonderlich and colleagues have extensively studied the relationship between ALE history and eating disturbances across the lifespan. In children, they found that CSA confers a significantly elevated risk for later eating pathology, including both restrictive and disinhibited eating behaviors (156; 158). Research in adult populations reveals similar findings, although CSA is most strongly associated with binge eating and purging behavior (29; 67). In a study differentiating eating pathology between a sample of participants with a CSA history only, CSA plus adult sexual trauma, adult sexual trauma only, and controls, Wonderlich and colleagues found that the CSA and CSA plus adult

sexual trauma samples were significantly more likely to meet DSM criteria for partial or full threshold BED. The sample with an adult sexual trauma history only was comparable to controls on partial and full-threshold BED (159). This important distinction highlights the unique long-term impact of CSA on later eating pathology.

With regard to risk for overweight and obesity, the examination of partial and full-threshold BED is of particular interest as individuals who manifest disinhibited eating behaviors (e.g., LOC eating) and attitudes are at significantly elevated risk for excess weight gain and overweight status (65; 133). Among treatment seeking populations of BED patients, the literature has shown a consistently high prevalence of childhood ALE exposure (approximately 70-80%), particularly all types of child maltreatment (8; 18; 65). The specific impact of that adversity remains unclear; most studies to date interpret ALE history as a general risk factor for eating pathology and obesity (18; 65).

These findings highlight areas where future research is needed, including expanding research efforts beyond treatment seeking populations and investigating more types and dimensions (e.g., chronicity) of ALE exposure. Additionally, improving the representation of men in eating disorders research, including studies of disinhibited eating behaviors, is both necessary and appropriate as the ratio of men to women who experience BED symptomology is more proportional than AN and BN (4). Although data are limited, emerging evidence reveals that male-specific eating pathology may not be captured by existing assessments, which have been predominantly validated in female samples (135). For example, although women may endorse an excessive drive for thinness or the desire to lose weight, men may be more likely to endorse an excessive

drive for muscularity and the desire to lose fat mass or gain lean mass (38). These differences are important to consider when interpreting data collected from samples of both sexes.

Summary

Among the broad range of medical and psychosocial sequelae of childhood ALE exposure, research in civilian populations supports a relationship between ALE and eating disturbance. However, there is substantial heterogeneity in the literature with respect to ALE types and characteristics that are predictive of eating disturbance. Attitudes and behaviors associated with BED are of particular interest in the current study as they are more strongly linked to early ALE exposure as compared to restrictive attitudes and behaviors (103) and they have been associated with elevated risk for overweight and obesity (8). There is not currently robust support for a casual link between ALE exposure and eating disturbance. However, existing research is limited largely to female, treatment-seeking individuals with BED. There is some support for the clinical significance of these relationships in non-treatment seeking populations who do not meet criteria for a full threshold psychiatric disorder (66). Therefore, an examination of the potential impact of ALE exposure on disturbed eating behaviors and attitudes that do not meet diagnostic criteria for a full threshold disorder, but may hold predictive value for adverse outcomes is warranted. Finally, these associations have yet to be examined comprehensively in military populations, who are less likely to meet full diagnostic criteria for a psychiatric diagnosis, but still manifest high prevalence of ALE exposure, disordered eating behaviors, and overweight/obesity.

PSYCHOSOCIAL FACTORS ASSOCIATED WITH ADVERSE LIFE EVENT EXPOSURE AND EATING DISTURBANCE

Given the established association between ALE exposure and eating disturbance, research efforts to identify and better understand the underlying mechanisms of this relationship are warranted to acquire a better understanding of etiology and to inform treatment. Due to the wide array of psychosocial factors that are correlated with both phenomena, it is most appropriate to examine emotional and behavioral constructs that consistently overlap between these populations.

Emotional Deficits

One of the hallmark features of chronic ALE exposure is impaired emotional awareness or *alexithymia* (32). Emotional awareness is defined as an individual's capacity to describe their own emotional experience as well as the emotional experience of others. Alexithymia is defined as an impairment of emotional awareness that is characterized by deficits in both cognitive and affective representations of internal and external emotional experience. Put simply, alexithymia represents the inability to identify emotions and put words to them (26; 83; 128). Research in treatment-seeking eating disorder samples has revealed higher levels of alexithymia among patients as compared to healthy controls (26; 30; 41; 60). In a sample of treatment-seeking adults with BED (N=100), alexithymia prevalence was approximately 40% and it predicted greater BED severity, poorer evaluation of weight and shape, and more severe depressive symptoms (27).

In a non-clinical sample of college-age women (N=254) De Berardis and colleagues observed a significant, large effect of alexithymia on predicting body

dissatisfaction and eating disorder risk. Specifically, the authors found that difficulty in identifying and naming emotions to be a core characteristic of elevated risk for eating disorders (39). In study comparing a clinical sample of obese women with BED to a nonclinical sample of obese women and a healthy control sample, De Chouly de Lenclave and colleagues (2001) found that obese participants as a whole had significantly higher rates of alexithymia than controls (53% vs 22%, $p < 0.05$). However, obese participants with and without BED did not differ significantly with respect to alexithymia, which raises the question of how alexithymia might play a role in sub-threshold eating pathology (40).

Although the precise mechanism remains unknown, alexithymia is posited to facilitate the pathogenesis and maintenance of disturbed eating behaviors across the eating disorders, potentially by fueling depressive symptoms (27; 39; 41). Specifically, an individual who has difficulty recognizing and naming emotions may misinterpret unpleasant or distressing emotions (e.g., sadness) as a physical perception of hunger. Therefore, researchers have proposed that individuals who manifest eating disturbances may engage in maladaptive eating behaviors as a means to modulate distressing emotional states (41; 142).

Emotion Regulation

Emotion regulation is another core domain where individuals exposed to ALE consistently manifest deficits; these deficits are often attributed to a lack of consistency in the immediate environment, disrupted development of appropriate self-soothing strategies, and a compromised sense of physical and/or emotional safety (32; 56). Emotion regulation describes an individual's ability to be aware of their emotional

experience and apply socially and situationally appropriate strategies to modulate the expression of their emotions via words or behaviors (63). In addition to its role in ALE exposure, extensive research has revealed an association between eating disturbances and emotion dysregulation, which contributed to the development and empirical support for Affect Regulation Theory (110).

According to Affect Regulation Theory, disinhibited eating behaviors, such as those observed in BED, are posited to originate as a behavioral means to cope with distressing affect. This conceptualization is consistent with the use of food to self-soothe, especially in individuals who struggle with alexithymia and may perceive their emotions as physical sensations, including hunger (i.e., somatization). However, eating as a means of affect regulation is a temporary solution, which typically perpetuates a cycle of maladaptive eating behaviors and risk for excess weight gain (142; 150).

Impulsivity

In parallel to the emotional deficits that are implicated in ALE exposure and eating disturbance, it is imperative to consider the role of behavioral regulation, given that much of eating pathology is behavioral. ALE exposure is associated with both excessive behavioral control (e.g., compulsiveness) as well as deficient behavioral control (32). With regard to eating pathology, rigid behavioral control is likely more characteristic of restrictive eating behaviors. In contrast, BED symptomology is most consistent with a lack of behavioral control, which is captured by the construct of impulsivity (87). Impulsivity is comprised of three primary domains: 1) motor (i.e., behavioral disinhibition), 2) inattention (i.e., focusing on a specific task), and 3) non-planning (i.e., failure to think ahead)(109).

Impulsivity has been implicated in BED and overweight/obesity in individuals of all ages. In children, a recent meta-analysis published by Thamotharan and colleagues (2013) revealed a moderate effect size for the association between impulsivity in overweight and obese children as compared to healthy weight controls (143). Wonderlich and colleagues found behavioral impulsivity to be the strongest mediator of CSA history and disordered eating in a pediatric sample (156). In adults, a recent systematic review revealed consistent findings of food-specific impulsivity in obese individuals diagnosed with BED. Obese individuals without a BED diagnosis tend to manifest significantly more impulsivity than healthy weight controls, but less than individuals with BED (126). Therefore, the specific role of impulsivity in eating disturbance and obesity in the warrants further investigation.

Summary

Despite a large body of research supporting the connection between ALE exposure, eating disturbance, and weight, the underlying mechanisms of those relationships remain largely ill defined. However, self-regulatory capacities including emotional and behavioral control are known sequelae of early ALE exposure as well as established correlates of eating disturbance and overweight/obesity.

Further, these psychosocial constructs are relevant to military populations, as military training requires rigid emotional and behavioral control in order to optimize performance, especially in deployed settings. However, a lack of emotional and behavioral control is characteristic of multiple psychiatric morbidities known to be prevalent among military personnel (e.g., PTSD, substance abuse) (72). Therefore, it would be appropriate to determine if these constructs play a role in the potential

connection between ALE exposure, eating disturbance, and overweight/obesity among active duty service members.

THEORETICAL FRAMEWORK AND CONCEPTUAL MODEL

The conceptual model for this study (see Figure 1) integrates a developmental and biopsychosocial conceptualization of the long-term impact of ALE exposure (45; 47) with an application of Affect Regulation Theory (110) to explain the nature of the relationship between childhood ALE exposure, eating disturbance, and BMI. Specifically, according to Polivy and Herman (1993), individuals with eating disturbances are posited to engage in pathological eating behaviors as a means of coping with distress and overwhelming affect (110).

Disturbed eating is a multifaceted construct with complex etiology including the interplay between a wide range of biological, psychological, and social factors (17; 150). Given the focus of the current study on the mission-wide significance of overweight and obesity in military personnel, eating disturbances associated with inappropriately high energy consumption, including binge eating symptoms (e.g., LOC eating) and disinhibited eating attitudes, will be emphasized. Further, the behavioral and emotional regulatory mediators are a select group of variables, which were purposefully included in the model based on the robust body of literature supporting their role in both ALE exposure and eating disturbance as well as the relevance of these functions to duty fitness in the military population. Similar to ALE exposure, although these regulatory deficits are nonspecific such that they are established correlates in a wide range of psychiatric disorders, their nonspecificity does not preclude the investigation and meaningful interpretation of their mediational role in the conceptual model (59). Rather, as described

previously, the findings of the study will shed light on the predictive value of these variables for interpretation and integration into a biopsychosocial framework for understanding the impact of ALE exposure on military personnel.

In summary, the conceptual model posits a) ALE exposure will be positively associated with eating disturbance; b) Psychosocial factors relating to emotional and behavioral regulation will mediate the relationship between ALE exposure and eating disturbance; c) ALE exposure will be positively associated with BMI in active duty personnel; and d) Eating disturbance will mediate the relationship between ALE exposure and weight status in active duty personnel.

CHAPTER 2: PURPOSE AND SIGNIFICANCE

Military service is characterized by numerous unique psychosocial stressors, including a high likelihood of frequent geographic relocation, extended separation from loved ones, rigorous physical and psychological training, and potential combat exposure. As such, maintaining a high level of physical fitness and psychosocial functioning is central to mission readiness, duty fitness, and U.S. national security. However, overweight and obesity are currently urgent public health concerns for the military and there is a robust body of literature highlighting the prevalence of early ALE exposure in both military personnel as well as individuals struggling with overweight and obesity. Therefore, research is warranted to elucidate the relationship between early ALE exposure, disturbed eating attitudes and behaviors, and BMI in this population of individuals whose occupation is characterized by significant duress.

If a significant relationship between childhood ALE exposure, eating disturbance, and BMI exists in the general military population, there would be a range of clinical and

occupational implications. First, by acquiring an understanding about the connection between ALE and eating attitudes and behaviors, it would expand our current understanding of factors beyond diet and exercise that contribute to negative weight-related occupational outcomes, such as failing a physical fitness test and compromising eligibility for promotion. Second, although much of the traumatic stress and eating disorders literature focuses on clinical populations, this study would provide an opportunity to examine ALE impact and disturbed eating in a relatively high functioning subset of the U.S. population. Although the deleterious sequelae associated with deployment have been well established, the susceptibility for other negative health outcomes associated with noncombat-related stressors has only begun to be explored; these findings would have important implications for long-term psychological and physical health and may be less intuitive to military providers and leadership than PTSD or depressive symptoms. Therefore, this knowledge could be incorporated into assessment, prevention, and intervention efforts to bolster duty fitness.

From a scientific perspective, the findings of this study are intended to build on existing literature by expanding the examination of ALEs in military personnel beyond child abuse and family violence, including the incorporation of a distinction between interpersonal and non-interpersonal event types as well as traumatic versus non-traumatic event types, which are shown to have unique clinical implications in the civilian literature. Second, if the study sample accurately represents the demographic composition of the military, the majority of participants would be male. Given that the eating disorders literature over-represents females, this study would provide the optimal opportunity to build on the existing body of knowledge about eating pathology in men.

Overall, this study is intended to contribute to a more individualized approach to the problems of ALE exposure and overweight/obesity in the U.S. military with the intent of informing future research and clinical efforts to improve duty fitness and the general well-being of U.S. service members.

CHAPTER 3: AIMS AND HYPOTHESES

The study specific aims and hypotheses are as follows:

- I. To systematically describe the types, chronicity, and subjective impact of childhood ALEs (i.e., prior to age 18) as reported by active duty military personnel. Specifically, event types will be defined as traumatic versus non-traumatic (4) and interpersonally perpetrated (e.g., child abuse) versus non-interpersonally perpetrated (e.g., natural disaster).
 - a. Hypothesis 1a: Significantly more childhood ALEs will be reported by enlisted personnel as compared to officers.
 - b. Hypothesis 1b: Female service members will be significantly more likely to report sexual abuse and assault than male service members.
- II. To determine if childhood ALE history is associated with eating disturbance among active duty military personnel (See Figure 3).
 - a. *Hypothesis 2a.* There will be a significant positive association between self-reported childhood ALEs and eating disturbance as indicated by endorsement of disordered eating behaviors and attitudes.
 - b. Hypothesis 2b: The severity of childhood ALE history (as indicated by type [interpersonally perpetrated vs non-interpersonally perpetrated], endorsement of the ALE as traumatic, chronicity [duration], and

subjective impact) will be positively associated with eating disturbance among active duty service members.

- III. To examine the emotional and behavioral self-regulatory factors underlying the association between ALEs and eating disturbance among active duty personnel (See Figure 4).
 - a. Hypothesis 3: The relationship between childhood ALE history and eating disturbance will be mediated by the following emotional and behavioral self-regulatory factors: alexithymia, impulsivity, and emotion dysregulation.
- IV. To determine if childhood ALE history is associated with BMI in active duty military personnel (See Figure 5).
 - a. Hypothesis 4a: There will be a significant, positive association between severity of self-reported childhood ALE history and BMI among active duty U.S. Service members.
 - b. Hypothesis 4b. Eating disturbance will mediate the relationship between childhood ALE and BMI in military personnel.

CHAPTER 4: METHOD

STUDY DESIGN

The study was a cross-sectional, observational online survey study examining the relationship between self-reported childhood ALEs, measures of psychosocial functioning, eating disturbance, and BMI in U.S. military service members. This study was an expansion of an ongoing three-pronged, multisite clinical trial entitled, *Prevention of Obesity in Military Communities* (POMC), which targets three critical time periods

during which U.S. military personnel and their families are especially susceptible to excess weight gain.

PARTICIPANTS

The target study population was U.S. service members who met the following criteria:

Inclusion criteria

- 1) Minimum age of 18 years
- 2) Active duty, activated reserve, or National Guard component
- 3) Proficient in spoken and written English language

Exclusion criteria

- 1) Retired, separated, or otherwise non-active duty status

PROCEDURES

Recruitment efforts were targeted toward active duty service members, and included a number of methods: 1. Flyers distributed, with permission, on community message boards located at USUHS and Madigan Army Medical Center at Joint Base Lewis-McChord in Tacoma, WA. 2. Study announcements distributed, with permission, on USUHS listservs; and 3. Online posts on social media websites (e.g., Facebook, LinkedIn, Reddit). All recruitment materials included the uniform resource locator (URL) and flyers included a Quick Response (QR) code for the study questionnaires, so that service members could access the survey anonymously at their convenience. Study recruitment materials included the study specific email address (i.e., life-events-study@usuhs.edu) and a telephone number for service members to call where they could leave a voicemail and/or speak with the PI directly.

The study was conducted online using a secure, web-based survey platform for which the USUHS Center for Health Disparities has an existing, valid membership (i.e., SurveyMonkey, Gold Edition; https://www.surveymonkey.com/pricing/?ut_source=header). When participants accessed the study webpage, a written statement of research including a description of the study including its purpose, procedures, estimated time required, possible benefits, risks, inconveniences, compensation structure, recourse in the event of injury, and contact information for questions and concerns was provided (see Appendix A). Further, prospective participants were informed that participation is entirely voluntary.

Before beginning the survey, prospective participants were asked to provide consent by indicating their agreement to the written statement of research on the study homepage. Then, they were provided with a list of resources to access in the event that they experience emotional discomfort during participation (see Appendix B). The survey platform included a progress bar to allow participants to track what proportion of the questionnaires remain after each page was complete. Page logic and question logic functions were implemented to maximize clarity and minimize participant burden by bypassing follow-up questions that did not apply to them. It was made clear to participants that they had the option to leave questions blank that they did not feel comfortable answering.

Direct financial compensation was not offered due to the anonymous format of the online questionnaires. As a token of appreciation for completing the study, participants were offered the option of choosing one of the following three nonprofit organizations whose mission directly benefits the U.S. military population to receive a \$5.00 donation on their behalf [permission obtained from USUHS Legal Department on 22Apr14; confirmed 11Aug14]:

1. **United Services Organizations (USO):** Available at: <http://www.uso.org/>
2. **Wounded Warrior Project (WWP):** Available at:
<http://www.woundedwarriorproject.org/>
3. **Team Red, White, & Blue (TRWB):** Available at: <http://teamrwb.org/>

STUDY MEASURES

1. **Demographic Questionnaire**. [Created for the present study]. The Demographics and Medical History Questionnaire contained 20 items asking participants to report on demographic variables (e.g., race/ethnicity, age), military service variables (e.g., branch, component, pay grade), and general medical history. Height and weight were queried to calculate Body Mass Index (BMI; kg/m^2). Specifically, participants were asked to provide their weight from their last official weigh-in as well as their current weight at the time of participation.

Approximate time to complete: 5 minutes

2. **Life Stressor Checklist – Revised (LSC-R)**. The LSC-R is a 30-item index of both traumatic events as well as stressful adverse life events that have the potential, but might not necessarily meet DSM criteria as traumatic (e.g., a family member being sent to jail). This measure is endorsed by the Department of Veterans Affairs, National Center for PTSD as a recommended trauma exposure measure for the assessment of military populations. It captures a wide array of ALEs that apply to both men and women, but it stands apart from other similar measures in that it was designed to include events that are specific to women, such as abortion (153; 154).

Approximate time to complete: 10-15 minutes

Accessibility: Permission and access granted to the study PI by the
National Center for PTSD on 07Jan2014

Scoring: The LSC-R was scored on five dimensions:

1) **Total number of events** – A sum score (0-30) was generated to determine the total number of distinct ALEs participants endorsed with onset during childhood (i.e., ages 0-17).

2) **Trauma exposure** – A sum score was generated to determine the number of childhood ALEs for which participants endorsed DSM PTSD Criterion A.

3) **Event type** - A sum score was computed to indicate the number of the following events that participants endorsed with onset before age 18:

- a) Interpersonally-perpetrated ALEs (e.g., abuse or assault)
- b) Non-interpersonally perpetrated ALEs (e.g., natural disaster or auto accident).

4) **Chronicity** - A variable was computed to reflect the maximum duration (1-17 years) for a single event out of all the childhood ALEs that each participant endorsed. All single incident events (e.g., death of a loved one) were coded “1” for duration.

5) **Weighted score** – A weighted sum score (0-150) was computed to describe participants’ subjective ratings on the 0-5 Likert-type scale for each childhood ALE, indicating how much it affected their lives in the past year.

Combat Exposure Scale (CES). The CES is a seven-item self-report measure that assesses combat-related stressors on a 0-5 Likert-type scale with

anchors pertaining to frequency, duration, and severity of events. Internal consistency ($\alpha = 0.85$) and test-retest reliability ($r = 0.97$) were satisfactory in studies testing the measure in samples of combat veterans (77).

Approximate time to complete: less than 5 minutes

Accessibility: Public domain

Scoring: Responses were coded according the criteria outlined by Keane and colleagues (1989) to obtain a total score of 0-41. Categorical classification is as follows:

0 – 8 = light combat

9 – 16 = light to moderate combat

17 – 24 = moderate combat

25 – 32 = moderate to heavy combat

33 – 41 = heavy combat

3. **Primary Care Health Questionnaire – 8 (PHQ-8)**. The PHQ-8 is an 8-item self-report depression screening measure based on the DSM diagnostic criteria for a major depressive episode. The measure was revised from the PHQ-9, such that the ninth item inquiring about suicidal ideation was omitted for use in populations that are expected to have a very low rate of endorsement and where appropriate clinical intervention is not feasible. The PHQ-8 achieved 88% specificity and 88% sensitivity for detecting major depressive disorder with a cutoff score of at least 10 out of 24 (82).

Approximate time to complete: less than 5 minutes

Accessibility: Public domain

Scoring: The PHQ-8 was coded dichotomously. A total score of ≥ 10 was coded as a positive screen for depression. Scores < 10 were coded as a negative screen for depression.

4. **Primary Care Posttraumatic Stress Disorder Screen (PC-PTSD)**. The Primary Care PTSD Screen is a brief 4-item self-report measure that assesses the presence or absence of core PTSD symptoms including: 1) avoidance; 2) detachment; 3) hypervigilance; and 4) nightmares. The PC-PTSD has been validated in civilian and military samples. A cutoff of two items endorsed out of four yielded high sensitivity (.91) and acceptable specificity (.72); when the cutoff was set at three items out of four, the measure yielded acceptable sensitivity (.78) and specificity increased (.87) (111).

Approximate time to complete: less than 5 minutes

Accessibility: Public domain

Scoring: The PC-PTSD was coded dichotomously and specificity was prioritized. Therefore, a total score of ≥ 3 was coded as a positive screen for PTSD. Scores < 3 were coded as negative for PTSD.

5. **Toronto Alexithymia Scale (TAS-20)**. The TAS-20 evaluates alexithymia with 20 items in three domains of emotional experience including identifying feelings, describing feelings, and externally-oriented experience. The TAS-20 has demonstrated adequate internal consistency ($\alpha = 0.81$) and test-retest reliability ($r = 0.77$) in both clinical and nonclinical populations (11; 12).

Approximate time to complete: 5 minutes

Accessibility: Purchased for the present study

Scoring: A total sum score was calculated for use in regression analyses (20-100). Descriptive statistics for the TAS-20 were computed as follows:

20 – 51 = no alexithymia

52-60 = possible alexithymia

>60 = alexithymia

6. **Barratt Impulsiveness Scale (BIS-11)**. The BIS-11 is a 30-item self-report measure assessing personality and behavioral construct of impulsiveness and it is the most widely used measure of this construct. The BIS-11 assesses three domains including inattention, motor impulsivity, and non-planning. It demonstrates adequate internal consistency ($\alpha = 0.81$) (109; 113).

Approximate time to complete: less than 5 minutes

Accessibility: Public domain

Scoring: The BIS-11 was scored according to the guidelines described by Patton and colleagues (1995) as outlined item-by-item on the official BIS-11 website: <http://www.impulsivity.org/measurement/bis11>. A total sum score was calculated (0-120) with higher scores indicating greater impulsivity.

7. **Difficulty in Emotion Regulation Scale (DERS)**. The DERS assesses capacity for emotion modulation, understanding, acceptance, and ability to behave desirably regardless of emotional state. Specific domains assessed include: a) Nonacceptance of emotional responses; b) Impulse control difficulties; c) Emotional awareness, Emotion regulation strategies; d) Difficulty in engaging in goal-directed behavior; and e) Emotional clarity. The DERS has established

psychometric properties, including high internal consistency ($\alpha = 0.93$) and adequate test-retest reliability ($r = 0.88$) (63).

Estimated time to complete: less than 5 minutes

Accessibility: Public domain

Scoring: A total sum score was calculated (0-180), with higher scores indicating greater emotion dysregulation.

8. **Questionnaire on Eating and Weight Pattern – Revised (QEWP-R)**. The QEWP-R was adapted to consist of 19 questions (i.e., demographic items omitted) inquiring about changes in eating and weight during adulthood. The QEWP-R has established psychometric properties, including reliability ($\alpha=0.75-0.79$) and validity (105; 134).

Approximate time to complete: 5 minutes

Accessibility: Public domain

Scoring: Responses were coded into three categories based on classification by Nangle and colleagues (105): 1) Binge Eating Disorder (BED); 2) Nonclinical Bingeing (NCB); 3) No Diagnosis (ND).

9. **Eating Disorder Examination - Questionnaire (EDE-Q)**. Eating disorder symptoms were assessed with the EDE-Q (short version, 26 items), which is considered to be the gold standard eating disorder assessment. It has established psychometric properties including, internal consistency ($\alpha=0.70-0.93$), test-retest reliability ($r=0.57-0.82$ for the four subscales), and criterion validity and

convergent validity with other scales assessing eating and general psychopathology (19; 48).

Approximate time to complete: 5 minutes

Accessibility: Public domain

Scoring: Responses were scored based on the total means of the four subscales, which creates a Global Score: Eating Concern, Shape Concern, Weight Concern, and Restraint

DATA ANALYTIC APPROACH

To address Aim I, descriptive statistics were computed for participants' responses to the LSC-R for ALEs that participants reported occurred or began between 0 – 17 years. Specifically, in accordance with Figure 2, frequencies and means were calculated, as applicable, for total number of childhood ALEs endorsed, total number of traumatic childhood ALEs endorsed, total number of interpersonally perpetrated and non-interpersonally perpetrated ALEs, maximum duration for a single ALE out of all the childhood ALEs each participant endorsed, and LSC-R weighted score. Chi-square analyses were conducted to address Hypotheses 1a and 1b, evaluating differences between officers and enlisted personnel on the aforementioned LSC-R variables and sex differences on sexual abuse and assault variables.

The primary analyses for Aims II-IV were conducted using a series of multiple linear regression models for continuous dependent variables (DV) (i.e., EDE-Q score and BMI) and binary logistic regression analyses for dichotomous DVs (i.e., QEWP-R). Data were screened for outliers according to procedures outlined by Tukey (145). Outliers were Winsorized such that outliers fell 1.5-times the interquartile range below the 25th

percentile or above the 75th percentile of the distribution. Reported results reflect models run with the original data except in select cases where models with Winsorized data revealed statistically meaningful differences, in which case both findings were reported.

Sample diagnostics were conducted to check for violations in the assumptions for regression according to the procedures outlined by Tabachnick & Fidell (139). Normality was assessed by visual inspection of the Normal Probability Plot (P-P) of the standardized residuals and the scatterplot of the residuals for each model were inspected for linearity and homoscedacity, which revealed satisfactory results. However, the distributions for several independent variables were positively skewed: interpersonally perpetrated ALE, traumatic ALE, and LSC-R weighted score. Log-transformation did not satisfactorily approximate a normal distribution. Therefore, regression models were repeated with dichotomously coded interpersonally perpetrated and traumatic childhood ALE variables (i.e., presence or absence) to determine if findings would reveal statistically meaningful differences. Reported results reflect models run with the original data except in select cases where the models with dichotomized variables revealed statistically meaningful differences, in which case both findings were reported. The LSC-R weighted score would be conceptually invalid as a dichotomous variable. Given the satisfactory residual plots in those models, the original coding of the LSC-R weighted score as a continuous variable was retained. Finally, collinearity diagnostics were performed; Tolerance values were greater than 0.10 and Variance Inflation Factor (VIF) values were less than 10 for each independent variable.

The individual regression models conducted for Aims II-IV are summarized in Figure 6 using the variables displayed in Figures 3-5. For models with the QEWP-R as

the DV, fewer than 10% of participants met criteria for binge eating disorder (BED; $n = 6$, 3.4%); therefore, the BED and NCB categories were collapsed and binary logistic regression analyses were conducted using a dichotomous classification of participants who endorsed binge eating (i.e., BED and NCB) and ND participants as the reference group.

The following covariates: age (continuous), sex (dichotomous: male or female), race (dichotomized: Caucasian/Non-Hispanic white or racial/ethnic minority), education (dummy coded: [1] Less than 4-year college, [2] 4-year college degree, and [3] at least some graduate study or graduate degree), pay grade (dichotomous: officer or enlisted), combat exposure (dichotomous: yes or no), depression screen (dichotomous: yes or no), and PTSD screen (dichotomous: yes or no) were considered in each of the regression models. Variable reduction procedures were implemented to maximize parsimony of the final regression models. Specifically, the covariates that achieved statistical significance ($p < .05$) in at least one model in each aim were retained in all models for that aim. All covariates that failed to reach statistical significance in all regression models within each aim were removed from the final models (see Figure 6b).

Mediation analyses were conducted using Efron's (1982) bias-corrected bootstrapping approach (44). Bias-corrected bootstrapping is a statistical approach to mediation analysis that involves drawing repeated samples from the final study sample (N), with replacement, to generate a minimum of 1,000-5,000 resampled datasets via computer simulation. Mediation analysis is defined as an estimate of whether variation in a predictor variable (X) can account for a significant degree of change in the outcome variable (Y) via change in a mediating variable (M) (16).

Bootstrapping tests mediated effects by providing an estimate of the size of the indirect (i.e., mediation) effect using the resampled datasets (68). The mediated effect equals the product of the path coefficients of Path A (association $X \rightarrow M$) and Path B (association $M \rightarrow Y$), and calculated as ab . Bias-corrected bootstrapping is characterized by a number of strengths as compared to other mediation techniques. First, it generates more accurate confidence intervals than other methods (89) and the bias-correction corrects for skew in the sample distribution (58). Further, it is more powerful than alternative techniques and can detect indirect effects using a smaller sample size (58). Finally, bootstrapping is a nonparametric statistical approach, thereby making no assumptions about the sample distribution, which may be a limitation of other methods (68).

Mediation analyses were conducted using Hayes's PROCESS macro for SPSS (69). For hypotheses testing mediation (Hypotheses 3 and 4b), regression analyses were first run to determine if there was a statistically significant association between X (the predictor) and M (the mediator) variables (i.e., Path A, $X \rightarrow M$). According to procedures outlined by Baron and Kenny (16), if there was not a statistically significant $X \rightarrow M$ association (i.e., Path A was not statistically significant), then mediation analyses were not conducted. If regression results revealed a statistically significant $X \rightarrow M$ association, mediation analyses were conducted. For each mediation model, unstandardized indirect effects were computed for 5,000 resampled datasets and 95% confidence intervals were generated for estimates of the indirect effects at the 2.5th and the 97.5th percentiles.

Power Analyses. *A priori* power analyses were conducted with G*Power, v3.2 (49) with a significance threshold of $\alpha = 0.05$. The study analyses with the

requirement for the greatest minimum sample size were the multiple linear regression models. Power analyses indicated that a minimum sample size of 167 participants would provide 80% power to detect a small-medium effect (Cohen's $f^2 = 0.08$) in a multiple linear regression model with five tested predictors and twenty total predictors.

CHAPTER 5: RESULTS

DESCRIPTIVE ANALYSES

A total of 359 individuals accessed the study surveys, of which 255 participants endorsed meeting study inclusion criteria, provided consent and initiated the survey (i.e., responded to at least one question). Participants who completed at least 80% of all study measures were retained in the final sample ($N = 179$). Participant flow is depicted in Figure 7. Group differences in demographic and military service characteristics between the final sample ($N = 179$) and the participants who dropped out ($n = 76$) are depicted in Tables 2 and 3. All subsequent study results reflect data from the final sample ($N = 179$).

Participant Demographic and Military Service Characteristics

Approximately half of participants identified as male ($n = 96$, 53.6%) and half female ($n = 83$ 46.4%). They ranged in age from 18 to 50 years with a mean age of 32.01 ± 7.34 years. Most participants identified as non-Hispanic white/Caucasian ($n = 135$, 75.4%). Over half of participants were married ($n = 104$, 58.4%) and over half of participants reported that they completed at least some graduate study ($n = 33$, 18.4%) or earned a graduate degree ($n = 70$, 39.1%). All demographic characteristics are summarized in Table 2.

With regard to military service characteristics, 40% ($n = 71$) of participants were in the Army, 32% ($n = 57$) were in the Air Force, 26% ($n = 46$) were in the Navy, 2% (n

= 4) were in the Marine Corps, and one participant was in the Coast Guard. The majority of participants were officers (n = 121, 67%) and approximately half of participants identified as junior officers (i.e., O1-O3, n = 92, 51%). Approximately half of the sample endorsed a deployment history (n = 93, 52%). Nearly half of the sample endorsed light or light-moderate combat exposure (n = 78, 44.6%) and 15 (8.4%) participants endorsed moderate, moderate-heavy, or heavy combat exposure on the Combat Exposure Scale. Military service characteristics are summarized in Table 3.

Participant Depression and PTSD Screens

Based on the PHQ-8, approximately 15% (n = 27) of participants screened positive for depression, which is nearly double the prevalence established in a large population based study (8.6%) (82).

According to the PC-PTSD, approximately 16% (n = 29) of participants screened positive for PTSD. The mean PC-PTSD score for male participants was 0.71 ± 1.32 , which is approximately $\frac{1}{2}$ standard deviation below the mean of the norms for a sample of male general medical VA patients. The mean PC-PTSD score for female participants was 0.92 ± 1.40 , which was approximately $\frac{1}{3}$ standard deviation below the mean of the norms for a sample of female general medical VA patients (111).

Participant Psychosocial Characteristics

According to the TAS-20, 13.4% (n = 24) of participants met criteria for possible alexithymia and 9% (n = 16) met or exceeded the cutoff for alexithymia. The mean score for male participants (n = 96) was 42.56 ± 10.65 and the mean score for female participants (n = 83) was 44.34 ± 13.84 , which is consistent with the norms for a nonclinical sample (11).

The mean TAS-20 score for enlisted personnel (48.18 ± 12.88) was significantly higher than the mean score for officers (41.15 ± 11.28); $t(177) = -3.71, p < .001$, two-tailed). The magnitude of the differences in the mean TAS-20 score (mean = -7.03 , 95% CI: -10.77 to -3.29) was moderate ($d = .56$) and the means for both groups fell within norms for a nonclinical population (11).

On the BIS-11, the mean total score for impulsiveness was 58.02 ± 10.56 for male participants and 56.26 ± 12.18 for female participants. These scores are approximately $\frac{1}{2}$ standard deviation below the norms for a nonclinical sample of undergraduate men and $\frac{3}{4}$ of a standard deviation below the norms for a nonclinical sample of undergraduate women (109).

The mean BIS-11 score for enlisted personnel (61.06 ± 11.85) was significantly higher than the mean score for officers (55.40 ± 10.67); $t(177) = -3.19, p < .01$, two-tailed). The magnitude of the differences in the mean BIS-11 score (mean = -5.66 , 95% CI: -9.16 to -2.16) was moderate ($d = .48$) and the means for both groups fell within norms for a nonclinical population (109).

On the DERS, the mean total score for emotion dysregulation was 68.52 ± 19.56 for male participants and 75.82 ± 28.57 for female participants. These means are approximately $\frac{2}{3}$ standard deviation below the norms for a nonclinical sample of men and consistent with the norms for a nonclinical sample of women, although the standard deviation for female participants was higher than the standard deviation of 20.72 reported by Gratz & Roemer (63).

The mean DERS score for enlisted personnel (78.03 ± 27.46) was significantly higher than the mean score for officers (69.05 ± 22.32); $t(177) = -2.33, p < .05$, two-

tailed). The magnitude of the differences in the mean DERS score (mean = -8.98, 95% CI: -16.60 to -1.36) was small to moderate ($d = .35$) and the means for both groups fell within norms for a nonclinical population (63).

Participant Eating Behaviors, Eating Attitudes, and Body Mass Index

On the QEWP-R, 31 (17.3%) of participants endorsed experiencing a loss of control over eating during the past three months. Six (3.4%) participants endorsed full diagnostic criteria for BED, which is consistent with the 2-5% base rates in the general population (129).

On the EDE-Q, the mean global score was 1.35 ± 1.14 for male participants, which is 1.75 standard deviations above the norms established for one nonclinical sample of men (0.44 ± 0.52) (112) and within the norms, at approximately the 70th percentile, for another nonclinical sample of men (85). The mean EDE-Q global score for female participants was 1.97 ± 1.45 , which falls between the 65th and 70th percentile of norms for a nonclinical sample of women (104).

With regard to BMI, the mean self-reported BMI at last official weigh-in ranged from 18.01-35.26 kg/m² with a mean of 25.03 ± 3.16 kg/m² and the mean current self-reported BMI ranged from 18.29-36.61 kg/m², with a mean of 25.34 ± 3.28 kg/m². Four participants were missing data for current BMI and one participant was missing data for BMI at last official weigh-in. The correlation between last official and current BMI was nearly perfect ($r = .97, p < .001$). Therefore, study analyses were conducted using self-reported BMI from the last official weigh-in as the dependent variable for Aim IV with the exception of the participant missing that value, for which their current self-reported BMI was used. With regard to BMI classification, approximately half of the sample's

self-reported BMI (51%, $n = 91$) was in the normal range ($18.5\text{-}24.9\text{ kg/m}^2$), 40.8% ($n = 73$) were in the overweight range ($25\text{-}29.9\text{ kg/m}^2$), 7.3% ($n = 13$) were in the obese range ($\geq 30\text{ kg/m}^2$), and one participant was in the underweight range ($<18.5\text{ kg/m}^2$) at the last official weigh-in.

RESULTS FOR SPECIFIC AIM I: CHILDHOOD ADVERSE LIFE EVENT EXPOSURE

Descriptive Statistics. Overall, approximately 75% ($n = 135$) of participants endorsed at least one childhood ALE with a mean of 2.45 ± 2.50 and maximum of 13 total ALEs. Forty percent ($n = 73$) of participants reported that at least one childhood ALE was traumatic, and overall, participants reported a mean of 0.87 ± 1.48 traumatic childhood ALEs. Approximately half (48%, $n = 86$) of participants endorsed experiencing at least one interpersonally perpetrated childhood ALE with an overall mean of 1.15 ± 1.64 interpersonally perpetrated childhood ALEs. With regard to childhood maltreatment specifically, 22% ($n = 40$) participants endorsed a history of childhood emotional abuse or neglect. Eight percent ($n = 15$) endorsed childhood physical neglect. Approximately 28% ($n = 50$) of participants endorsed witnessing family violence during childhood. Twenty percent ($n = 36$) participants endorsed childhood physical abuse. Nine percent ($n = 16$) endorsed childhood sexual abuse and approximately 5% ($n = 8$) endorsed rape during childhood.

Sixty percent ($n = 108$) of participants endorsed at least one non-interpersonally perpetrated childhood ALEs with a sample mean of 1.25 ± 1.41 non-interpersonally perpetrated childhood ALEs. With regard to the maximum duration for a single childhood ALE, responses ranged from 0 (for participants who denied experiencing any childhood ALEs) to 17 years. The mean maximum duration for a single childhood ALE

was 3.32 ± 4.14 years. The LSC–R weighted score in the study sample ranged from 0–35 out of a possible maximum of 150. The mean LSC–R weighted score was 4.49 ± 5.72 . All descriptive statistics for the LSC–R are depicted in Table 4.

Hypothesis 1a. Hypothesis 1a stated that significantly more childhood ALEs would be reported by enlisted personnel as compared to officers. Findings indicated significant differences between enlisted personnel and officers such that enlisted personnel reported a higher proportion of total childhood ALEs, $\chi^2(5, n = 179) = 11.45, p = .04, V = .25$, a higher proportion of non-interpersonally perpetrated childhood ALEs, $\chi^2(3, n = 179) = 15.26, p < .01, V = .29$, and greater maximum duration of a single childhood ALE, $\chi^2(4, n = 179) = 10.95, p = .03, V = .25$. No statistically significant differences were observed for traumatic childhood ALE, interpersonally perpetrated childhood ALE, or LSC–R weighted score. Therefore, Hypothesis 1a was partially supported; findings for this hypothesis are summarized in Table 5.

Hypothesis 1b. Hypothesis 1b stated that female service members would be significantly more likely to report childhood sexual abuse and assault than male service members. Significant differences were observed between male and female participants such that a greater proportion of women than men endorsed childhood sexual harassment, $\chi^2(1, n = 179) = 6.33, p < .05, phi = .25$, sexual molestation, $\chi^2(1, n = 179) = 10.21, p < .01, phi = .26$, and childhood sexual assault, $\chi^2(1, n = 179) = 4.10, p < .05, phi = .18$. Therefore, Hypothesis 1b was supported; findings for this hypothesis are summarized in Table 6.

RESULTS FOR SPECIFIC AIM II: CHILDHOOD ADVERSE LIFE EVENT EXPOSURE AND EATING DISTURBANCE

Using the covariate reduction strategy summarized in Figure 6b, all final models in Aim II were adjusted for age, sex, education, pay grade, combat exposure, and depression screen.

Hypothesis 2a. Hypothesis 2a stated that there would be a significant positive association between self-reported childhood ALEs and eating disturbance. Results revealed that total childhood ALEs explained a significant amount of the variance in EDE-Q global score after adjusting for the aforementioned covariates, $F(8, 169) = 9.30, p < .001, R^2 = .306$ and total childhood ALEs were positively related to the EDE-Q global score ($beta = .14, p < .05, R^2 = .02$).

For the association between total childhood ALEs and presence versus absence of LOC eating, the full model was statistically significant $\chi^2(8) = 30.79, p < .001$, indicating that the model as a whole was able to distinguish between participants who endorsed and denied LOC eating in the past three months. However, total childhood ALEs did not significantly contribute to the model, $OR = 1.03, p = .72$. Results for Hypothesis 2a are summarized in Tables 7a and 7b. Hypothesis 2a was partially supported.

Hypothesis 2b. Hypothesis 2b stated that the severity of childhood ALE history would be positively associated with eating disturbance among active duty service members. Results revealed that traumatic childhood ALEs explained a significant amount of the variance in EDE-Q global score after adjusting for the aforementioned covariates, $F(8, 169) = 10.71, p < .001, R^2 = .315$, and traumatic childhood ALEs were a significant positive predictor of the EDE-Q global score ($beta = .23, p < .001, R^2 = .05$).

The adjusted model examining the association between interpersonally perpetrated ALEs and EDE-Q global score was statistically significant, $F(8, 169) = 12.09, p < .001, R^2 = .315$, and total interpersonal ALE was a statistically significant positive predictor of the EDE-Q global score ($beta = .17, p < .01, R^2 = .03$). However, when interpersonally perpetrated ALE was coded as a dichotomous variable to address positive skew, it was no longer a statistically significant predictor of EDE-Q global score ($beta = .10, p = .14$).

Finally, the model assessing the association between LSC-R weighted score and the EDE-Q global score was significant, $F(8, 169) = 10.71, p < .001, R^2 = .336$, and LSC-R weighted score was a statistically significant positive predictor of the EDE-Q global score ($beta = .24, p < .001, R^2 = .05$). In their respective adjusted models, no statistically significant associations were observed between non-interpersonally perpetrated ALEs and EDE-Q global score ($beta = .04, p = .57$) and maximum duration for a single childhood ALE and EDE-Q global score ($beta = .09, p = .19$).

In models adjusted for the aforementioned covariates, no statistically significant associations were observed between traumatic childhood ALEs and LOC eating as reported on the QEWPR (OR = 1.24, $p = .11$), interpersonally perpetrated childhood ALE and LOC eating (OR = 1.03, $p = .83$), non-interpersonally perpetrated childhood ALE and LOC eating (OR = 1.05, $p = .78$), maximum duration for a single childhood ALE and LOC eating (OR = 1.00, $p = .99$), or LSC-R weighted score and LOC eating (OR = 1.06, $p = .12$). Results for all logistic regression analyses should be interpreted in the context of achieved power $< .15$ for all models. Results for Hypothesis 2b are

summarized in Tables 8a-e (multiple regression models) and Tables 9a-e (logistic regression models). In conclusion, Hypothesis 2b was partially supported.

RESULTS FOR SPECIFIC AIM III: CHILDHOOD ADVERSE LIFE EVENT EXPOSURE, PSYCHOSOCIAL FUNCTIONING, AND EATING DISTURBANCE

Using the covariate reduction strategy summarized in Figure 6b, all final models in Aim III were adjusted for age, sex, education, pay grade, combat exposure, depression screen, and PTSD screen.

Hypothesis 3. Hypothesis 3 stated that the relationship between childhood ALE history and eating disturbance would be mediated by measures of alexithymia, impulsivity, or emotion dysregulation. A total of 18 multiple regression models testing the association (i.e., A-path, $X \rightarrow M$) between the six LSC–R variables (X ; i.e., total childhood ALE, traumatic childhood ALE, interpersonally perpetrated childhood ALE, non-interpersonally perpetrated childhood ALE, maximum duration of a single childhood ALE, and LSC–R weighted score) and the three mediator variables (M ; i.e., TAS-20, BIS-11, and DERS) were conducted, adjusting for the aforementioned covariates. One model revealed statistically significant results such that traumatic childhood ALE was a significant positive predictor of TAS-20 (alexithymia) score ($\beta = .15, p < .05$; see Table 10a). A simple mediation analysis was then conducted to test the indirect effect of TAS-20 score on the association between traumatic childhood ALE and EDE–Q global score. The bias-corrected bootstrap confidence interval for the indirect effect ($ab = 0.025$) based on 5,000 bootstrap samples did not fall above zero $[-0.002 \text{ to } 0.087]$. Therefore, there was no evidence to support an indirect effect of alexithymia on the association between traumatic childhood ALE and EDE–Q global score. Mediation model

coefficients are summarized in Table 10b and the mediation model is depicted in Figure 8.

Given that the other regression models did not reveal statistically significant results, no additional mediation analyses were conducted to test Hypothesis 3. The additional multiple regression models conducted to test the A-path ($X \rightarrow M$) associations for Hypothesis 3 are summarized in Appendix C. Hypothesis 3 was not supported.

RESULTS FOR SPECIFIC AIM IV: CHILDHOOD ADVERSE LIFE EVENT EXPOSURE, EATING DISTURBANCE, AND BODY MASS INDEX

Using the covariate reduction strategy summarized in Figure 6b, all models in Aim IV were adjusted for age, sex, race/ethnicity, and depression screen.

Hypothesis 4a. Hypothesis 4a stated that there would be a significant, positive association between self-reported childhood ALE history and BMI among active duty U.S. Service members. Results revealed that traumatic childhood ALEs explained a significant proportion of the variance BMI after adjusting for the aforementioned covariates, $F(5, 172) = 11.48, p < .001, R^2 = .228$, and traumatic childhood ALEs were a significant positive predictor of BMI ($beta = .17, p < .05, R^2 = .02$). However, when the model was repeated with traumatic childhood ALEs coded dichotomously to account for positive skew, the variable approached, but no longer reached statistical significance, ($beta = .13, p = .06$).

An adjusted model testing the LSC–R weighted score as a predictor of BMI was statistically significant $F(5, 172) = 11.42, p < .001, R^2 = .249$, and LSC–R weighted score was a statistically significant predictor of BMI, ($beta = .17, p < .05, R^2 = .03$). However, interpersonally perpetrated childhood ALE, non-interpersonally perpetrated childhood

ALE, and maximum duration of a single childhood ALE were not statistically significant. All regression models for Hypothesis 4a are summarized in Tables 11a-f. Hypothesis 4a was partially supported.

Hypothesis 4b. Hypothesis 4b stated that eating disturbance would mediate the relationship between childhood ALE and BMI in military personnel. Simple mediation analyses were conducted to test the indirect effects of EDE–Q global score on the association between total childhood ALE and BMI, traumatic childhood ALE and BMI, interpersonally-perpetrated ALE and BMI, and LSC–R weighted score and BMI. Mediation analyses for models with non-interpersonally perpetrated childhood ALE and maximum duration of a single childhood ALE as the predictor variables (X) and with QEWP–R responses as the mediator variables (M) were not conducted because the A-path ($X \rightarrow M$) results for these models (see Hypothesis 2b results) were not statistically significant.

For the mediation model with total childhood ALE as the predictor variable (X), the bias-corrected bootstrap confidence interval for the indirect effect ($ab = .083$) based on 5,000 bootstrap samples did not fall above zero [-0.004 to 0.177]. However, when the model was repeated using Winsorized data, the bootstrap confidence interval for the indirect effect ($ab = .089$) fell entirely above zero [0.009 to 0.186] with a partially standardized effect, $ab_{ps} = .03 \pm .02$. Therefore, there was mixed evidence to support an indirect effect of EDE–Q global score on the association between total childhood ALE and BMI. Mediation model coefficients for the original and Winsorized models are summarized in Tables 12a.i and 12a.ii, respectively; the mediation models are depicted in Figures 9 and 10.

For the mediation model with traumatic childhood ALE as the predictor variable (X), the bias-corrected bootstrap confidence interval for the indirect effect ($ab = 0.196$) based on 5,000 bootstrap samples fell entirely above zero [0.086 to 0.333] with a partially standardized effect, $ab_{ps} = .07 \pm .03$. There was no evidence that traumatic childhood ALE influenced BMI independent of its effect on EDE–Q global score ($c' = 0.17, p = .21$). Mediation model coefficients are summarized in Table 12b and the mediation model is depicted in Figure 11.

For the mediation model with interpersonally perpetrated childhood ALE as the predictor variable (X), the bias-corrected bootstrap confidence interval for the indirect effect ($ab = 0.152$) based on 5,000 bootstrap samples fell entirely above zero [.012 to .318] with a partially standardized effect, $ab_{ps} = .05 \pm .03$. However, when the model was repeated with interpersonally perpetrated childhood ALE as a dichotomous variable to address positive skew, the bootstrap confidence interval for the indirect effect ($ab = 0.284$) no longer fell entirely above zero [-0.071 to 0.725]. Therefore, there was mixed evidence to support an indirect effect of EDE–Q global score on the association between interpersonally perpetrated childhood ALE and BMI. Mediation model coefficients for the original and dichotomized models are summarized in Tables 12c.i and 12c.ii, respectively; the mediation models are depicted in Figures 12 and 13.

For the mediation model with LSC–R weighted score as the predictor variable (X), the bias-corrected bootstrap confidence interval for the indirect effect ($ab = .053$) based on 5,000 bootstrap samples fell entirely above zero [.040 to .108] with a partially standardized effect, $ab_{ps} = .02 \pm .01$. There was no evidence that LSC–R weighted score influenced BMI independent of its effect on EDE–Q global score ($c' = 0.04, p = .26$).

Mediation model coefficients are summarized in Table 12d and the mediation model is depicted in Figure 14.

In conclusion, Hypothesis 4b was partially supported.

CHAPTER 6: DISCUSSION

Given the positive trajectory of overweight and obesity in the U.S. military over the past several decades (1), combined with the occupational and medical consequences of failing to make weight (2), a more sophisticated understanding of the specific underlying factors associated with overweight and obesity in U.S. service members is needed to inform more sensitive, individualized, and effective remediation efforts. The purpose of this study was to examine the potential connection between self-reported childhood ALE exposure, eating disturbance, and BMI in a nonclinical active duty sample in order to determine if psychosocial factors beyond diet and exercise are associated with BMI.

SAMPLE CHARACTERISTICS

The study sample (N = 179) was approximately half male and half female, which represents about a three-fold higher representation of women as compared to the active component as a whole (43). Approximately three quarters of participants identified as Caucasian/non-Hispanic white, which is slightly greater than the rate in the military as a whole (69% Caucasian/non-Hispanic white) (43). However, individuals who identified as African American/Black were markedly underrepresented in this study, comprising approximately 5% of the study sample versus 17% of the active component (43). With regard to education, participants reported a significantly higher level of education than the active component overall. Specifically, proportion of active duty service members

with less than a four-year college degree in the general military population is about three fold the proportion for participants in this study; approximately five-fold as many participants in this study endorsed a graduate degree as compared to the active duty population (43). With regard to marital status, the sample approximated that of the active duty population.

In terms of military service characteristics, the Army, Navy, and Air Force were well represented in the study sample; the Marine Corps and Coast Guard were underrepresented (43). Nearly all participants identified as members of the active component, with fewer than 5% of participants identifying as members of the reserve or National Guard components. Therefore, study findings are primarily generalizable to the active duty population. With regard to rank, approximately two-thirds of participants identified as officers. Given that the active component consists of approximately 82% enlisted personnel and 18% officers (43), officers were markedly overrepresented in the sample. Finally, approximately half of participants endorsed at least one career deployment. According to figures published by the RAND Corporation and the Institute of Medicine using data from the Defense Manpower Data Center (13; 121), approximately two-thirds of the active component deployed in support of OEF/OIF between 2001-2011. Therefore, the study sample appears to have a smaller proportion of service members with deployment experience as compared to the general military population.

When compared to the participants who did not complete the survey ($N = 76$), the participants retained in the final sample were significantly older, reported a higher level of education, and were more likely to be officers than enlisted personnel. No significant

differences were observed on other demographic and military service characteristics, although differences in service branch and component approached significance.

Taken together, this study sample represents an older, somewhat less racially and ethnically diverse, higher educated subset of the military population with approximately equal representation of men and women and comparatively less deployment experience. Additionally, participants were primarily officers, who occupy a higher position in the chain of command with conventionally more leadership training and responsibilities as compared to enlisted personnel. Further, younger participants, enlisted personnel, and individuals with less than a four-year college degree were significantly less likely to complete the survey. These characteristics limit the generalizability of the study findings to this subset of the active component. Moreover, previous studies of military personnel that revealed a high prevalence of child abuse exposure were conducted in samples of predominantly younger, enlisted personnel with less than a college degree (100; 102; 108). Therefore, the frequency and severity of these events in the current sample are likely an underestimate of the true prevalence in the general military population.

AIM I: DESCRIBING CHILDHOOD ALE EXPOSURE IN AN ACTIVE DUTY SAMPLE

Results from the LSC-R revealed that approximately 75% of the sample endorsed at least one childhood ALE, 40% endorsed at least one traumatic childhood ALE, approximately half of the sample endorsed at least one interpersonally perpetrated childhood ALE, and approximately 60% endorsed at least one non-interpersonally perpetrated childhood ALE. The average maximum duration for a single childhood ALE was approximately three years, with a range of 1-17 years. Finally, the average LSC-R weighted score, which reflects a sum of each event multiplied by a rating on a 0-5 Likert

scale assessing subjective impact of the event over the past year, was 4.5, with a range of 0-35.

The frequency of individual ALEs in the current sample was markedly lower than findings published from other studies using the LSC-R (62; 94). These findings should be interpreted in the context of the present study's focus on childhood ALEs, whereas the LSC-R has most often been used to query lifetime ALE exposure. As compared to studies querying childhood ALEs specifically, participants in the present study also endorsed significantly fewer events, with the exception of one study in police academy recruits where 20% of participants reported a history of traumatic childhood ALE (107) as compared to 40% of the present sample who endorsed at least one traumatic childhood ALE. However, Otte and colleagues' results (107) are potentially explained by their use of 14 years as the cutoff for childhood ALE versus the more inclusive cutoff of 17 years in this study.

Overall, the lower frequency of childhood ALEs on the LSC-R in the current study can likely be attributed to two primary factors. First, in order to maximally preserve the integrity of the original the LSC-R measure, it was not modified to specify age of onset during childhood, with the exception of items that already contained an age-related prompt. Therefore, participants may have chosen to report events occurring after age 17, thereby omitting potential childhood events. Consequently, the childhood ALE frequencies reported in this study may be an underestimate of the true exposure in this population. Second, the majority of studies using the LSC-R to date have been conducted in populations that are known to be at especially elevated risk for ALE exposure, such as individuals with substance use disorders and refugees (71; 86; 162). Therefore, this study

is one of the only studies to administer this measure in a nonclinical population and the first known study to use the LSC–R in an active duty U.S. military sample.

Despite the limited data in military populations using the LSC–R, there is a small body of literature examining the prevalence of childhood ALE using other methods and measures. Overall, U.S. service members appear to report more childhood ALE exposure (21; 99; 100; 102; 108; 119) than the general U.S. population (5; 75). These previous studies focused almost exclusively on a history of childhood maltreatment and exposure to family violence. As such, participants in the current study reported comparatively less childhood emotional abuse as compared to previous military samples, but about twice the prevalence of the general population. With regard to physical and sexual abuse, prevalence was comparable to the general population, but markedly less than previous research in military samples. Exposure to family violence was comparable to previous research in military samples, but approximately double the prevalence reported in the general population. These findings should be interpreted in the context of the wide variability in study design and methodology in the stress and trauma literature, including studies conducted in military samples. Notably, although the frequency of individual ALE items was computed, the more inclusive design of the present study that queried a range of ALEs that are potentially, but not necessarily traumatic, may limit the ability to accurately compare figures for childhood ALE exposure as a whole across studies. Further, prospective research on this topic is particularly challenging due to both practical and ethical considerations, which presents an additional barrier to addressing these limitations. However, more systematic and inclusive assessments of childhood ALE exposure are needed to more accurately capture the nature and extent of U.S. service

members' exposure to early adversity in order to gain a more comprehensive understanding of the impact of these experiences on their psychosocial and occupational functioning.

With regard to group differences between officers and enlisted personnel, enlisted personnel endorsed a significantly higher proportion of total childhood ALE, non-interpersonally perpetrated childhood ALE, and greater maximum duration of a single event with no significant group differences in traumatic ALE, interpersonally-perpetrated ALE, and LSC-R weighted score. Although the differences between officers and enlisted personnel with regard to childhood ALE exposure have not been thoroughly examined, these findings are consistent with previous studies indicating a high prevalence of childhood ALE exposure in samples of enlisted personnel (100; 102; 120). Specifically, the comparable frequency of traumatic and interpersonally perpetrated ALE between officers and enlisted personnel in the present study indicates that pay grade may not be a significant factor in this type of childhood ALE exposure in military personnel. Taken together, these results may indicate that enlisted personnel are more likely than officers to enter the military having endured more chronic, general life stress, but that they are no more likely than officers to have sustained substantial trauma, interpersonal abuse or violence, or adversity that they consider to have current impact on their functioning.

With regard to differences between male and female service members on history of childhood sexual abuse and assault, as expected, women were significantly more likely to endorse a childhood history of sexual harassment, molestation, and assault as compared to men. These findings are consistent with previous studies examining sex differences in sexual abuse in active duty samples (102; 108; 119). As a whole, despite

the overrepresentation of women in the current sample, the prevalence of childhood sexual abuse and violence among participants in this study was markedly lower than previous studies conducted in military populations (99; 102; 108; 119). This finding may be attributable to other demographic characteristics of this sample, such as older age and higher education in light of the increased risk of premature attrition associated with a history of childhood sexual trauma (100; 108). However, the sex differences that were observed support the need for particular vigilance and sensitivity when assessing childhood ALE exposure in female service members.

AIM II: THE ASSOCIATION BETWEEN CHILDHOOD ALE AND EATING DISTURBANCE

Results for Aim II revealed that total childhood ALE, traumatic childhood ALE, interpersonally perpetrated childhood ALE, and the LSC–R weighted score were significantly related to disordered eating attitudes, as measure by the EDE–Q global score, after adjusting for age, sex, education, pay grade, combat exposure, and depression screen. When interpersonally perpetrated childhood ALE was dichotomized, it did not significantly predict EDE–Q global score. Additionally, non-interpersonally perpetrated childhood ALE and maximum duration of a single childhood ALE were not significant. None of the childhood ALE variables were significantly related to disordered eating behaviors (i.e., presence versus absence of binge eating) on the QEWP–R.

These findings partially supported the hypothesis that both the amount and severity of childhood ALE exposure would be positively associated with eating disturbance in active duty personnel. Notably, beyond total childhood ALE exposure, the number of traumatic events, indicated by participants' endorsement of the belief that the event could have caused them or another person to be killed or seriously harmed (4),

specifically was associated with higher disordered eating attitudes. These findings broadly align with the established relationship between early trauma and eating disturbance in the general population (10; 24; 140). However, they should be interpreted in the context of the relatively small contribution of the ALE variables to the models as a whole, underscoring the importance of a comprehensive biopsychosocial conceptualization when evaluating the potential impact of early adversity on eating disturbance.

In addition to traumatic childhood ALE, the finding that interpersonally perpetrated ALE demonstrated a significant positive association with EDE–Q global score combined with the non-significant findings for non-interpersonally perpetrated ALE is consistent with previous research supporting the particularly deleterious impact of interpersonally perpetrated abuse and/or violence (54; 55) and the association between early trauma and abuse and disordered eating (10; 29; 132). However, the mechanisms of this association remain unclear, as indicated by contradictory findings supporting child abuse as a significantly more prevalent, yet nonspecific correlate of eating pathology (18).

The results for the present analyses should be interpreted in the context of the fact that interpersonally perpetrated childhood ALE became non-significant when coded as a dichotomous variable to account for positive skew. These results may reflect a dose-response relationship between interpersonally perpetrated childhood ALE exposure and EDE–Q global score. They may also indicate the influence of extreme values on the outcome; however the findings retained significance with Winsorized variables, which does not support that explanation. Ultimately, these findings suggest that interpersonally

perpetrated abuse and violence specifically were associated with higher EDE–Q global score, indicating that the type of ALE is an important consideration when assessing the potential relationship between early adversity and eating disturbance in U.S. service members. Although additional research is needed to replicate and expand on these findings, they provide initial support for the specificity of interpersonally perpetrated childhood ALE exposure as a potential risk factor for subsequent eating disturbance in military personnel. Moreover, given the aforementioned sex differences observed between male and female participants’ reports of childhood sexual abuse and assault combined with the sexual trauma as an established correlate of eating disturbance in civilian samples (156; 157; 159) and veteran samples (57), these findings support the need for particular sensitivity and vigilance when assessing the history and clinical needs of female service members.

Third, the significant positive association between the LSC–R weighted score and EDE–Q global score highlights potentially lasting impact of early adversity on current eating disturbance given that the weighted score is based on the individual’s perceived impact of a given childhood ALE over the past year. Although these ratings are purely subjective, this significant association suggests that a service member’s current appraisal of the effect of childhood adversity may be related to their eating and weight-related attitudes and behaviors in adulthood. Research published to date on the LSC–R has emphasized the raw score; no known studies have examined the implications of participants’ weighted scores. Therefore, it is difficult to compare these findings to previous studies using this measure and additional research is needed to further elucidate this association. However, findings from the current study provide preliminary support

for the clinical utility of assessing service members' perceptions of the current impact of ALE beyond querying what types of adversity they have experienced. Moreover, if subsequent research corroborates this association, the potential role of the lasting impact of early adversity in subsequent eating disturbance may be a useful target of psychoeducation for the general military population and/or psychotherapy for treatment seeking individuals. Specifically, leaders and providers alike may benefit from the knowledge that early trauma and adversity may manifest in other domains beyond susceptibility to PTSD.

Finally, the non-significant association between maximum duration of a single childhood ALE and EDE-Q global score warrants mention. In isolation, this finding suggests that chronicity may not have been an influential factor in the relationship between early adversity and eating disturbance in this sample. However, this outcome should be interpreted with caution for several reasons. First, in contrast to the questions querying trauma and subjective impact in the LSC-R that require subjective appraisal, the questions pertaining to age of onset/occurrence and duration of a specific event are querying factual data that may be particularly susceptible to recall bias. Relatedly, onset and duration are likely to be comparatively more difficult to remember accurately than whether or not the event occurred. Second, duration evaluated by subtracting age of onset from the age an event ended is a relatively crude measure for the actual frequency and severity of the exposure to a given event. For example, sustaining abuse intermittently versus regularly over a period of several years would theoretically yield the same duration. Third, the data for duration was particularly inconsistent in this study. This outcome is likely attributable in part to the format of the LSC-R measure, which only

includes a query for end date for a subset of events and divides several questions about maltreatment into “before age 16” and “after age 16.” Additionally, there appeared to be wide variation how participants interpreted duration. For example, some participants endorsed that their parents divorced with duration of one year, while others reported that same event as ongoing, as indicated by entering their current age as the end date. As a result, chronicity was assessed using the duration for the single childhood ALE with the greatest duration versus the cumulative duration of all childhood ALEs. However, the marked variability and inconsistency of data for this variable likely hindered its validity and highlights the limited utility of assessing ALE chronicity using an anonymous, self-report format. Although these limitations present a barrier to the interpretation and potential implications of these data, they highlight key considerations for the assessment of ALE history.

With regard to the findings for analyses examining the association between childhood ALE and binge eating on the QEWP-R, although the minimum sample size indicated by *a priori* power analyses was obtained, achieved power was insufficient to detect a significant effect. Therefore, a substantially larger sample may be required to obtain sufficient power and improve stability of the regression models to more effectively examine this association. Study participants demonstrated a comparable frequency of binge eating to the healthy comparison group used by Nangle and colleagues (105) to validate the measure. These results are not consistent with previous research indicating elevated rates of binge eating among active duty personnel (28; 96-98). One possible explanation for this finding is the composition of the sample. Given that older service members are overrepresented, they may feel comparatively less pressure to meet weight

standards as compared to younger personnel who are typically more likely to fill occupational specialties that require more rigorous physical activity and may face more severe occupational consequences for failing to meet weight standards due to their junior status. Despite the overrepresentation of officers in the sample, previous studies have not found significant differences in eating disorder diagnoses between officers and enlisted personnel (9). Indeed, some studies posit that officers may be at elevated risk for eating disturbance as compared to enlisted personnel (28; 148). Finally, the vast majority of eating disorder research in the military was conducted before the DSM-5 was published; therefore, clinically significant binge eating symptoms and binge eating disorder were often broadly classified as EDNOS, hindering an accurate interpretation of those studies. Consequently, additional research assessing binge eating behavior according to DSM-5 diagnostic criteria (4) in a more representative sample of military personnel is warranted to more precisely and accurately capture the true prevalence and severity in this population.

Beyond the rates of binge eating in the sample, the lack of an association between childhood ALE and binge eating behavior was unexpected, particularly in the context of the significant findings observed for the EDE–Q. One possible explanation for these findings may relate to military occupational factors. Specifically, binge eating behavior may be more attributable to the cycle of physical fitness tests where service members exercise more restraint in the months leading up to the test and then potentially overcompensate afterward. Previous research lends some support to this explanation, including an observed correlation between disordered eating attitudes/behaviors and concern about passing a physical fitness test in a sample of older officers at a military

medical facility (28), which aligns closely to the characteristics of the present sample. As such, disordered eating behaviors may be more normative in military personnel due to the weight and fitness standards, whereas disordered eating attitudes in multiple domains may be more stable indicator of clinically significant eating pathology. Future research is needed to more clearly determine the impact of the physical fitness test schedule on eating disturbance in military personnel.

In summary, the association between childhood ALE and eating disturbance in a military sample is particularly noteworthy due to the range of cultural factors that likely influence beliefs and attitudes about eating. Specifically, given that military personnel are required to maintain rigorous weight and fitness standards, this population is at elevated risk for eating pathology as compared to the general population, despite a discrepancy between reported rates of eating pathology and documented eating disorder diagnoses (9; 96-98). These findings are likely influenced by the pressure to make weight (28; 84), the cultural acceptability and prevalence of extreme weight control methods (93), preliminary support for the prevalence and cultural acceptability of weight stigmatization (127), and the cyclical schedule of physical fitness tests (28). Combined with these cultural factors, the results of this aim support exposure to early adversity as a potential additional risk factor for subsequent eating disturbance during military service.

Ultimately, the results of Aim II underscore the importance of evaluating the nature and subjective impact of childhood ALE exposure in active duty personnel both in general as well as in service members who may be experiencing eating disturbance. Moreover, clinically significant eating disturbance may be more likely to include attitudes pertaining to eating, weight, shape, and restraint versus binge eating behavior in

isolation. Finally, when interpreting the results of these analyses, it is imperative to consider the sex differences in EDE–Q global score observed in the study sample. Specifically, although the prevalence of eating disturbance in men has historically been significantly lower than women, the female participants in the study scored within the expected range on the EDE–Q. However, male participants’ scores were more variable, such that the average was within norms established in one sample of young men (85), but they scored nearly two standard deviations *above* the mean in another normed sample of men (112). This finding underscores the importance of evaluating male service members for disordered eating symptoms, particularly if they endorse a history of traumatic and/or interpersonally perpetrated childhood ALE.

AIM III: PSYCHOSOCIAL MEDIATORS OF CHILDHOOD ALE AND EATING DISTURBANCE

Results for Aim III revealed that the association between childhood ALE exposure and eating disturbance was not mediated by measures of alexithymia (TAS-20), impulsivity (BIS-11), or emotion regulation (DERS). Although no indirect effects of these measures were observed, results revealed a significant association between traumatic childhood ALE and TAS-20 score, potentially indicating that service members with a history of childhood trauma may experience more difficulties with emotional awareness. This finding is consistent with established frameworks of for the psychosocial sequelae of early trauma (32). However, given that it was the only significant result for this aim, this finding should be interpreted cautiously in the context of potential issues related to multiple comparisons.

Overall, participants’ scores on these measures were consistent with norms established in nonclinical populations (11; 63; 109), which would be expected based on

the broad inclusion criteria for this study. The means for enlisted personnel were significantly higher than officers on all three measures. However, their average scores still fell within population norms, which indicates that these individuals are not endorsing substantial self-regulatory difficulties. Given the overrepresentation of older service members with higher education, the likelihood of these service members experiencing substantial self-regulatory difficulties of this nature may be particularly low given the likely barriers that these difficulties would present for scholastic achievement, occupational success, and long-term retention in the military. Combined with the disproportionate attrition of younger participants with less education, future research is required to determine whether these findings are truly representative of the general military population.

To date, there is very limited research on alexithymia, impulsivity, and emotion regulation in the general U.S. military population both in general and in the context of eating disturbance among U.S. service members. There is some empirical support for the role of impulsive behavior and emotion dysregulation in psychopathology among certain subsets of the U.S. military population. The relationship between alcohol abuse and impulsive or reckless behavior has been well established, particularly following combat exposure (14; 124; 151). Additionally, a study conducted by Klemanski and colleagues (80) in a small sample of male service members revealed that emotion dysregulation mediated the association between PTSD and other psychological difficulties. These studies combined with the present findings may indicate that disturbances in emotional and behavioral regulation are more likely to manifest in service members who meet

diagnostic criteria for a psychological disorder versus due to exposure to childhood adversity alone.

Although these constructs were not significant mediators of the association between childhood ALE and eating disturbance, incidentally, a positive major depressive disorder screen was a statistically significant covariate in all of the regression models conducted to test the association between each childhood ALE predictor and the psychosocial mediator variables; a positive PTSD screen was statistically significant in most, but not all models. Although, depression and PTSD screens served as covariates in the present study, these findings further support the value of assessing these disorders in ongoing research examining the impact of childhood ALE and/or the etiology of depression and PTSD in military populations. That said, despite the significant effect of a positive depression screen and a positive PTSD screen in a subset of these analyses, the effect of the aforementioned childhood ALE variables retained significance as predictors of subsequent eating disturbance. Taken together, these findings indicate that although screening positive for one psychological disorder is positively associated screening positive for a comorbid disorder, exposure to substantial childhood ALE accounts for a small, but still significant proportion of the variance in eating-related outcomes above and beyond these positive screens.

AIM IV: THE ASSOCIATION BETWEEN CHILDHOOD ALE AND BMI

Results for Aim IV revealed that traumatic childhood ALE exposure and LSC-R weighted score were significant predictors of BMI in this active duty sample after adjusting for age, sex, race/ethnicity, and major depressive disorder screen; mediation analyses revealed a significant indirect effect of EDE-Q global score for these

associations. Additionally, although there was no significant direct association between total childhood ALE and BMI or interpersonally perpetrated childhood ALE and BMI, a significant indirect effect of EDE–Q global score was revealed in mediation analyses for total childhood ALE and when interpersonally perpetrated childhood ALE was coded as a continuous variable. No significant direct effects or indirect effects of EDE–Q global score were observed in mediation analyses with non-interpersonally perpetrated childhood ALE or maximum duration of a single childhood ALE as predictors of BMI. These findings partially supported the hypotheses that the nature and severity of childhood ALE exposure would be positively associated with BMI and that eating disturbance would mediate that association.

In addition to the associations between childhood ALE exposure and psychological facets of eating and weight behavior examined in Aim II, these findings lend support to the association between childhood ALE exposure and a physiological construct in a military sample. Similar to the results for eating disturbance observed in Aim II, childhood trauma and current subjective impact of childhood ALE specifically predicted greater self-reported BMI at the last official weigh-in. These findings are consistent with a robust body of literature supporting elevated risk for adult overweight and obesity among individuals with a childhood trauma history (36; 66; 70; 90). Moreover, this finding is consistent with the conceptualization of overweight/obesity as a heterogeneous construct such that not all overweight/obesity can be attributed to childhood ALE exposure, but the prevalence of that exposure is disproportionately high among individuals with overweight/obesity. That said, similar to the findings for Aim II, the effects of the individual childhood ALE variables on BMI were small. Therefore, they

should be interpreted in the context of a comprehensive biopsychosocial conceptualization of the association between early adversity and adult BMI.

Although the relationship between childhood ALE and BMI has yet to be comprehensively examined in military populations, studies in civilian samples, including the landmark Adverse Childhood Experiences Study (51), indicate that beyond overweight and obesity, childhood trauma exposure typically demonstrates a dose-response relationship with chronic illnesses with robust associations with overweight/obesity including heart disease, cancer, diabetes, and poor overall health (50; 70; 95). The specific mechanisms and causal pathways between childhood adversity, weight status, and medical morbidity are complex and remain an area of ongoing scientific inquiry. However, the potential co-occurrence of these conditions in military personnel carries additional occupational and mission-wide implications in addition to the known economic and health-related sequelae in the general population (1). Therefore, a better understanding of the links between childhood ALE exposure and overweight/obesity during military service is needed to promote individual health and overall operational readiness and to prevent premature attrition.

In order to foster that understanding, the significant indirect effects of EDE-Q global score on the association between childhood ALE exposure and BMI warrant consideration. Study findings revealed that childhood ALE exposure in isolation does not significantly predict higher BMI. Rather, this association can be explained by greater global eating disturbance. These findings are consistent with research highlighting that beyond overweight and obesity, individuals who have substantial childhood abuse and trauma histories are more likely to experience eating disorder symptomology (67; 137;

159), including a study in active duty personnel, indicating childhood abuse as a correlate of disordered eating (148).

From a theoretical perspective, these findings align broadly with Affect Regulation Theory (110), which posits that disordered eating arises as a means to cope with intolerable distressing emotions. The aforementioned absence of a mediation effect of emotion dysregulation in the current study may potentially reflect a masking effect of eating disturbance that allows individuals to better regulate distressing affect, albeit by potentially substituting or obscuring one set of symptoms with another. Ultimately, as previously discussed, this association may be reinforced in military personnel given the potential interaction of individual eating and weight-related attitudes and behaviors with cultural norms and beliefs about eating and weight control. As such, when evaluating and treating this population, it would be prudent to determine service members' concerns pertaining to meeting weight standards as well as their beliefs about acceptable eating and weight control methods.

The absence of direct effects of between total childhood ALE and interpersonally perpetrated childhood ALE and BMI may indicate that these indices of childhood ALE exposure are comparatively less robust predictors of BMI despite their significant associations with eating disturbance. That said, the indirect effect of EDE-Q global score on the association between these childhood ALE variables and BMI in the absence of a direct effect further emphasizes the value of evaluating eating disturbance as a possible treatment target for service members who exceed weight standards. Taken together, although temporal ordering of eating disturbance and BMI trajectory could not be ascertained in this study, the results from this aim may inform hypotheses for future

research regarding eating disturbance as a potential risk factor for overweight/obesity among service members with a substantial childhood ALE history. Moreover, individuals with a substantial childhood ALE history may be especially susceptible to disturbed eating attitudes and behaviors when confronted with the cultural emphasis on fitness in the military.

In addition to the findings for the original hypotheses, an incidental and noteworthy finding distinct to Aim IV was the significance of race/ethnicity as a covariate. Whereas race/ethnicity was not significant in any models examining the association between childhood ALE and eating disturbance, and therefore omitted as a covariate in the final models, it was significant or approaching significance in all regression models with BMI as an outcome variable. Specifically, although the aforementioned childhood ALE variables retained significance after accounting for the contribution of race/ethnicity, participant identification as a member of a racial or ethnic minority was positively associated with BMI. Similar to findings in civilian populations, this finding aligns with research indicating that U.S. service members who identify as African American/Black or Hispanic/Latino are at elevated risk for overweight and obesity (122; 131). Moreover, this finding is consistent with longitudinal research in a civilian sample, establishing child abuse as a risk factor for subsequent obesity in adulthood among participants of the Black Women's Health Study (22). When considered in the context of research conducted in the general population, this finding emphasizes the importance of taking race and ethnicity into consideration to promote individualized, culturally sensitive assessment and weight management programs.

STUDY STRENGTHS

This study is characterized by a number of unique strengths. First and foremost, this study addresses the relationships among three prevalent public health problems in the U.S. with known occupational and health-related consequences. Despite a limited body of research examining childhood adversity, eating disturbance, and BMI independently in military samples, there is a dearth of knowledge about the associations between these phenomena in this population.

Second, this study addressed several gaps in the broad empirical literature examining the relationship between ALE exposure, eating disturbance, and BMI. As previously mentioned, the existing trauma literature emphasizes child maltreatment as a primary type of ALE and the eating disorder literature favors female populations and treatment-seeking populations. This study expanded the scope of ALE exposure to include a variety of event types, including examining interpersonally perpetrated and non-interpersonally perpetrated events as well as differentiating traumatic ALE from total ALE. Further, approximately half of participants identified as male and therefore this study contributes to a growing body of knowledge about the psychosocial impact of early ALE exposure and its connection with eating disturbance and weight in men, specifically.

Finally, the anonymous online survey design was intended to attenuate potential underreporting of sensitive information (e.g., abuse history, psychiatric symptoms), which would be expected in a study design with additional limits on confidentiality. Confidentiality is an especially important consideration when conducting research in military personnel as U.S. service members are considered a vulnerable population and may otherwise be reluctant to endorse behaviors or other characteristics that may be perceived as detrimental to their career.

STUDY LIMITATIONS

In addition to the study's strengths, the findings should be interpreted in the context of several limitations. First, the external validity of the study is limited by the demographic characteristics of the sample that over-represent officers and service members with high levels of education combined with the underrepresentation of racial and ethnic minorities and the disproportionate attrition of enlisted personnel and participants with less than a college degree. As a result, these findings should be interpreted accordingly as they may not generalize to the military population as a whole.

Second, despite the aforementioned benefits of the study design, the anonymous, self-report format of the questionnaires presented the risk of recall bias, especially for events that occurred in childhood. Moreover, as previously discussed, variables such as age of onset, occurrence, and duration of childhood ALEs were likely to be especially susceptible to recall bias and general distortion. Although this limitation would inherently apply to similar studies relying on retrospective recall for life events, the findings of the current study highlighted the challenges of an anonymous, self-report design for assessing chronicity of childhood ALE in particular.

A related limitation of the study was the assessment of BMI via self-reported height and weight, which presented the potential for under- and over-estimates. Although there is a precedent in the literature for the use of this method in similarly designed studies (96-98), actual height and weight measurements would have been preferable. Given that breach of confidentiality was a primary potential risk for this study, ensuring anonymity was a priority. In anticipation of this limitation, participants were asked to provide their body weight at their last official weigh-in in addition to their current weight

as a means to provide a more objective anchor point. Moreover, given the nearly perfect correlation between the self-reported current and last official BMI, the latter variable was used in study analyses.

Third, although BMI is one means of classifying weight status, it may not accurately account for body composition, including lean muscle mass, which outweighs adipose tissue. Therefore, elevated BMI may not necessarily indicate that an individual is overweight or obese. The recent rise of overweight and obesity-related morbidity in the military (1) reflects the validity of this public health concern. However, more precise measurements of body composition, including body fat mass, would provide a more accurate representation of weight status in subsequent similar studies.

Finally, despite querying age of onset or occurrence for childhood ALEs as a means to assess chronology, the study's cross-sectional design limited the ability to definitively determine temporality and infer causality between variables in the mediation analyses (92). Given that these research questions had not been previously explored in military population, the findings from this cross-sectional study are intended to inform future prospective research and generate subsequent hypotheses about the unique association between childhood ALE exposure, eating disturbance, and BMI in this population.

CLINICAL IMPLICATIONS

The current findings have a range of potential implications for providers in the Military Health System. First, this study adds to a growing body of literature supporting the role of early adversity within a biopsychosocial conceptualization of adult eating disturbance and weight concerns. As such, these findings underscore the value of Trauma

Informed Care (73), which promotes acquiring an awareness and understanding of the impact of early adversity, including how certain beliefs and behaviors may have originated as adaptive coping strategies that became maladaptive over time. Within the military specifically, this recommendation may extend to more supportive and less punitive trauma informed remediation efforts for service members who fail to meet weight and fitness regulations. For example, highlighting the previous function of certain maladaptive eating and weight-related beliefs and behaviors and facilitating the transition to more adaptive strategies may foster post-traumatic growth versus the exacerbation of distress caused by eating disturbance and overweight/obesity.

Clinically, these findings highlight the importance of conducting a thorough social history that includes an assessment of childhood ALE exposure in addition to diet and exercise habits when treating service members presenting with eating and/or weight-related concerns. That said, study results revealed that nearly all participants endorsed some form of childhood ALE exposure. Therefore, beyond querying specific events, the service members' perception of whether or not the events were traumatic as well as the degree to which they believe the events continue to impact them may inform a more sophisticated conceptualization and individualized treatment plan. Additionally, when treating service members with a substantial childhood ALE history who present with eating and weight-related concerns, it would also be prudent to assess for depression and PTSD, as these potential comorbidities may exacerbate eating and weight-related morbidity and may serve as adjunct treatment targets.

In addition to evaluating the nature and severity of childhood ALE exposure, the findings of this study support evaluating eating disturbance among service members

whose primary presenting concerns pertain to overweight and obesity. Specifically, a comprehensive assessment of the service member's attitudes and behaviors pertaining to eating, weight, shape, and food restraint is warranted to inform a treatment plan that targets these concerns in addition to modifying nutrition and exercise in isolation. Moreover, when considered in the context of previous studies of the psychological impact of cyclical fitness tests (28), this assessment should incorporate the service member's potential concerns about making weight and/or passing their physical fitness test as well as their unique cultural beliefs about eating, weight, and fitness in the military.

Beyond general implications, this study highlighted the importance of tailoring assessment and treatment to the specific characteristics and needs of female and male service members. First, as expected, women were significantly more likely to endorse a history of sexual victimization. Therefore, the nature and impact of their childhood ALE exposure may warrant a particular degree of sensitivity. Moreover, previous research in individuals with history of sexual abuse or assault and overweight/obesity has conceptualized weight gain as a protective mechanism to prevent future victimization (52). As such, working with service members of either sex who endorse such a history to better understand the origins of their eating and weight concerns, including how certain coping strategies may have originally fostered resilience or survival (64; 91), may promote a more strength-based, individualized, and less punitive approach to addressing eating and weight concerns.

With regard to men, study findings revealed that male participants' EDE-Q scores ranged from within norms to significantly higher than a normed sample for global eating

disturbance. Despite the markedly lower prevalence of eating disorders in men as compared to women in the general population, these findings highlight that male service members are likely at elevated risk for eating disturbance as compared to their civilian counterparts. When interpreted in the context of previous research, male service members may more closely resemble male athletes versus men in the general population with regard to prevalence and presentation of eating disturbance. Specifically, the mean EDE-Q global score for male participants fell between the 80-85th percentile of a male undergraduate sample of competitive athletes (37), indicating that the average EDE-Q global score for male participants in this sample was equal to or greater than 80-85% of the male athletes in Darcy and colleagues' study (37). These findings likely reflect the impact of the rigorous fitness requirements of military service.

Given that the ratio of male to female service members is over 5 to 1 (43), there are potentially more men than women who experience eating pathology in the military. Therefore, it may be especially prudent to evaluate eating and weight-related attitudes and behaviors among male service members who present with overweight/obesity and endorse a history of childhood ALE. Moreover, the unique presentation of eating disorder symptomology in men, including potentially more emphasis on muscularity, warrants consideration (38; 53). Specifically, the use of eating disorder assessments specifically designed and validated in men, such as those outlined by Darcy and colleagues (38), may provide a more sensitive means of detecting eating disturbance among male service members and promote treatment that is tailored to their unique concerns. Moreover, continued research that more comprehensively examines and accounts for military

cultural norms surrounding fitness and weight standards in the assessment of eating disturbance will promote a more nuanced assessment of clinically significant pathology.

Finally, beyond medical and mental health providers, the findings of this study have potential implications for military leadership. Weight and fitness standards are essential to operational readiness and should not be compromised. As such, failing to meet standards historically increases risk for occupational consequences and/or premature attrition from military service (28; 79; 141; 144). However, the findings of this study combined with previous research underscore that the etiology of overweight and obesity is multifaceted and varies by individual. The cross-sectional design of this study precludes the ability to infer causality. That said, these findings support the value of striving toward a more comprehensive and culturally sensitive understanding of the potential origins of eating disturbance and overweight/obesity among U.S. service members in order to promote strength-based versus punitive remediation efforts. Ideally, this understanding would promote a shift in military culture that retains the core values of fitness and readiness while minimizing weight and shape-based stigmatization.

FUTURE DIRECTIONS

Beyond the findings of the current study, additional research is needed to better understand the nature and significance of the association between childhood ALE exposure, eating disturbance, and weight in military personnel. First, this study highlights the necessity of a thorough, systematic approach to the assessment of childhood ALE exposure. Although the cross-sectional design and anonymous self-report format of this study were valuable means of promoting feasibility and ensuring confidentiality, future studies that implement a prospective design and include structured clinical interviews to

more comprehensively ascertain ALE history are needed to enhance the validity of these data. Relatedly, administering a clinical interview, such as the Eating Disorder Examination (48), in place of the EDE–Q and measuring body fat mass using a method such as dual-energy X-ray absorptiometry (DXA) in place of self-reported BMI would provide more precise assessments of eating disturbance and overweight/obesity, respectively.

Second, future research should include a more representative sample of the demographic and military service characteristics of the U.S. military, including more younger, enlisted personnel with less than a four-year college degree to bolster external validity. Recruitment efforts should also focus on enrolling service members who identify as members of racial and ethnic minority groups, given the disproportionately high prevalence of overweight/obesity in this subset of the population (123; 131). Finally, future research efforts on this topic should assess the membership in sexual and gender minority groups given the increased likelihood of exposure to bullying and victimization during adolescence and corresponding elevated risk of adverse health outcomes (20; 31)

Figure 1. Theoretical Model: The Association Between Childhood Adverse Life Events, Eating Disturbance, and BMI in Active Duty U.S. Military Personnel

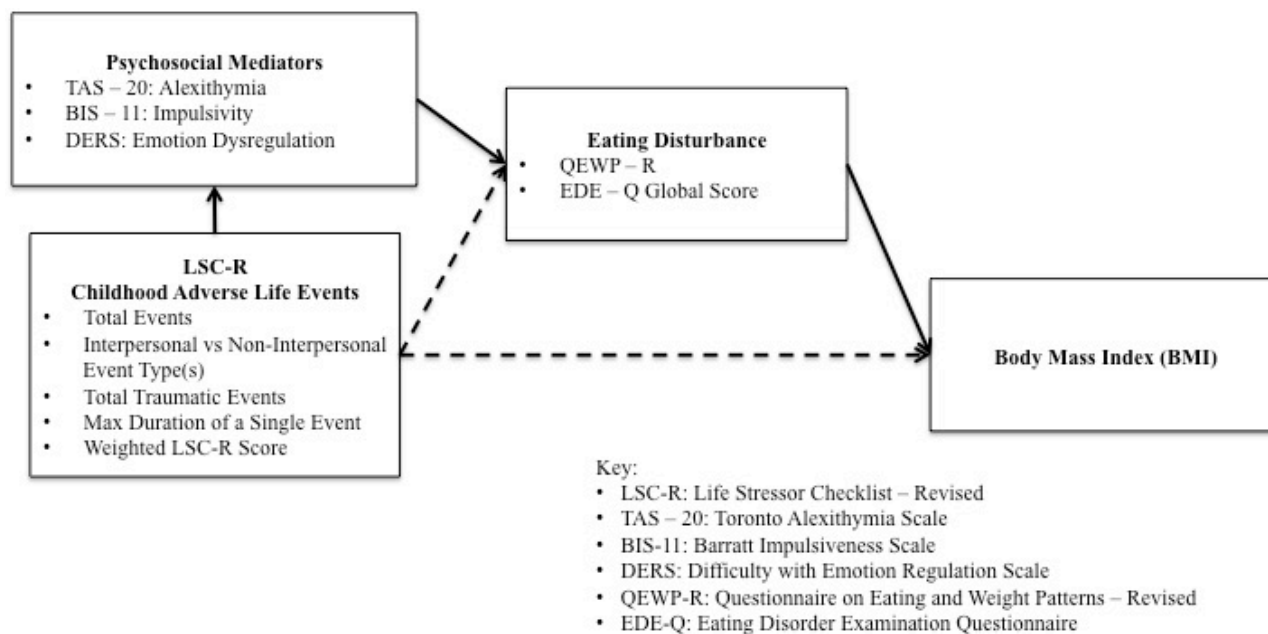


Figure 2. Study Aim I: Childhood Adverse Life Event Data Collected from the Life Stressor Checklist - Revised

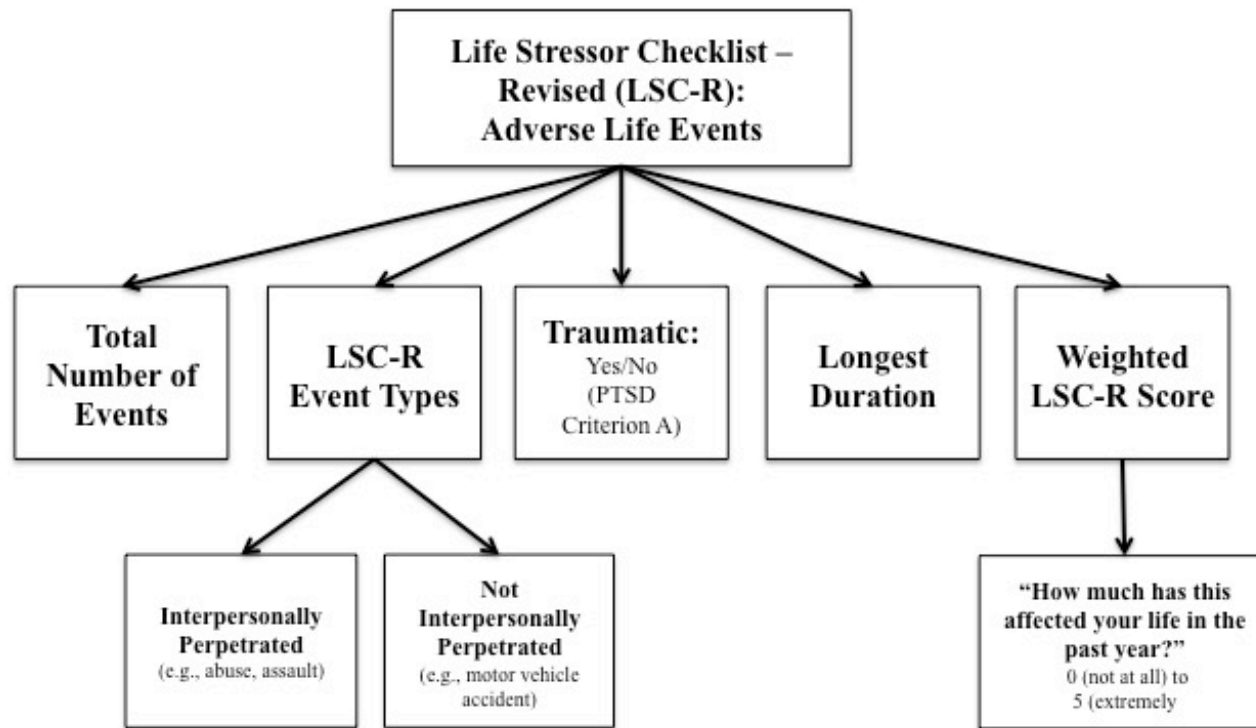


Figure 3. Study Aim II: Association Between Childhood Adverse Life Event Exposure and Eating Disturbance in Active Duty U.S. Military Personnel

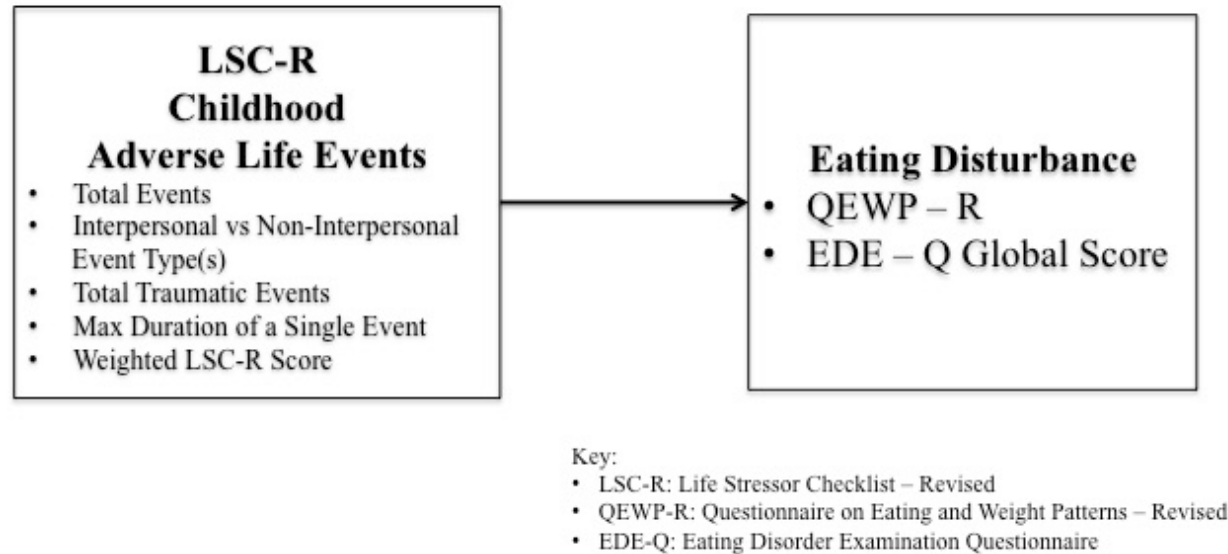
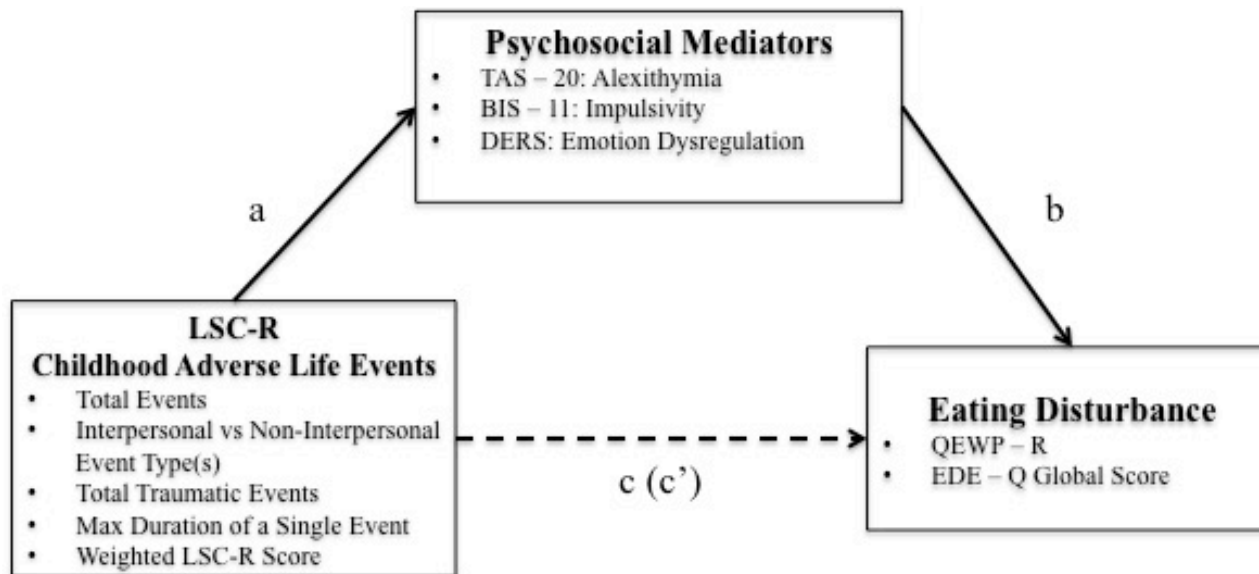


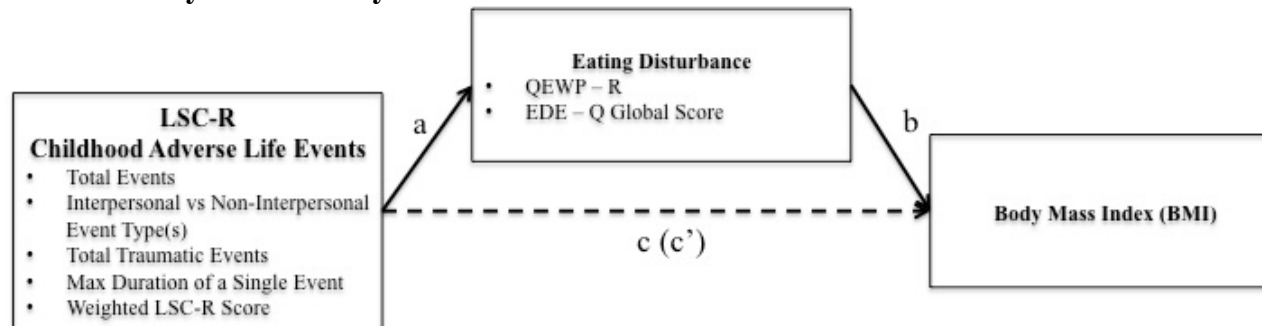
Figure 4. Study Aim III: Psychosocial Mediators of Childhood Adverse Life Event Exposure and Eating Disturbance in Active Duty U.S. Military Personnel



Key:

- LSC-R: Life Stressor Checklist – Revised
- TAS – 20: Toronto Alexithymia Scale
- BIS-11: Barratt Impulsiveness Scale
- DERS: Difficulty with Emotion Regulation Scale
- QEWP-R: Questionnaire on Eating and Weight Patterns – Revised
- EDE-Q: Eating Disorder Examination Questionnaire

Figure 5. Study Aim IV: Eating Disturbance as a Mediator of Childhood Adverse Life Event Exposure and Body Mass Index in Active Duty U.S. Military Personnel



Key:

- LSC-R: Life Stressor Checklist – Revised
- QEWP-R: Questionnaire on Eating and Weight Patterns – Revised
- EDE-Q: Eating Disorder Examination Questionnaire

Figure 6a. Summary of Data Analytic Plan for Multivariate Models

Model	Hypothesis	IV	Mediators	DV	Covariates Considered
Logistic Regression	2a	Total ALE	NA	QEWP-R	Age Sex Race Education Pay Grade Combat Depression Screen PTSD Screen
	2b	IP ALE			
		Non-IP ALE			
		Traumatic ALE			
		Max Duration			
		LSC - R _w			
Linear Regression	2a	Total ALE		EDE-Q	
	2b	IP ALE			
		Non-IP ALE			
		Traumatic ALE			
		Max Duration			
		LSC - R _w			
Logistic Regression	3	Total ALE	TAS - 20 BIS - 11 DERS	QEWP-R	Age Sex Race Education Pay Grade Combat Depression Screen PTSD Screen
		IP ALE			
		Non-IP ALE			
		Traumatic ALE			
		Max Duration			
		LSC - R _w			
Linear Regression		Total ALE		EDE-Q	
		IP ALE			
		Non-IP ALE			
		Traumatic ALE			
		Max Duration			
		LSC - R _w			
Linear Regression	4a	Total ALE	NA	BMI	Age Sex Race Education Pay Grade Combat Depression Screen PTSD Screen
		IP ALE			
		Non-IP ALE			
		Traumatic ALE			
		Max Duration			
		LSC - R _w			
	4b	Total ALE	QEWP-R EDE-Q		
		IP ALE			
		Non-IP ALE			
		Traumatic ALE			
		Max Duration			
		LSC - R _w			

Note. IV = Independent Variable; DV = Dependent Variable; ALE = childhood adverse life events; IP = interpersonal; Max Duration = Maximum duration of a single ALE; LSC-R_w = Life Stressor Checklist – Revised weighted score; EDE-Q = Eating Disorder Examination Questionnaire Global Score; QEWP – R = Questionnaire on Eating and Weight Pattern – Revised; TAS-20 = Toronto Alexithymia Scale; BIS-11: Barratt Impulsiveness Scale; DERS = Difficulty in Emotion Regulation Scale; BMI = Body Mass Index

Figure 6b. Variable Reduction Decision Tree for Multivariate Models

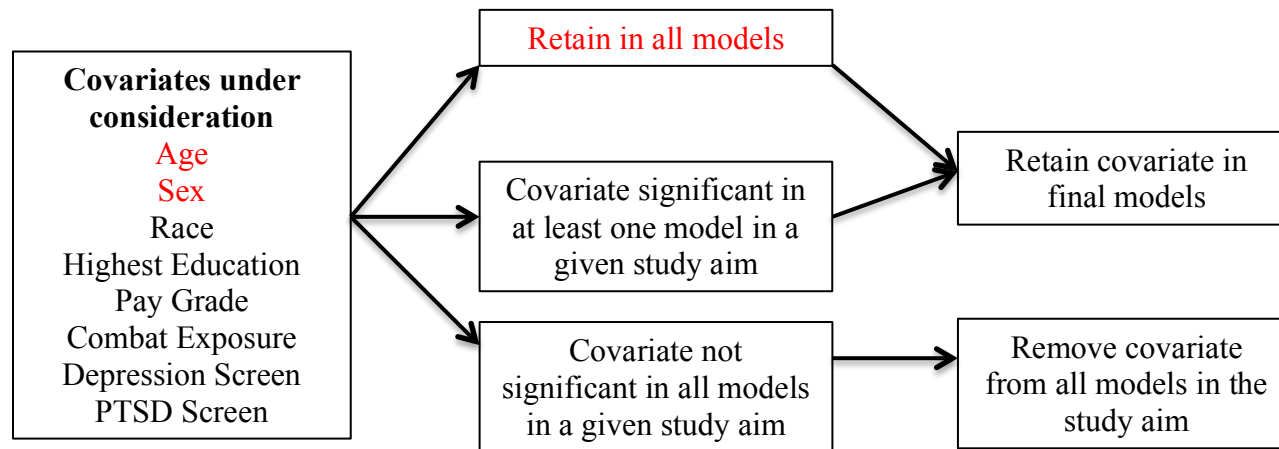


Figure 7. Participant Flow Diagram

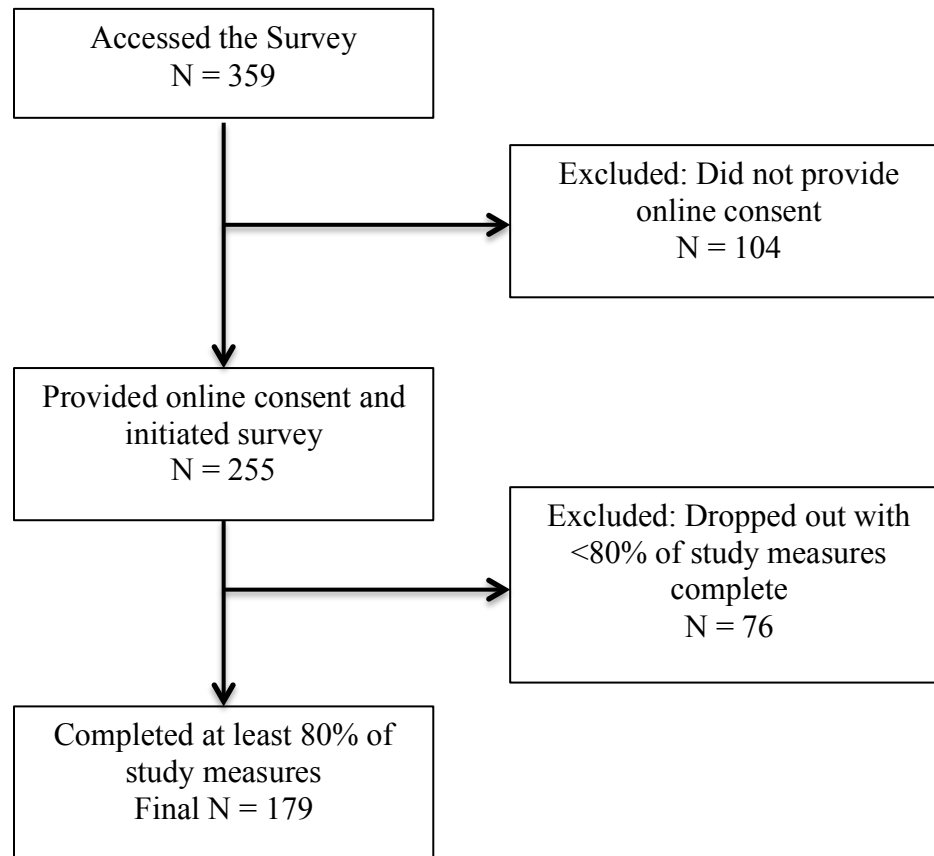


Table 1. Summary of Study Measures

Variable	Instrument	Authors
Predictor	Life Stressor Checklist – Revised (LSC-R)	Wolfe & Kimerling, 1997
Mediator	Toronto Alexithymia Scale (TAS-20)	Taylor et al., 1994
Mediator	Difficulty with Emotion Regulation Scale (DERS)	Gratz & Roemer, 2004
Mediator	Barratt Impulsivity Scale (BIS-11)	Patton et al., 1995
Covariate	Primary Care PTSD Screen (PC-PTSD)	Prins et al., 2003
Covariate	Patient Health Questionnaire Depression Screen (PHQ-8)	Kroenke et al., 2009
Covariate	Combat Exposure Scale (CES)	Keane et al., 1989
Covariate	Demographics Questionnaire	n/a
Outcome	Questionnaire on Eating and Weight Pattern – Revised (QEW-P-R)	Spitzer et al., 1993
Outcome	Eating Disorder Examination – Questionnaire (EDE-Q)	Fairburn & Beglin, 1994

Table 2. Sample Demographic Characteristics

	Final Sample, n = 179		Incomplete Sample, n = 76		χ^2	p^a
	n	%	n	%		
Age						
18-25	31	17.3	25	32.9	12.50	.01
26-30	58	32.4	24	31.6		
31-35	37	20.7	14	18.4		
36-40	27	15.1	11	14.5		
>40	25	14	2	2.6		
Data Missing	1	0.6	0	0		
Sex						
Male	96	53.6	48	63.2	1.91	.17
Female	83	46.4	27	35.5		
Data Missing	0	0	1	1.3		
Race/Ethnicity						
White/Caucasian	135	75.4	41	53.9	6.19	.27 ^b
Latino/Hispanic White	10	5.6	8	10.5		
Black/African-American	8	4.5	1	1.3		
Asian/Pacific Islander	8	4.5	5	6.6		
Multiracial	12	6.7	4	5.3		
Other	6	3.4	3	3.9		
Data Missing	0	0	14	18.4		
Marital Status						
Married	104	58.4	27	35.5	5.05	.17
Single, Never Married	48	26.8	25	32.9		
Divorced/Separated	16	8.9	5	6.6		
Cohabiting	10	5.6	5	6.6		
Data Missing	1	0.6	14	18.4		

Highest Education Level

Trade/Technical School	15	8.4	15	19.7	20.72	<.01
Some College	29	16.2	17	22.4		
4-Year College degree	30	16.8	17	22.4		
Some Graduate study	33	18.4	2	2.6		
Graduate Degree	70	39.1	21	27.6		
Data Missing	2	1.1	4	5.3		

^a Chi-square or Fisher's exact tests (for analyses in which the expected count was less than 5 in 20% of cells); ^b Fisher's exact test.

Table 3. Sample Military Service Characteristics

	Final Sample, n = 179		Incomplete Sample, n = 76		χ^2	p^a
	n	%	n	%		
Service Branch						
Army	71	39.7	25	32.9	8.63	.06 ^b
Air Force	57	31.8	25	32.9		
Navy	46	25.7	17	22.4		
Marine Corps	4	2.2	8	10.5		
Coast Guard	1	0.6	1	1.3		
Pay Grade						
E1 – E3	12	6.7	13	17.1	14.39	.01 ^b
E4 – E6	37	20.7	26	34.2		
E7 – E9	8	4.5	3	3.9		
O1 – O3	92	51.4	26	34.2		
O4 – O10	29	16.2	8	10.5		
W1 – W5	1	0.6	0	0		
Time in Service (years)						
0-2	34	19	18	23.7	7.28	.12
3-5	41	22.9	15	19.7		
6-10	41	22.9	24	31.6		
10-19	51	28.5	19	25		
20+	11	6.1	0	0		
Data Missing	1	0.6	0	0		
Component						
Active	173	96.6	69	90.8	5.54	.052 ^b
National Guard	4	2.2	5	6.6		
Reserve	2	1.1	1	1.3		
Data Missing	0	0	1	1.3		

Total No. Deployments						
0	86	48	30	39.5	6.49	.17
1	37	20.7	14	18.4		
2	22	12.3	19	25		
3	14	7.8	5	6.6		
4 or more	20	11.2	8	10.5		
Combat Exposure						
Not applicable	86	48	34	44.7	2.06	.86 ^b
Light	56	31.3	25	32.9		
Light-Moderate	22	12.3	8	10.5		
Moderate	7	3.9	5	6.6		
Moderate-Heavy	7	3.9	3	3.9		
Heavy	1	0.6	1	1.3		
Data Missing	0	0	4	5.3		

^a Two-tailed *p*-values for Chi-square or Fisher's exact tests when the expected count was less than 5 in 20% of cells; ^b Fisher's exact test; No. = Number.

Table 4. Descriptive Statistics for Life Stressor Checklist – Revised (N = 179)

Childhood ALE Category	n	%	Mean	SD	Min	Max
Total ALE						
0	44	24.6	2.45	2.5	0	13
1	37	20.7				
2	29	16.2				
3	20	11.2				
4	18	10.1				
5 or more	31	17.3				
Traumatic ALE						
0	106	59.2	0.87	1.48	0	9
1	38	21.2				
2	14	7.8				
3 or more	21	11.7				
Interpersonal ALE						
0	93	52.0	1.15	1.64	0	7
1	32	17.9				
2	24	13.4				
3 or more	30	16.8				
Non-Interpersonal ALE						
0	71	39.7	1.25	1.41	0	6
1	50	27.9				
2	25	14				
3 or more	33	18.4				
Max Duration of a Single ALE (years)						
0	51	28.5	3.32	4.14	0	17
1	51	28.5				
2-5	32	17.9				
6-9	23	12.8				
10 or more	22	12.3				

LSC-R

Weighted Score

0	44	24.6	4.49	5.72	0	35
1	30	16.8				
2-3	28	15.6				
4-5	19	10.6				
6-10	38	21.2				
11 or greater	20	11.2				

Note. ALE = Adverse Life Events; SD = Standard Deviation; Min = Minimum; Max = Maximum

Table 5. Hypothesis 1a, Group Differences in Childhood ALE exposure between Officers and Enlisted personnel (N = 179)

	Officers n = 122	%	Enlisted n = 57	%	χ^2	p^a
Total ALE						
0	37	30.3	7	12.3	11.45	.04
1	26	21.3	11	19.3		
2	20	16.4	9	15.8		
3	12	9.8	8	14.0		
4	12	9.8	6	10.5		
5 or more	15	12.3	16	28.1		
Traumatic ALE						
0	74	60.7	32	56.1	3.24	.36
1	26	21.3	12	21.0		
2	11	9.0	3	5.3		
3 or more	11	9.0	10	17.5		
Interpersonal ALE						
0	65	53.3	28	49.1	3.89	.27
1	23	18.9	9	15.8		
2	18	14.8	6	10.5		
3 or more	16	13.1	14	24.6		
Non-Interpersonal ALE						
0	60	49.2	11	19.3	15.26	<.01
1	30	24.6	20	35.1		
2	15	13.9	10	17.5		
3 or more	17	13.9	16	28.1		

Max Duration of
a Single ALE (years)

0	43	35.2	8	14.0	10.95	.03
1	34	27.9	17	29.8		
2-5	17	13.9	15	26.3		
6-9	13	10.7	10	17.5		
10 or more	15	12.3	7	12.3		

LSC-R

Weighted Score

0	37	30.3	7	12.3	8.94	.11
1	21	17.2	9	15.8		
2-3	19	15.6	9	15.8		
4-5	10	8.2	9	15.8		
6-10	23	18.9	15	26.3		
11 or greater	12	9.8	8	14.0		

Note. ALE = Adverse Life Events; Max = Maximum; ^a Chi-square or Fisher's exact tests (for analyses in which the expected count was less than 5 in 20% of cells); ^b Fisher's exact test

Table 6. Sex differences in self-reported history of childhood sexual harassment, sexual abuse, and sexual assault (N = 179)

	Men		Women		χ^2 ^a	<i>p</i>
	n = 96	%	n = 83	%		
Childhood Sexual Harassment						
No	96	100	76	91.6	6.33	.01
Yes	0	0	7	8.4		
Childhood Sexual Molestation						
No	94	98	69	83.1	10.20	<.01
Yes	2	2	14	16.9		
Childhood Sexual Assault						
No	95	99	76	91.6	4.10	.04
Yes	1	1	7	8.4		

Note. ^aYates Continuity Correction for 2x2 tables

Table 7a. Hypothesis 2a: Multiple linear regression of the association between Total Adverse Life Events and the Eating Disorder Examination Questionnaire – Global Score

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Total ALE	0.08	0.04	.14	2.15	.03	9.30	8, 169	<.001
Age	0.03	0.02	.17	1.93	.06			
Sex	0.56	0.18	.21	3.12	<.01			
Education_D1	-0.03	0.35	-.01	-0.08	.94			
Education_D2	0.29	0.39	.11	0.75	.46			
Pay Grade	0.43	0.33	.15	1.32	.19			
Combat Exposure	-0.38	0.21	-.15	-1.80	.07			
MDD Screen	1.46	0.24	.41	6.23	<.001			

Note. $R^2 = .306$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 7b. Hypothesis 2a: Logistic regression of the association between Total Adverse Life Events and Presence or Absence of Loss of Control eating as reported in the Questionnaire on Eating and Weight Patterns – Revised (QEWPR)

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Total ALE	0.03	0.09	1.03	[0.87, 1.22]	0.13	.72
Age	0.05	0.04	1.05	[0.97, 1.13]	1.39	.24
Sex	0.88	0.47	2.41	[0.95, 6.09]	3.46	.06
Education_D1	-0.89	0.99	0.41	[0.06, 2.85]	0.81	.37
Education_D2	-0.96	1.01	0.38	[0.05, 2.80]	0.89	.35
Pay Grade	1.59	0.87	4.91	[0.89, 26.95]	3.35	.07
Combat Exposure	-0.07	0.57	0.93	[0.31, 2.82]	0.02	.90
MDD Screen	2.12	0.51	8.31	[3.06, 22.60]	17.23	<.001

Note. Model $\chi^2(8) = 30.79$, $p < .001$; CI = Confidence Interval for odds ratio (OR); ALE = Adverse Life Events; QEWPR = Questionnaire on Eating and Weight Pattern - Revised; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder.

Table 8a. Hypothesis 2b: Multiple linear regression of the association between Traumatic ALE and the EDE - Q

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Traumatic ALE	0.20	0.06	.23	3.56	<.001	10.71	8, 169	<.001
Age	0.03	0.02	.17	2.07	.04			
Sex	0.57	0.17	.22	3.29	<.01			
Education_D1	0.06	0.35	.02	0.18	.86			
Education_D2	0.37	0.38	.14	0.98	.33			
Pay Grade	0.53	0.32	.19	1.65	.10			
Combat Exposure	-0.41	0.21	-.16	-1.99	.048			
MDD Screen	1.55	0.23	.42	6.64	<.001			

Note. $R^2 = .315$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; EDE –Q = Eating Disorder Examination Questionnaire – Global Score; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 8b.i. Hypothesis 2b: Multiple linear regression of the association between Interpersonally Perpetrated ALE and the EDE - Q

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Interpersonal ALE	0.14	0.05	.17	2.63	<.01	12.09	8, 169	<.001
Age	0.03	0.02	.14	1.65	.10			
Sex	0.52	0.18	.20	2.95	<.01			
Education_D1	-0.01	0.35	-.004	-0.04	.97			
Education_D2	0.35	0.39	.13	0.92	.36			
Pay Grade	0.49	0.33	.17	1.51	.13			
Combat Exposure	-0.34	0.21	-.13	-1.61	.11			
MDD Screen	1.48	0.24	.40	6.20	<.001			

Note. $R^2 = .315$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; EDE –Q = Eating Disorder Examination Questionnaire – Global Score; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 8.b.ii. Hypothesis 2b: Multiple linear regression of the association between Interpersonally-Perpetrated Childhood ALE (dichotomized) and the EDE - Q

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Interpersonal ALE	0.26	0.17	.10	1.48	.14	8.87	8, 169	<.001
Age	0.03	0.02	.16	1.83	.07			
Sex	0.56	0.18	.21	3.16	<.01			
Education_D1	-0.07	0.35	-.02	-0.20	.84			
Education_D2	0.26	0.39	.10	0.67	.50			
Pay Grade	0.48	0.33	.17	1.45	.15			
Combat Exposure	-0.36	0.21	-.14	-1.70	.09			
MDD Screen	1.54	0.24	.42	6.40	<.001			

Note. $R^2 = .296$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; EDE –Q = Eating Disorder Examination Questionnaire – Global Score; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 8c. Hypothesis 2b: Multiple linear regression of the association between Non-interpersonally Perpetrated ALE and the EDE - Q

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Non-Interpersonal ALE	0.04	0.06	.04	0.56	.57	11.06	8, 169	<.001
Age	0.03	0.02	.18	2.05	.04			
Sex	0.59	0.18	.22	3.31	<.01			
Education_D1	-0.09	0.36	-.03	-0.25	.80			
Education_D2	.021	0.39	.08	0.55	.58			
Pay Grade	0.45	0.33	.16	1.34	.18			
Combat Exposure	-0.38	0.22	-.14	-1.76	.08			
MDD Screen	1.55	0.24	.42	6.41	<.001			

Note. $R^2 = .288$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; EDE –Q = Eating Disorder Examination Questionnaire – Global Score; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 8d. Hypothesis 2b: Multiple linear regression of the association between Maximum Duration of a ALE and the EDE - Q

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Max Duration of a Single ALE	0.03	0.02	.09	1.32	.19	8.79	8, 169	<.001
Age	0.03	0.02	.16	1.81	.07			
Sex	0.57	0.18	.22	3.18	<.01			
Education_D1	-0.05	0.36	-.02	-0.15	.88			
Education_D2	0.27	0.39	.10	0.70	.49			
Pay Grade	0.47	0.33	.17	1.43	.15			
Combat Exposure	-0.37	0.21	-.14	-1.73	.09			
MDD Screen	1.54	0.24	.42	6.37	<.001			

Note. $R^2 = .294$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; EDE –Q = Eating Disorder Examination Questionnaire – Global Score; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 8e. Hypothesis 2b: Multiple linear regression of the association between the Life Stressor Checklist – Revised Weighted Score and the EDE - Q

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
LSC-R Weighted Score	0.06	0.02	.24	3.56	<.001	10.71	8, 169	<.001
Age	0.03	0.02	.16	1.88	.06			
Sex	0.51	0.17	.19	2.92	<.01			
Education_D1	0.002	0.34	.001	0.01	.99			
Education_D2	0.42	0.38	.16	1.12	.27			
Pay Grade	0.52	0.32	.18	1.61	.11			
Combat Exposure	-0.36	0.21	-.14	-1.74	.08			
MDD Screen	1.36	0.24	.37	5.70	<.001			

Note. $R^2 = .336$ ($N = 177$, $p < .001$); LSC – R = Life Stressor Checklist – Revised; EDE –Q = Eating Disorder Examination Questionnaire – Global Score; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder

Table 9a. Hypothesis 2b: Logistic regression of the association between Traumatic ALE and Loss of Control eating as reported in the QEWP - R

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Traumatic ALE	0.21	0.14	1.24	[0.95, 1.62]	2.55	.11
Age	0.05	0.04	1.05	[0.97, 1.13]	1.44	.23
Sex	0.91	0.48	2.48	[0.97, 6.31]	3.63	.06
Education_D1	-0.75	1.00	0.47	[0.07, 3.35]	0.56	.45
Education_D2	-1.13	1.02	0.27	[0.04, 2.39]	1.22	.27
Pay Grade	1.69	0.87	5.44	[0.99, 30.04]	3.77	.05
Combat Exposure	-0.10	0.57	0.91	[0.30, 2.78]	0.03	.86
MDD Screen	2.19	0.52	8.89	[3.21, 24.62]	17.66	<.001

Note. Model $\chi^2(8) = 33.09$, $p < .001$; CI = Confidence Interval for odds ratio (OR); ALE = Adverse Life Events; QEWP – R = Questionnaire on Eating and Weight Pattern - Revised; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder.

Table 9b. Hypothesis 2b: Logistic regression of the association between Interpersonally perpetrated ALE and Loss of Control eating as reported in the QEWP - R

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Interpersonal ALE	0.03	0.13	1.03	[0.80, 1.31]	0.05	.83
Age	0.05	0.04	1.05	[0.97, 1.13]	1.32	.25
Sex	0.88	0.48	2.42	[0.95, 6.12]	3.45	.06
Education_D1	-0.91	0.99	0.40	[0.06, 2.80]	0.84	.36
Education_D2	-0.94	1.02	0.39	[0.05, 2.86]	0.86	.36
Pay Grade	1.59	0.87	4.90	[0.89, 27.96]	3.34	.07
Combat Exposure	-0.07	0.57	0.94	[0.31, 2.86]	0.01	.91
MDD Screen	2.12	0.51	8.37	[3.08, 22.75]	17.33	<.001

Note. Model $\chi^2(8) = 30.70$, $p < .001$; CI = Confidence Interval for odds ratio (OR); ALE = Adverse Life Events; QEWP – R = Questionnaire on Eating and Weight Pattern – Revised; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder.

Table 9c. Hypothesis 2b: Logistic regression of the association between Non-interpersonally Perpetrated ALE and Loss of Control eating as reported in the QEWP - R

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Non-Interpersonal ALE	0.05	0.16	1.05	[0.77, 1.43]	0.08	.78
Age	0.05	0.04	1.05	[0.97, 1.13]	1.44	.23
Sex	0.89	0.47	2.44	[0.97, 6.16]	3.56	0.06
Education_D1	-0.90	0.99	0.41	[0.06, 2.82]	0.83	.36
Education_D2	-0.93	1.01	0.40	[0.05, 2.87]	0.84	.36
Pay Grade	1.58	0.87	4.85	[0.88, 26.82]	3.28	.07
Combat Exposure	-0.86	0.57	0.92	[0.30, 2.79]	0.02	.88
MDD Screen	2.13	0.51	8.44	[3.11, 22.86]	17.58	<.001

Note. Model $\chi^2(8) = 30.44, p < .001$; CI = Confidence Interval for odds ratio (OR); ALE = Adverse Life Events; QEWP – R = Questionnaire on Eating and Weight Pattern – Revised; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder.

Table 9d. Hypothesis 2b: Logistic regression of the association between the Maximum Duration of a Single ALE and Presence or Absence of Loss of Control eating as reported in the QEWP - R

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Max Duration of a Single ALE	-0.001	0.05	1.00	[0.90, 1.10]	<0.01	.99
Age	0.05	0.04	1.05	[0.97, 1.13]	1.37	.24
Sex	0.89	0.48	2.44	[0.96, 6.21]	3.53	.06
Education_D1	-0.92	0.99	0.40	[0.06, 2.75]	0.87	.35
Education_D2	-0.90	1.01	0.41	[0.06, 2.95]	0.80	.37
Pay Grade	1.58	0.87	4.87	[0.88, 26.94]	3.30	.07
Combat Exposure	-0.07	0.57	0.93	[0.31, 2.82]	0.02	.90
MDD Screen	2.14	0.51	8.46	[3.12, 22.98]	17.56	<.001

Note. Model $\chi^2(8) = 30.66, p < .001$; CI = Confidence Interval for odds ratio (OR); ALE = Adverse Life Events; QEWP – R = Questionnaire on Eating and Weight Pattern – Revised; Max = Maximum; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder.

Table 9e. Hypothesis 2b: Logistic regression of the association between the LSC – R Weighted Score and Presence or Absence of Loss of Control eating as reported in QEWP - R

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Weighted Score	0.06	0.04	1.06	[0.99, 1.13]	2.39	.12
Age	0.05	0.04	1.05	[0.97, 1.13]	1.38	.24
Sex	0.81	0.47	2.24	[0.88, 5.67]	2.89	.09
Education_D1	-0.95	1.01	0.39	[0.05, 2.83]	0.87	.35
Education_D2	-1.24	1.04	0.29	[0.04, 2.22]	1.42	.23
Pay Grade	1.77	0.89	5.88	[1.03, 33.47]	3.99	.05
Combat Exposure	0.05	0.57	0.95	[0.31, 2.92]	0.01	.93
MDD Screen	-4.27	1.37	7.42	[2.69, 20.47]	9.69	<.01

Note. Model $\chi^2(8) = 33.00$, $p < .001$; CI = Confidence Interval for odds ratio (OR); ALE = Adverse Life Events; LSC – R = Life Stressor Checklist – Revised; QEWP – R = Questionnaire on Eating and Weight Pattern - Revised; D1, D2 = Dummy Variable; MDD = Major Depressive Disorder

Table 10a. Multiple linear regression of the association between Total Traumatic ALE and the Toronto Alexithymia Scale – 20

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Traumatic ALE	1.26	0.54	.15	2.35	.02	9.40	9, 168	<.001
Age	0.01	0.14	.01	0.09	.93			
Sex	3.32	1.62	.14	2.06	.04			
Education_D1	0.04	3.23	.001	0.01	.99			
Education_D2	-2.83	3.53	-.12	-0.80	.43			
Pay Grade	3.99	2.98	.15	1.34	.18			
Combat Exposure	3.82	1.95	.16	1.96	.05			
MDD Screen	8.85	2.27	.26	3.90	<.001			
PTSD Screen	7.98	2.28	.24	3.49	<.001			

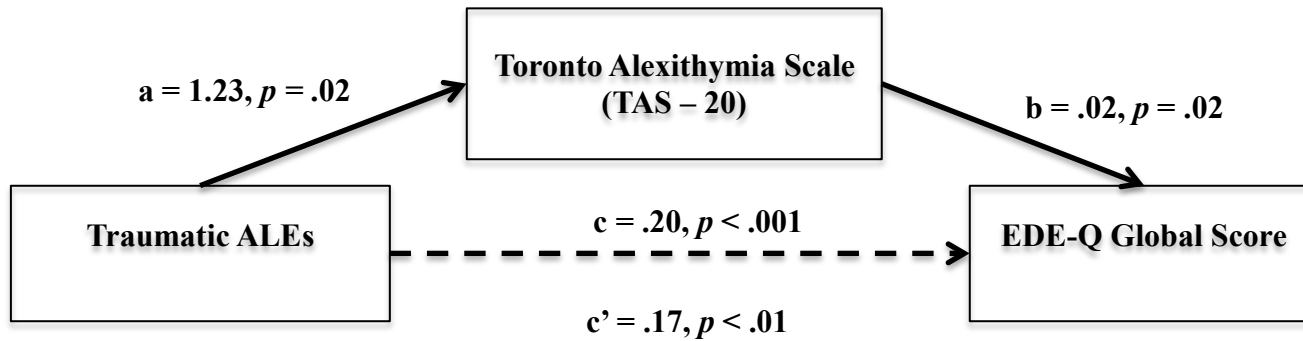
Note. $R^2 = .335$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Table 10b. Hypothesis 3: Mediation Model Coefficients for the Indirect Effect of Alexithymia on the Association between Traumatic Childhood ALE and EDE – Q Global Scale

Antecedent		Consequent						
		<i>M (TAS-20)</i>			<i>Y (EDE-Q)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>	<i>Coeff</i>	<i>SE</i>	<i>p</i>	
X (Traumatic ALE)	<i>a</i>	1.23	0.53	.02	<i>c'</i>	0.17	0.06	<.001
M (TAS-20)	--	--	--	--	<i>b</i>	0.02	0.01	.02
Constant	<i>i₁</i>	28.79	7.01	<.001	<i>i₂</i>	-1.89	0.79	.02
$R^2 = .342$					$R^2 = .337$			
$F(9, 168) = 9.71, p < .001$					$F(10, 167) = 9.37, p < .001$			

Note. ALE = Adverse Life Events; TAS-20 = Toronto Alexithymia Scale; EDE – Q = Eating Disorder Examination

Figure 8. Mediation Model for the Indirect Effect of Alexithymia on the Association between Traumatic Childhood ALE and EDE – Q Global Scale



Note. ALE = Adverse Life Events; EDE-Q = Eating Disorder Examination – Questionnaire;
Model adjusted for Age, Sex, Race, and Depression Screen

Table 11a. Hypothesis 4a: Multiple linear regression of the association between Total Childhood ALE and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Total ALE	0.14	0.09	.11	1.65	.10	10.50	5, 172	<.001
Age	0.06	0.03	.14	2.08	.04			
Sex	-2.04	0.43	-.32	-4.77	<.001			
Race	1.03	0.49	.14	2.08	.04			
MDD Screen	2.60	0.60	.29	4.34	<.001			

Note. $R^2 = .234$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 11b.i. Hypothesis 4a: Multiple linear regression of the association between Traumatic Childhood ALE and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Traumatic ALE	0.36	0.14	.17	2.56	.01	11.48	5, 172	<.001
Age	0.06	0.03	.14	2.14	.03			
Sex	-2.01	0.42	-.32	-4.75	<.001			
Race	0.94	0.49	.13	1.92	.06			
MDD Screen	2.70	0.59	.30	4.59	<.001			

Note. $R^2 = .228$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 11b.ii. Hypothesis 4a: Multiple linear regression of the association between Traumatic Childhood ALE (dichotomized) and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Traumatic ALE	0.84	0.43	.13	1.93	.06	10.76	5, 172	<.001
Age	0.06	0.03	.13	1.99	.05			
Sex	-1.93	0.43	-.30	-4.51	<.001			
Race	1.04	0.49	.14	2.10	.04			
MDD Screen	2.77	0.59	.31	4.67	<.001			

Note. $R^2 = .238$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 11c. Hypothesis 4a: Multiple linear regression of the association between the Interpersonally Perpetrated Childhood ALE and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Interpersonal ALE	0.17	0.13	.09	1.24	.22	10.20	5, 172	<.001
Age	0.06	0.03	.13	1.98	.049			
Sex	-2.07	0.43	-.32	-4.79	<.001			
Race	1.01	0.50	.14	2.04	.04			
MDD Screen	2.62	0.60	.30	4.35	<.001			

Note. $R^2 = .229$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 11d. Hypothesis 4a: Multiple linear regression of the association between the Non-Interpersonally Perpetrated Childhood ALE and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Non-Interpersonal ALE	0.20	0.15	.09	1.29	.20	10.23	5, 172	<.001
Age	0.06	0.03	.15	2.16	.03			
Sex	-1.98	0.43	-.31	-4.60	<.001			
Race	1.06	0.50	.14	2.13	.03			
MDD Screen	2.70	0.60	.30	4.52	<.001			

Note. $R^2 = .229$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 11e. Hypothesis 4a: Multiple linear regression of the association between the Maximum Duration of a Single Childhood ALE and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Max Duration of a Single ALE	<.01	0.05	<.01	<-.01	.99	9.80	5, 172	>.001
Age	0.06	0.03	.14	2.05	.04			
Sex	-2.01	0.43	-.31	-4.65	<.001			
Race	1.04	.050	.14	2.09	.04			
MDD Screen	2.73	0.60	.31	4.55	<.001			

Note. $R^2 = .222$ ($N = 177$, $p < .001$); Max = Maximum; ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 11f. Hypothesis 4a: Multiple linear regression of the association between the Life Stressor Checklist – Revised Weighted Score and BMI

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
LSC – R Weighted Score	0.10	0.04	.17	2.51	.01	11.42	5, 172	<.001
Age	0.06	0.03	.14	2.17	.03			
Sex	-2.10	0.43	-.33	-4.95	<.001			
Race	1.00	0.49	.14	2.05	.04			
MDD Screen	2.36	0.61	.27	3.88	<.001			

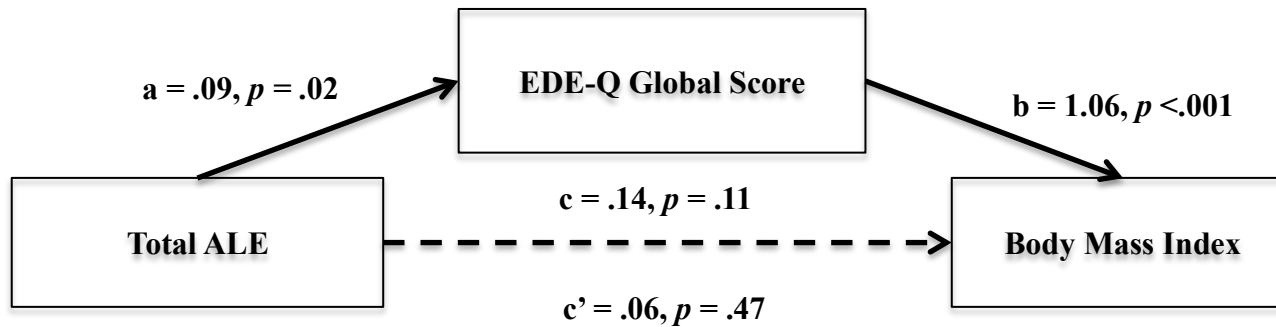
Note. $R^2 = .249$ ($N = 179$, $p < .001$); ALE = Adverse Life Events; MDD = Major Depressive Disorder

Table 12a.i. Hypothesis 4b: Mediation Model Coefficients for the Indirect Effect of EDE – Q on the Association between Total Childhood ALE and Body Mass Index

Antecedent		Consequent						
		<i>M (EDE-Q)</i>			<i>Y (BMI)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>		<i>Coeff</i>	<i>SE</i>	<i>p</i>
X (Total ALE)	<i>a</i>	0.08	0.03	.02	<i>c'</i>	0.05	0.08	.48
M (EDE-Q)		--	--	--	<i>b</i>	1.06	0.17	<.001
Constant	<i>i₁</i>	-0.51	0.51	.32	<i>i₂</i>	24.64	1.15	<.001
$R^2 = .282$					$R^2 = .368$			
$F(5, 172) = 13.49, p < .001$					$F(6, 171) = 16.60, p < .001$			

Note. ALE = Adverse Life Events; EDE – Q = Eating Disorder Examination Questionnaire Global Score; BMI = Body Mass Index

Figure 9. Mediation Model for the Indirect Effect of EDE – Q on the Association between Total Childhood ALE and Body Mass Index



Note. ALE = Adverse Life Events; EDE-Q = Eating Disorder Examination – Questionnaire; Model adjusted for Age, Sex, Race, and Depression Screen

Table 12a.ii. Hypothesis 4b: Mediation Model Coefficients for the Indirect Effect of EDE – Q on the Association between Total Childhood ALE and Body Mass Index (Winsorized)

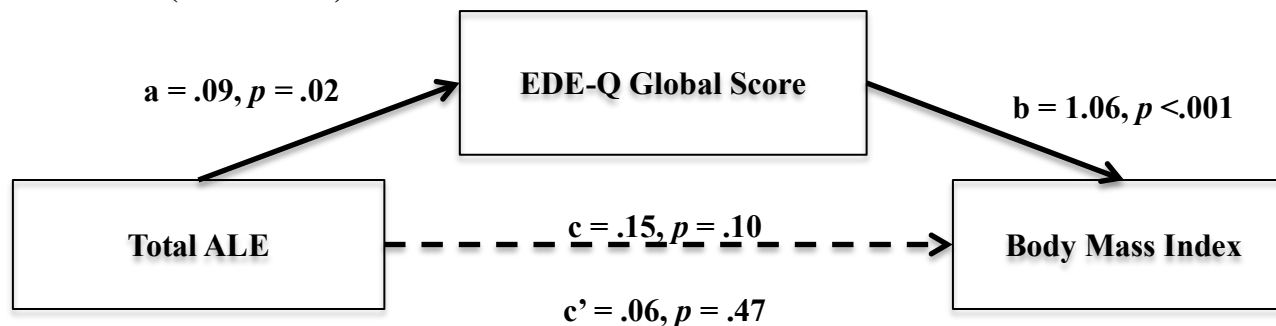
Antecedent		Consequent						
		<i>M (EDE-Q)</i>			<i>Y (BMI)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>	<i>Coeff</i>	<i>SE</i>	<i>p</i>	
X (Total ALE)	<i>a</i>	0.08	0.04	.02	<i>c'</i>	0.05	0.08	.47
M (EDE-Q)					<i>b</i>	1.06	0.17	<.001
Constant	<i>i₁</i>	-0.53	0.51	.29	<i>i₂</i>	24.62	1.16	<.001

$R^2 = .282$
 $F(5, 172) = 13.53, p < .001$

$R^2 = .368$
 $F(6, 171) = 16.61, p < .001$

Note. ALE = Adverse Life Events; EDE – Q = Eating Disorder Examination Questionnaire Global Score; BMI = Body Mass Index

Figure 10. Mediation Model for the Indirect Effect of EDE – Q on the Association between Total Childhood ALE and Body Mass Index (Winsorized)



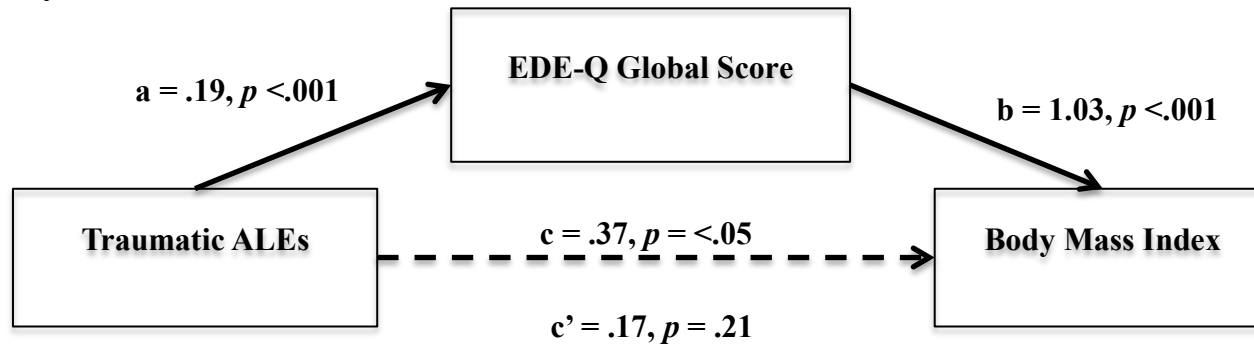
Note. ALE = Adverse Life Events; EDE-Q = Eating Disorder Examination – Questionnaire; Model adjusted for Age, Sex, Race, and Depression Screen

Table 12b. Hypothesis 4b: Mediation Model Coefficients for the Indirect Effect of EDE – Q on the Association between Traumatic Childhood ALE and BMI

Antecedent		Consequent						
		<i>M (EDE-Q)</i>			<i>Y (BMI)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>	<i>Coeff</i>	<i>SE</i>	<i>p</i>	
X (Traumatic ALE)	<i>a</i>	0.19	0.06	<.001	<i>c'</i>	0.17	0.13	.21
M (EDE-Q)	--	--	--	--	<i>b</i>	1.03	0.18	<.001
Constant	<i>i₁</i>	-0.48	.50	.34	<i>i₂</i>	24.63	1.14	<.001
$R^2 = .306$					$R^2 = .372$			
$F(5, 172) = 15.16, p < .001$					$F(6, 171) = 16.89, p < .001$			

Note. ALE = Adverse Life Events; EDE – Q = Eating Disorder Examination Questionnaire Global Score; BMI = Body Mass Index

Figure 11. Mediation Model for the Indirect Effect of EDE – Q on the Association between Traumatic Childhood ALE and Body Mass Index



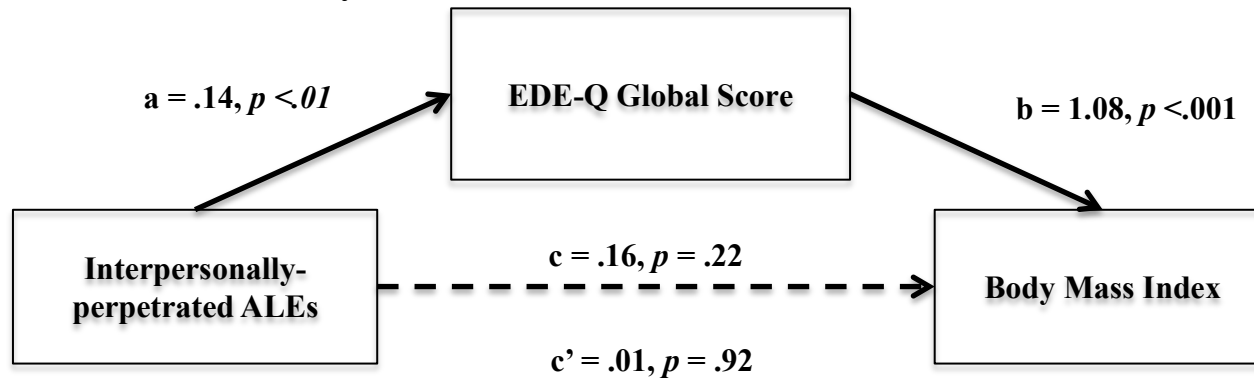
Note. ALE = Childhood Adverse Life Events; EDE-Q = Eating Disorder Examination – Questionnaire;
Model adjusted for Age, Sex, Race, and Depression Screen

Table 12c.i. Hypothesis 4b: Mediation Model Coefficients for the Indirect Effect of EDE – Q on the Association between Total Interpersonally-Perpetrated ALE and BMI

Antecedent		Consequent						
		<i>M (EDE-Q)</i>			<i>Y (BMI)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>	<i>Coeff</i>	<i>SE</i>	<i>p</i>	
X (IP ALE)	<i>a</i>	0.14	0.04	<.01	<i>c'</i>	0.01	0.12	.92
M (EDE-Q)	--	--	--	--	<i>b</i>	1.07	0.17	<.001
Constant					<i>i</i> ₂	24.7	1.14	<.001
	<i>i</i> ₁	-0.33	.50	.51		5		
R ² = .289					R ² = .366			
F(5, 172) = 14.01, <i>p</i> < .001					F(6, 171) = 16.47, <i>p</i> < .001			

Note. ALE = Adverse Life Events; IP = Interpersonal; EDE – Q = Eating Disorder Examination Questionnaire Global Score; BMI = Body Mass Index

Figure 12. Mediation Model for the Indirect Effect of EDE – Q on the Association between Interpersonally Perpetrated Childhood ALEs and Body Mass Index



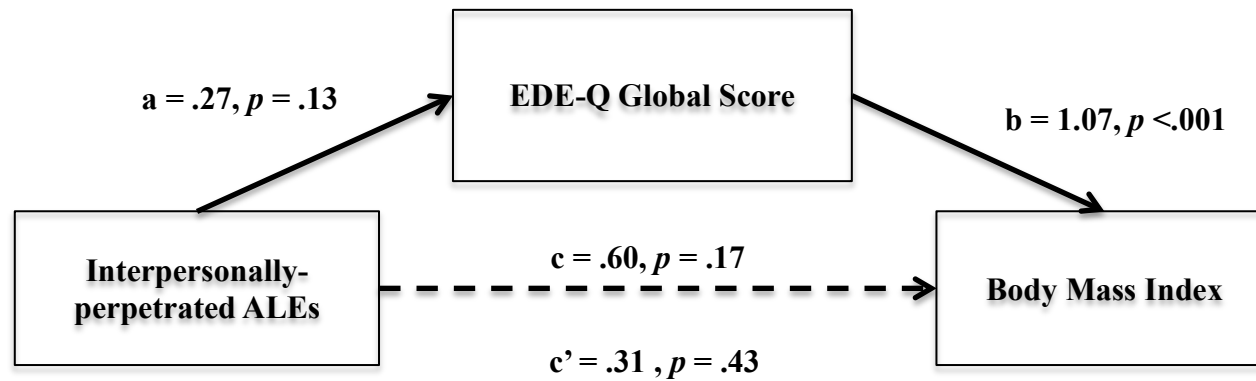
Note. ALE = Childhood Adverse Life Events; EDE-Q = Eating Disorder Examination – Questionnaire;
Model adjusted for Age, Sex, Race, and Depression Screen

Table 12c.ii. Hypothesis 4b: Mediation Model Coefficients for the Indirect Effect of EDE – Q on the Association between Interpersonally-Perpetrated Childhood ALE (dichotomized) and BMI

Antecedent		Consequent						
		<i>M (EDE-Q)</i>			<i>Y (BMI)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>	<i>Coeff</i>	<i>SE</i>	<i>p</i>	
X (IP ALE)	<i>a</i>	.27	0.17	.13	<i>c'</i>	0.51	0.39	.20
M (EDE-Q)	--	--	--	--	<i>b</i>	1.06	0.17	<.001
Constant	<i>i₁</i>	-0.38	0.51	.45	<i>i₂</i>	24.73	1.14	<.001
$R^2 = .270$					$R^2 = .369$			
$F(5, 172) = 12.71, p < .001$					$F(6, 171) = 16.64, p < .001$			

Note. ALE = Adverse Life Events; IP = Interpersonal; EDE – Q = Eating Disorder Examination Questionnaire Global Score; BMI = Body Mass Index

Figure 13. Mediation Model for the Indirect Effect of EDE – Q on the Association between Interpersonally-Perpetrated Childhood ALE (dichotomized) and Body Mass Index



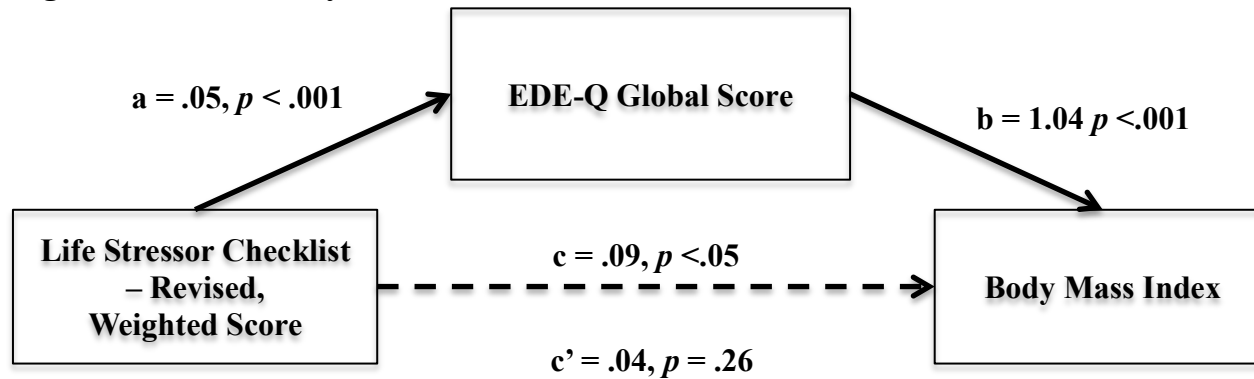
Note. ALE = Childhood Adverse Life Events; EDE-Q = Eating Disorder Examination – Questionnaire;
Model adjusted for Age, Sex, Race, and Depression Screen

Table 12d. Hypothesis 4b: Mediation Model Coefficients for the Indirect Effect of EDE – Q Global Scale on the Association between LSC – R Weighted Score and BMI

Antecedent		Consequent						
		<i>M (EDE-Q)</i>			<i>Y (BMI)</i>			
		<i>Coeff</i>	<i>SE</i>	<i>p</i>	<i>Coeff</i>	<i>SE</i>	<i>p</i>	
X (LSC - R _w)	<i>a</i>	.05	0.02	<.001	<i>c'</i>	0.04	0.04	.26
M (EDE-Q)	--	--	--	--	<i>b</i>	1.03	0.18	<.001
Constant	<i>i₁</i>	-0.50	0.50	.32	<i>i₂</i>	24.73	1.14	<.001
$R^2 = .307$					$R^2 = .371$			
$F(5, 172) = 15.21, p < .001$					$F(6, 171) = 16.81, p < .001$			

Note. LSC –R_w = Life Stressor Checklist – Revised Weighted Score; IP = Interpersonal; EDE – Q = Eating Disorder Examination Questionnaire Global Score; BMI = Body Mass Index

Figure 14. Mediation Model for the Indirect Effect of EDE – Q on the Association between Life Stressor Checklist – Revised Weighted Score and Body Mass Index



Note. EDE-Q = Eating Disorder Examination – Questionnaire;
Model adjusted for Age, Sex, Race, and Depression Screen

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Appendix A: Online Consent Form

CONSENT FOR VOLUNTARY PARTICIPATION IN A RESEARCH STUDY

1. INTRODUCTION:

You are being asked to be in a research study entitled, “**Preventing Obesity in Military Communities – Life Events Study**”, being conducted at the Uniformed Services University of the Health Sciences (USUHS), Bethesda, Maryland. You have been asked to take part in this study because you are an active duty service member age 18 or above in the U.S. military. Your participation is **voluntary**. Refusal to participate will not result in any punishment or loss of benefits to which you are otherwise entitled. Please read the information below, and ask questions about anything you do not understand before deciding whether to participate.

2. THE PURPOSE OF THE STUDY:

This study’s purpose is to better understand the connection between life events, eating patterns, and fitness. Specifically, we are interested in determining how early stressful and potentially traumatic experiences are linked with emotional functioning, eating patterns, and body mass index. We intend to use our findings to inform efforts to optimize the psychological well-being and duty fitness of active duty military personnel. Between 170-300 U.S. service members will complete this study.

3. THE PROCEDURES TO BE FOLLOWED:

If you agree to participate in this study, you will complete a series of anonymous online questionnaires. The questions will include basic demographic information, basic military service history, basic medical information, life events you may or may not have experienced, your mood and behavioral patterns, and your eating patterns.

4. DURATION OF THE STUDY:

The online study is expected to take approximately 30 minutes to complete.

5. POSSIBLE BENEFITS TO YOU THAT MAY BE REASONABLY EXPECTED ARE:

This study is being conducted solely for the purpose of research and there will be no direct benefit to you by participating in this study. The goal of this research is to help other U.S. service members by expanding our understanding of the psychological and physical factors that influence duty fitness. However, you may gain a better understanding of the ways your life events, mood, and behavioral patterns are connected to your eating patterns.

6. DISCOMFORTS AND/OR RISKS THAT CAN BE REASONABLY EXPECTED ARE:

The risks associated with this study are minor. You may find that some questions make you uncomfortable. Specifically, some questions will inquire about stressful and potentially traumatic events that you may have experienced. You may skip any questions that you do not wish to answer. Also, you may decline to participate at any time and/or withdraw your participation at any time. If you decide to stop taking part in this study, you in no way risk losing benefits to which you are otherwise entitled.

7. PRIVACY AND CONFIDENTIALITY:

All information you provide as part of this study will be anonymous and confidential and will be protected to the fullest extent provided by law. Your computer IP address will not be collected as part of the study. Information that you provide and other records related to this study will be accessible to those persons directly involved in conducting this study and members of USUHS Institutional Review Board (IRB), which provides oversight for protection of human research volunteers.

All study data will not have identifying information and will be kept in a restricted access, password protected computer. All hard copies of study data will be stored in the locked office of the Center for Health Disparities B-1022, Department of Medical & Clinical Psychology, USUHS.

8. COMPENSATION:

In order to preserve the anonymous format of the study, direct compensation will not be offered. As a token of appreciation for your participation if you complete the study, you will be given the option to choose one of the three nonprofit organizations listed below that directly benefit U.S. service members, Veterans, and their families to receive a \$5 donation on your behalf:

- i. **United Services Organizations (USO):** An organization whose mission is to provide a wide range of programs and organize events to improve morale for service members and their families worldwide. Available at: <http://www.uso.org/>
- ii. **Wounded Warrior Project (WWP):** An organization whose mission is to raise awareness and provide services to assist injured service members and their families. Available at: <http://www.woundedwarriorproject.org/>
- iii. **Team Red, White, & Blue (TRWB):** An organization whose mission is to connect Veterans within their communities with a focus on social and physical activities. Available at: <http://teamrwb.org/>

9. RECOURSE IN THE EVENT OF INJURY:

This study should not entail any physical or mental risk beyond those described above. It is believed that complications arising from participation should not occur. If, for any reason, you feel that continuing this study would constitute a hardship for you, you may end your participation in the study at any time.

If at any time you believe you have suffered an injury or illness as a result of participating in this research project, contact the Director of Human Subjects Protection Program at USUHS, Bethesda, Maryland 20814-4799 at (301) 295-9534. This office can review the matter with you. They can provide information about your rights as a research volunteer. They may also be able to identify resources available to you.

10. CONTACT FOR QUESTIONS OR PROBLEMS:

If you have questions about this research, you should contact Jennifer Bakalar, M.S., the study Principal Investigator.

The study phone number at USUHS is: (240) 479-4630

The study email address is: life-events-study@usuhs.edu

Even in the evening or on weekends, you can leave a message at that number. If you have questions about your rights as a research subject, you should call the Director of Human Research Protections Programs at USUHS at (301) 295-9534. (S)he is your representative and has no connection to the researcher conducting this study.

STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS RESEARCH PROJECT:

I have read this consent form and I understand the procedures to be used in this study and the possible risks, inconveniences, and/or discomforts that may be involved. All of my questions have been answered. I freely and voluntarily choose to participate. I understand that I may withdraw at any time.

BY CLICKING ON THE "YES..." BUTTON, YOU ARE AGREEING THAT YOU HAVE READ THE CONSENT FORM AND UNDERSTAND THE PROCEDURES TO BE USED IN THIS STUDY. YOU ALSO AGREE THAT YOU FREELY AND VOLUNTARILY CHOOSE TO PARTICIPATE AND UNDERSTAND THAT YOU MAY WITHDRAW AT ANYTIME. IF YOU WISH YOU MAY PRINT OUT A COPY OF THIS FORM FOR YOUR RECORDS.

☐ Yes, I consent to participate

☐ No, I do not consent to participate

Appendix B: Resource Page for Participants

Dear Participant,

Please find below a list of resources that are available to U.S. service members and Veterans who seek behavioral health services. These resources may be of use in the event that you experience emotional discomfort as part of your participation or if you or a family member would like to seek professional services for any reason.

Give an Hour

From the website: *"We are a nonprofit organization providing free mental health services to U.S. military personnel and families affected by the current conflicts in Iraq and Afghanistan."*

Online: <http://www.giveanhour.org/>

National Sexual Assault Hotline

From the website: *"The concept behind the hotline is simple. When a caller dials 1.800.656.HOPE, a computer notes the area code and first three digits of the caller's phone number. The call is then instantaneously connected to the nearest RAINN member center. If all counselors at that center are busy, the call is sent to the next closest center. The caller's phone number is not retained, so the call is anonymous and confidential unless the caller chooses to share personally-identifying information."*

Online: <https://www.rainn.org/>

Phone: **1-800-656-HOPE (1-800-656-4673)**

Real Warriors

From the website: *"The Real Warriors Campaign is a multimedia public awareness campaign designed to encourage help-seeking behavior among service members, veterans and military families coping with invisible wounds. Launched by the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE) in 2009, the campaign is an integral part of the Defense Department's overall effort to encourage warriors and families to seek appropriate care and support for psychological health concerns."*

Online: <http://www.realwarriors.net/veterans/resources.php>

Phone: **866-966-1020**

Veterans Crisis Line

From the website: *"The Veterans Crisis Line connects Veterans in crisis and their families and friends with qualified, caring Department of Veterans Affairs responders through a confidential toll-free hotline, online chat, or text."*

Online: <http://veteranscrisisline.net/>

Phone: **1-800-273-TALK (1-800-273-8255) Press 1 for Veterans**

Military OneSource

From the website: *"Confidential services, including non-medical counseling and specialty consultations, are available through Military OneSource. Eligible individuals may receive confidential services at no cost."*

Online: <http://www.militaryonesource.mil/>

Phone: **1-800-342-9647**

Appendix C: Aim III Multiple Regression Models

Hypothesis 3: Multiple linear regression of the association between Total ALE and the Toronto Alexithymia Scale – 20

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Total ALE	0.22	0.33	.05	0.66	.51	8.57	9, 168	<.001
Age	0.02	0.24	.01	0.10	.92			
Sex	3.29	1.65	.14	2.00	.05			
Education_D1	-0.70	3.27	-.02	-0.21	.83			
Education_D2	-3.48	3.58	-.14	-0.97	.33			
Pay Grade	3.57	3.03	.14	1.18	.24			
Combat Exposure	3.98	1.98	.16	2.01	.05			
MDD Screen	8.52	2.30	.25	3.71	<.001			
PTSD Screen	8.67	2.33	.26	3.72	<.001			

Note. $R^2 = .315$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Interpersonally Perpetrated ALE and the Toronto Alexithymia Scale – 20

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Interpersonal ALE	-0.22	0.53	-.03	-0.43	.67	8.53	9, 168	<.001
Age	0.03	0.15	.02	0.23	.82			
Sex	3.44	1.65	.14	2.08	.04			
Education_D1	-0.96	3.27	-.03	-0.29	.77			
Education_D2	-3.81	3.59	-.15	-1.06	.29			
Pay Grade	3.69	3.03	.14	1.22	.22			
Combat Exposure	3.91	1.99	.16	1.97	.05			
MDD Screen	8.62	2.30	.25	3.75	<.001			
PTSD Screen	9.35	2.41	.28	3.88	<.001			

Note. $R^2 = .314$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Non-interpersonally perpetrated ALE and the Toronto Alexithymia Scale – 20

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Non-Interpersonal ALE	0.77	0.57	.09	1.33	.18	8.79	9, 168	<.001
Age	0.04	0.14	.02	0.24	.81			
Sex	3.35	1.64	.14	2.05	.04			
Education_D1	-0.59	3.25	-.02	-0.18	.86			
Education_D2	-3.64	3.55	-.15	-1.02	.31			
Pay Grade	3.15	3.04	.12	1.04	.30			
Combat Exposure	3.70	1.98	.15	1.86	.06			
MDD Screen	8.46	2.29	.25	3.69	<.001			
PTSD Screen	9.04	2.26	.27	3.99	<.001			

Note. $R^2 = .320$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Maximum Duration of a Single ALE and the Toronto Alexithymia Scale – 20

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Max Duration of a Single ALE	0.80	0.20	.03	0.41	.68	8.53	9, 168	<.001
Age	0.01	0.15	.01	0.09	.93			
Sex	3.31	1.65	.14	2.01	.05			
Education_D1	-0.74	3.27	-.02	-0.23	.82			
Education_D2	-3.50	3.59	-.14	-0.97	.33			
Pay Grade	3.70	3.03	.14	1.22	.22			
Combat Exposure	3.99	1.98	.16	2.02	.05			
MDD Screen	8.58	2.30	.25	3.73	<.001			
PTSD Screen	8.89	2.29	.27	3.88	<.001			

Note. $R^2 = .314$ ($N = 177$, $p < .001$); Max = Maximum; ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Life Stressor Checklist – Revised (LSC-R) Weighted Score and the Toronto Alexithymia Scale – 20

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
LSC – R Weighted Score	0.23	0.15	.11	1.50	.14	8.87	9, 168	<.001
Age	.001	0.14	.001	0.01	.99			
Sex	3.14	1.64	.13	1.92	.06			
Education_D1	-0.57	3.24	-0.02	-0.18	.86			
Education_D2	-2.95	3.58	-.12	-0.82	.41			
Pay Grade	3.83	3.01	.15	1.27	.21			
Combat Exposure	4.15	1.97	.17	2.11	.04			
MDD Screen	8.13	2.31	.24	3.52	<.001			
PTSD Screen	7.85	2.39	.24	3.29	<.001			

Note. $R^2 = .322$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Total ALE and the Barratt Impulsiveness Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Total ALE	-1.71	1.67	-.08	-1.03	.31	3.39	9, 168	.001
Age	-0.22	0.15	-.01	-0.15	.88			
Sex	-0.65	1.70	-.03	-0.38	.70			
Education_D1	-6.28	3.36	-.21	-1.87	.06			
Education_D2	-7.30	3.69	-.32	-1.98	.05			
Pay Grade	-0.82	3.11	-.03	-0.26	.79			
Combat Exposure	0.34	2.04	.02	0.17	.87			
MDD Screen	5.09	2.37	.16	2.15	.03			
PTSD Screen	5.05	2.39	.17	2.11	.04			

Note. $R^2 = .154$ ($N = 177$, $p = .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Traumatic ALE and the Barratt Impulsiveness Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Traumatic ALE	0.61	0.56	.08	1.09	.28	3.40	9, 168	<.001
Age	-0.05	0.15	-.03	-0.33	.74			
Sex	-0.81	1.69	-.04	-0.48	.63			
Education_D1	-5.70	3.38	-.19	-1.69	.09			
Education_D2	-6.68	3.70	-.29	-1.81	.07			
Pay Grade	-0.67	3.12	-.03	-0.21	.83			
Combat Exposure	0.33	2.04	.01	0.16	.87			
MDD Screen	5.23	2.37	.17	2.21	.03			
PTSD Screen	4.05	2.39	.13	1.70	.09			

Note. $R^2 = .154$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Interpersonal ALE and the Barratt Impulsiveness Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Interpersonal ALE	-0.37	0.54	-.05	-0.69	.49	3.31	9, 168	<.001
Age	-0.03	0.15	-.02	-0.17	.87			
Sex	-0.66	1.70	-.03	-0.39	.70			
Education_D1	-6.30	3.37	-.21	-1.87	.06			
Education_D2	-7.35	3.70	-.32	-1.98	.05			
Pay Grade	-0.82	3.12	-.03	-0.26	.79			
Combat Exposure	0.28	2.05	.01	0.14	.89			
MDD Screen	5.15	2.37	.16	2.17	.03			
PTSD Screen	5.12	2.49	.17	2.06	.04			

Note. $R^2 = .151$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Non-Interpersonal ALE and the Barratt Impulsiveness Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Non-Interpersonal ALE	0.59	0.60	.07	0.99	.33	3.38	9, 168	<.01
Age	-0.04	0.15	-.02	-0.24	.81			
Sex	-0.80	1.69	-.04	-0.47	.64			
Education_D1	-5.93	3.36	-.20	-1.76	.08			
Education_D2	-7.07	3.68	-.31	-1.92	.06			
Pay Grade	-1.23	3.15	-.05	-0.39	.70			
Combat Exposure	0.18	2.05	.01	0.09	.93			
MDD Screen	5.00	2.37	.16	2.11	.04			
PTSD Screen	4.58	2.34	.15	1.96	.05			

Note. $R^2 = .108$ ($N = 177$, $p < .01$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between the Maximum Duration of a Single ALE and the Barratt Impulsiveness Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Max Duration of a Single ALE	0.12	0.20	.05	0.61	.54	3.30	9, 168	<.01
Age	-0.06	0.15	-.04	-0.40	.69			
Sex	-0.87	1.70	-.04	-0.51	.61			
Education_D1	-5.95	3.38	-.20	-1.76	.08			
Education_D2	-6.85	3.70	-.30	-1.85	.07			
Pay Grade	-0.81	3.12	-.03	-0.26	.80			
Combat Exposure	0.41	2.04	.02	0.20	.84			
MDD Screen	5.08	2.37	.16	2.14	.03			
PTSD Screen	4.37	2.37	.14	1.85	.07			

Note. $R^2 = .150$ ($N = 177$, $p < .01$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Life Stressor Checklist – Revised Weighted Score and the Barratt Impulsiveness Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
LSC – R Weighted Score	0.04	0.16	.02	0.24	.81	3.26	9, 168	<.01
Age	-0.05	0.15	-.03	-0.33	.75			
Sex	-0.82	1.70	-.04	-0.48	.63			
Education_D1	-6.09	3.37	-.20	-1.81	.07			
Education_D2	-6.96	3.72	-.30	-1.87	.06			
Pay Grade	-0.78	3.13	-.03	-0.25	.80			
Combat Exposure	0.44	2.05	.02	0.21	.83			
MDD Screen	5.03	2.40	.16	2.10	.04			
PTSD Screen	4.36	2.48	.14	1.76	.08			

Note. $R^2 = .149$ ($N = 177$, $p < .01$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Total ALE and the Difficulties in Emotion Regulation Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Total ALE	.14	0.64	.02	0.22	.82	11.13	9, 168	<.001
Age	-.10	0.27	-.03	-0.36	.72			
Sex	7.53	3.14	.16	2.40	.02			
Education_D1	-2.89	6.22	-.04	-0.46	.64			
Education_D2	1.52	6.81	.03	0.22	.82			
Pay Grade	7.49	5.77	.14	1.30	.20			
Combat Exposure	0.99	3.77	.02	0.26	.79			
MDD Screen	26.40	4.38	.39	6.02	<.001			
PTSD Screen	20.30	4.44	.31	4.57	<.001			

Note. $R^2 = .340$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Interpersonally Perpetrated ALE and the Difficulties in Emotion Regulation Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Interpersonal ALE	-0.32	1.00	-.02	-0.32	.75	11.14	9, 168	<.001
Age	-0.08	0.28	-.02	-0.28	.78			
Sex	7.69	3.14	.16	2.45	.02			
Education_D1	-3.13	6.22	-.05	-0.50	.62			
Education_D2	1.18	6.84	.02	0.17	.86			
Pay Grade	7.56	5.76	.15	1.31	.19			
Combat Exposure	0.88	3.79	.02	0.23	.82			
MDD Screen	26.49	4.38	.39	6.05	<.001			
PTSD Screen	21.01	4.59	.32	4.58	<.001			

Note. $R^2 = .340$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Non-Interpersonally Perpetrated ALE and the Difficulties in Emotion Regulation Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Non-Interpersonal ALE	0.47	1.10	.03	0.43	.67	11.15	9, 168	<.001
Age	-0.09	0.27	-.03	-0.31	.75			
Sex	7.57	3.13	.16	2.42	.02			
Education_D1	-2.83	6.21	-.04	-0.46	.65			
Education_D2	1.42	6.80	.03	0.21	.84			
Pay Grade	7.24	5.81	.14	1.25	.22			
Combat Exposure	0.82	3.79	.02	0.22	.83			
MDD Screen	26.37	4.38	.39	6.02	<.001			
PTSD Screen	20.54	4.33	.31	4.75	<.001			

Note. $R^2 = .340$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Traumatic ALE and the Difficulties in Emotion Regulation Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Traumatic ALE	1.27	1.03	.08	1.22	.22	11.39	9, 168	<.001
Age	-0.10	0.27	-.03	-0.38	.71			
Sex	7.54	3.11	.16	2.42	.02			
Education_D1	-2.08	6.22	-.03	-0.34	.74			
Education_D2	2.23	6.80	.05	0.33	.74			
Pay Grade	7.86	5.74	.15	1.37	.17			
Combat Exposure	0.82	3.76	.02	0.22	.83			
MDD Screen	26.70	4.37	.39	6.12	<.001			
PTSD Screen	19.48	4.40	.30	4.43	<.001			

Note. $R^2 = .346$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between the Maximum Duration of a Single ALE and the Difficulties in Emotion Regulation Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
Total ALE	0.35	0.37	.06	0.94	.35	11.28	9, 168	<.001
Age	-0.14	0.28	-.04	-0.50	.62			
Sex	7.35	3.13	.15	2.35	.02			
Education_D1	-2.45	6.21	-.04	-0.40	.69			
Education_D2	2.05	6.82	.04	0.30	.76			
Pay Grade	7.55	5.74	.15	1.31	.19			
Combat Exposure	1.00	3.76	.02	0.27	.79			
MDD Screen	26.36	4.37	.39	6.03	<.001			
PTSD Screen	20.02	4.35	.30	4.60	<.001			

Note. $R^2 = .343$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder

Hypothesis 3: Multiple linear regression of the association between Life Stressor Checklist – Revised Weighted Score and the Difficulties in Emotion Regulation Scale

Variable	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>
LSC – R Weighted Score	0.39	0.29	.09	1.34	.18	11.44	9, 168	<.001
Age	-0.13	0.27	-.04	-0.47	.64			
Sex	7.20	3.13	.15	2.30	.02			
Education_D1	-2.50	6.18	-.04	-0.40	.69			
Education_D2	2.59	6.82	.05	0.38	.71			
Pay Grade	7.78	5.73	.15	1.36	.18			
Combat Exposure	1.27	3.76	.03	0.34	.74			
MDD Screen	25.65	4.40	.38	5.84	<.001			
PTSD Screen	18.56	4.55	.28	4.08	<.001			

Note. $R^2 = .380$ ($N = 177$, $p < .001$); ALE = Adverse Life Events; D1, D2 = Dummy Variables; MDD = Major Depressive Disorder; PTSD = Posttraumatic Stress Disorder