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THE RELATIONSHIPS AMONG SELF-COMPASSION, BMI,
DISORDERED EATING, AND CARDIOMETABOLIC MARKERS
IN ADOLESCENT MILITARY DEPENDENTS

by

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DEDICATION

To my grandmother, Yu Chu Lee; mom, Lang Lang Lee; dad, Yuan Rong Leu; and older brothers, Phillip and Edward Leu. I would not be the person I am today without them. My family has taught me the importance of hard work, the value of a dollar, how to be a good and caring individual, and staying true to my roots. Words cannot express my gratitude for the sacrifices they made in order for me to get to where I am today.

謝謝你們的支持和愛。

Last, to my wife, Jasmine Leu, for her unconditional love and support, youthful energy, and willingness to go on adventures and eat good food with me.

DISCLAIMER

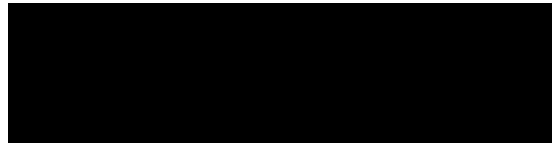
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ABSTRACT

Title of Dissertation: The Relationships Among Self-Compassion, BMI, Disordered Eating, and Cardiometabolic Markers in Adolescent Military Dependents

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The rise in rates of pediatric obesity over the past several decades has been associated with more frequent obesity-related comorbidities among youth that may persist into adulthood and contribute to poor cardiometabolic health, including development of the metabolic syndrome. Obesity is a multifaceted condition, with genetic, environmental, behavioral, and psychosocial factors implicated in its development and persistence. As such, a large body of research has focused on identifying modifiable risk and maintenance factors that may be useful targets in obesity prevention and treatment programs. One psychosocial construct that may be important to consider in relation to both obesity and cardiometabolic health is self-compassion, which is characterized by openly and non-judgmentally confronting personal shortcomings and fostering the desire to alleviate suffering through kindness. Self-compassion is conceptualized as comprising three primary elements: self-kindness (i.e., extending kindness and understanding to oneself), common humanity (i.e., viewing personal

experiences as part of the human experience), and mindfulness (i.e., having balanced awareness of cognitions and emotions). Studies in adults have demonstrated that higher levels of self-compassion are associated with more weight loss, better psychological functioning, lower disordered eating, and attenuated physiological responses to laboratory-based stressors. However, no studies have examined the associations of self-compassion with body mass index (BMI), disordered eating attitudes, and cardiometabolic factors in adolescents. Therefore, the present investigation examined self-compassion in relation to these variables both cross-sectionally and prospectively in a sample of adolescent military dependents, who represent a population of particular vulnerability for overweight or obesity due to unique stressors associated with being part of a military family. Participants were 105 adolescents (age: 14.3 ± 1.5 y, 56.2% female, 44.4% non-Hispanic White, $BMI_z = 2.0 \pm 0.4$) at high-risk for adult obesity and eating disorders (i.e., based on reports of loss-of-control eating and/or elevated anxiety symptoms) who were recruited to participate in a group-based randomized controlled trial comparing Interpersonal Psychotherapy versus Health Education for weight gain prevention. Data in this study were drawn from assessments conducted at baseline (prior to commencing the prevention program) and post-intervention. Using select, conceptually-relevant items drawn from primary study questionnaires administered at baseline, exploratory factor analysis and standard scale development methods were applied to create the Self-Compassion Assessment Form (SCAF) as a measure of perceived self-compassion. Next, a series of multiple linear regressions adjusting for relevant psychosocial and demographic covariates were conducted to examine cross-sectional relationships of self-compassion with BMI, disordered eating attitudes, and

cardiometabolic factors at baseline. A paired-samples *t*-test was then used to compare self-compassion scores at pre- and post-intervention in the full sample, and an analysis of covariance adjusting for relevant covariates was used to examine the association between intervention group and change in self-compassion scores from pre- to post-intervention. Finally, a logistic regression and series of multiple linear regressions adjusting for relevant covariates were used to examine the associations of pre- to post-intervention change in self-compassion with post-treatment disordered eating, BMI, and cardiometabolic factors. Results from the preliminary psychometric evaluation of the SCAF revealed support for a unidimensional factor structure, and the 9-item measure demonstrated good internal reliability and adequate convergent validity. At baseline, self-compassion was significantly uniquely associated with disordered eating attitudes ($p < .001$), but not with BMI or any cardiometabolic factors ($ps > .05$). On average, self-compassion scores were higher in the full sample at post-intervention compared to baseline ($p < .001$). However, intervention group was not significantly uniquely associated with pre- to post-intervention changes in self-compassion ($p > .05$). Finally, adjusting for baseline self-compassion and respective baseline values of the dependent variables, pre- to post-intervention change in self-compassion was uniquely associated with post-treatment BMI ($p < .05$), but not uniquely associated with post-treatment LOC eating status or any cardiometabolic factors ($ps > .05$). Taken together, findings provide preliminary support for the SCAF as a measure of self-compassion, although additional psychometric testing is needed. In addition, self-compassion is cross-sectionally associated with disordered eating attitudes and the change in pre- to post-intervention self-compassion is uniquely associated with post-treatment BMI. Further, the mean self-

compassion score was significantly higher in the full sample at post-intervention compared to baseline. Future studies should examine these relationships further to better understand the impact of self-compassion on excess weight gain, disordered eating, and cardiometabolic risk factors.

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CHAPTER 1: INTRODUCTION

The prevalence of pediatric obesity has increased dramatically over the past several decades (104). Excess body weight in youth is associated with numerous health (46; 70) and psychosocial problems (212), which often persist into adulthood (100). The etiology of obesity is complex and is the result of genetic, behavioral, environmental, and psychosocial components. While there are numerous factors linked to excess weight, disordered eating attitudes and behaviors are commonly reported by youth with overweight or obesity (111). Overweight and obesity are also associated with the metabolic syndrome (46), which is linked to the development of cardiovascular disease and type 2 diabetes (118). One area of psychological well-being that has been linked to decreased eating disorder symptoms and weight (140) as well as higher psychosocial functioning (192) in adults is self-compassion. In children and adolescents, there are limited, but promising, data demonstrating positive impacts of self-compassion in relation to psychological and emotional health (30; 190), but none relating to disordered eating. One population that may be at particularly high risk for overweight, obesity, and disordered eating is the military family (48; 165). Due to the unique stressors that military families experience, dependents of service members may be more susceptible to engage in disordered behaviors and have increased risk for obesity and eating disorders (52; 114).

This dissertation will review the risk factors for pediatric overweight and obesity and the impact of excess weight on physiological and psychosocial outcomes. Specifically, the relationships among excess weight, disordered eating, and physiological markers will be discussed, with a particular focus on investigating the role of self-

compassion in these three relationships. Given the dearth of research examining self-compassion in adolescents and the increased risk for disordered eating associated with being in a military family (266), adolescent military dependents will be the focus of the present study.

PEDIATRIC OVERWEIGHT AND OBESITY

Pediatric overweight is defined as having a body mass index (BMI; kg/m²) between the 85th and 94.9th percentile for age and sex (146). Pediatric obesity is defined as having a BMI at or greater than the 95th percentile (51). Given a shift to a greater prevalence of those on the highest end of the obesity spectrum, most recently, an additional category has been described as BMI $\geq 120\%$ of the 95th percentile for age and sex (76). Pediatric obesity affects nearly one in five children and adolescents, with prevalence rates increasing with age (51). Trends in obesity prevalence have indicated a nearly 5-fold increase for 12-19 year olds, while rates for 6-11 year olds have quadrupled since the mid-1960s (104). Racial and ethnic minorities are also disproportionately affected. Studies consistently report higher rates of obesity for Hispanic and non-Hispanic Black adolescents compared to non-Hispanic White and Asian adolescents (51; 121; 203). Prevalence rates of obesity are similar for boys and girls across racial and ethnic categories (121).

The etiology of obesity is complex and multifaceted. Research in recent years has identified multiple single- and common-genes contributing to the development of obesity (37). Among several other candidate genes (218), in particular, the presence of the *FTO* risk allele has been associated with excess weight in adolescents and adults (98). Obesity also aggregates in families. For example, adolescents whose parents have obesity are

significantly more likely to have excess weight in childhood (145). This may be attributed to not only shared genetics, but also environmental factors within the home such as eating habits (25) and available food options (145). Additional environmental contributions include limited access to affordable healthy food (56) and urbanization, which restricts opportunities for physical activity such as walking or playing sports (209; 245). Collectively, these factors have created an obesogenic environment that promotes unhealthy diets and sedentary lifestyles, and place youth at disproportionate risk for obesity.

Psychological Correlates of Pediatric Obesity

Excess weight in children and adolescents has been cross-sectionally linked to mood symptoms. A systematic review investigating co-morbid conditions in youth with obesity identified higher rates of internalizing symptoms, such as depression and anxiety, and externalizing behaviors, such as impulsivity and behavioral problems in the classroom (212). Depression and anxiety are also correlated with BMI in youth without overweight (227). Indeed, anxiety is often co-morbid with depression (21) and may be elevated in youth with excess weight. In a sample of children with overweight or obesity, Lim et al (152) investigated children's anxiety symptoms in relation to child factors, such as body dissatisfaction, as well as family-related factors, such as parental distress, and family functioning. Findings indicated that the presence of clinically significant anxiety symptoms was associated with lower body image satisfaction and health-related quality of life, even after adjusting for gender, age, race, and socioeconomic status (152). This suggests anxiety may exacerbate concerns about body image and weight and poor psychosocial functioning in youth with excess body weight.

Additional adverse psychological correlates of pediatric obesity include decreased health-related quality of life and lower self-esteem (116; 177; 290). In studies examining parent and adolescent reports, overweight in adolescence has been associated with poorer quality of life, such as in general health, physical appearance, mobility, and interpersonal domains (91). Worsening self-esteem in children with obesity has also been associated with increased feelings of sadness and loneliness (112), which may inhibit their engagement in social interactions. Fewer quality relationships may exacerbate feelings of rejection and isolation, further placing youth with obesity at risk for depression (21). In a longitudinal study, adolescents had greater than two-fold risk of having obesity at follow-up than their peers without depression (28); furthermore, girls with depression, but not boys, were approximately 2.5 times more likely to have excess weight gain at follow-up measurements, even after adjusting for baseline BMI. Conversely, in a separate sample of children at risk for adult obesity, depressive symptoms were not a significant predictor of increases in fat mass (261). With regard to anxiety, data from two prospective studies demonstrated a bi-directional link between anxiety and excess weight for girls followed up into adulthood (11; 12). As these findings highlight important relationships between excess weight and psychological health, data also show the impact of pediatric obesity on physical health.

Health Correlates of Pediatric Obesity

The rise in rates of childhood obesity is consequential, as excess weight in childhood is predictive of overweight and obesity in adolescence (182) and adulthood (26; 133). Youth with obesity are increasingly presenting with obesity-related comorbidities. These include cardiovascular complications, such as hypertension (251)

and atherosclerosis (70), obstructive sleep apnea (272), asthma (212), metabolic syndrome (46), and type 2 diabetes (222). Childhood overweight or obesity that persists into adulthood increases the risk for the development of the metabolic syndrome (133), which is a cluster of cardiometabolic abnormalities that place individuals at high risk for insulin resistance, hypertension, and coronary heart disease (117; 118).

Cardiometabolic Health Factors in Youth

To be diagnosed with metabolic syndrome, adults have to present with at least three of the following criteria: increased visceral adiposity, hypertriglyceridemia, reduced high-density lipoprotein (HDL) cholesterol, hypertension, and hyperglycemia (4; 118). Using these criteria, but modifying the cutoff values for pediatric samples, the prevalence of metabolic syndrome among adolescents with obesity was 28.7% compared to 6.8% for adolescents with overweight (61), suggesting disproportionate rates in youth with higher BMI. However, the criteria for metabolic syndrome in youth are not well established (62), likely due to the variability of developmental and pubertal stages (296). Cook et al (60) investigated the prevalence of metabolic syndrome in US adolescents using various proposed definitions of metabolic syndrome and estimated rates ranging from 2% to 9.4%.

Yet, studies consistently suggest the relevance of abdominal circumference, triglyceride levels, blood pressure, HDL cholesterol, and blood glucose as cardiometabolic markers of pediatric metabolic syndrome (59; 73; 175; 296). Several studies have reported metabolic syndrome in childhood may substantially increase vulnerability to premature cardiovascular disease and type 2 diabetes (66). Furthermore, data suggest an association between cardiometabolic risk factors and vulnerability to

insulin resistance (254). This relationship may be bi-directional, as individuals who are insulin resistant tend to have elevated fasting glucose levels and excess adiposity (62). Among adolescents, Li et al (150) also found that impaired fasting glucose, impaired glucose tolerance, and pre-diabetes were positively correlated with cardiometabolic risk factors. In a longitudinal study, Sun et al (257) found that youth with elevated blood pressure were at significantly greater risk for developing hypertension in adulthood. Collectively, these components have demonstrated positive predictive value for adult metabolic syndrome (132), which supports their utility as screening tools to identify at-risk youth.

Risk Factors for the Development of Metabolic Syndrome

There are several risk factors that contribute to worsening metabolic health, such as lifestyle behaviors, stress, and excess weight (79). Physical inactivity is associated with unhealthy weight gain (25; 245) and may increase an individual's propensity for obesity. For example, Veugelers and Fitzgerald (276) reported the risk of overweight significantly increased if youth engaged in more than one hour of sedentary activity per day. Furthermore, screen-based sedentary activities, such as watching TV or playing video games, have been positively associated with cardiometabolic risk and adiposity among youth (234). Sleep disturbances may also lead to metabolic abnormalities.

Obstructive sleep apnea has become more prevalent in children, particularly among those with high weight (272). Studies examining sleep-disordered breathing in youth with overweight and obesity found sleep disordered breathing was associated with metabolic dysfunction, even after adjusting for adiposity (275) and BMI (221). In addition, chronic exposure to stress may be linked to excess weight and insulin resistance. The

hypothalamic-pituitary-adrenal axis is critical to the body's stress response and hyper-activation of this system is associated with the excess release of cortisol (27). High cortisol levels have been correlated with insulin resistance and visceral adiposity in adolescent girls with overweight (170).

In addition to psychosocial risk factors, having overweight or obesity substantially increases risk for metabolic syndrome in adolescence (277); it is believed that this is largely attributable to the persistence of weight status from youth into adulthood (100). The prevalence of metabolic syndrome in a sample of youth with obesity increased with weight, reaching rates as high as 50% in youth with severe obesity (285). Further supporting the notion of central adiposity as an important component of the metabolic syndrome, in a sample of children with obesity, compared to their peers with lower waist circumferences, children above the 90th percentile were at higher risk for elevated HDL-cholesterol, hypertriglyceridemia, and hyperglycemia (20). After adjusting for BMI, waist circumference was also positively correlated with blood pressure, which indicates that risk for hypertension increases with abdominal adiposity (54; 105). This is notable, as elevated blood pressure in youth is predictive of hypertension and metabolic syndrome in adulthood (257). Triglycerides are another important indicator of metabolic dysfunction and have been associated with decreased HDL and increased LDL cholesterol (256). Together, these contribute to increased risk for cardiovascular disease (181) and type 2 diabetes (68).

Type 2 Diabetes in Childhood

Type 2 diabetes is a chronic metabolic disorder characterized by insulin resistance and relative insulin deficiency, resulting in higher than normal blood glucose levels (9;

87). Two factors involved with insulin resistance are insulin sensitivity and secretion, which have an inverse and proportionate relationship (122). As insulin resistance becomes progressively worse, the pancreas can no longer secrete enough insulin to balance insulin sensitivity, thereby resulting in clinical diabetes (122). Insulin resistance is theorized to be causally related to serious health consequences such as dyslipidemia, hypertension (232), cardiovascular disease, loss of visual acuity, and kidney disease (183; 223). While previously referred to as adult-onset diabetes, between 2001-2009, data show an overall increase of 30.5% for newly diagnosed cases of type 2 diabetes in children and adolescents (69). With adult studies reporting that early-onset type 2 diabetes is associated with a significantly higher risk of cardiovascular disease (130) and premature mortality (58), this rise in childhood type 2 diabetes is alarming as it may make youth more vulnerable to serious health consequences at a much younger age and may contribute to a worse disease prognosis over the life course.

In adolescent populations, the most common co-morbidity of type 2 diabetes is obesity (231); it is also correlated with cardiovascular disease. Shah et al (238) found a positive correlation between the severity and duration of type 2 diabetes with carotid intima-media thickness, an early marker for cardiovascular disease. LDL cholesterol and BMI in childhood also predicted carotid intima-media thickness in young adulthood (151), highlighting the link between cardiometabolic factors and later health complications. Indeed, adolescents with type 2 diabetes may be more susceptible to developing atherosclerosis and subsequent coronary events or early mortality later in life (232). Furthermore, compared to control samples, children and adolescents with type 2

diabetes demonstrated increased risk for vascular, ophthalmologic, renal, and neurologic diseases (71).

Risk Factors for the Development of Type 2 Diabetes

Metabolic syndrome puts youth at elevated risk for developing type 2 diabetes (118; 176; 232). Specifically, excess weight is a prominent risk factor for type 2 diabetes (122; 207) and visceral adiposity has been identified as a main contributor of insulin resistance (183; 280). As there is a strong genetic component for obesity (98; 282), there is likewise a genetic disposition for type 2 diabetes, with heritability estimates at greater than 50% (200). Despite genetic underpinnings, there are important environmental and behavioral contributors as well. Given the robust link between obesity and type 2 diabetes, behavioral risk factors that contribute to excess weight, such as decreased physical activity and poor diet quality, are also implicated in the development of type 2 diabetes (120). In a review of psychosocial risk factors for type 2 diabetes, Tamayo et al (259) found that socioeconomic status, depression, and anxiety are all associated with future risk of type 2 diabetes. Taken together, metabolic syndrome and type 2 diabetes appear to share many of the same risk factors, which emphasizes the relationships among cardiometabolic risk factors, weight, and type 2 diabetes.

Psychological Correlates of Cardiometabolic Health in Adolescents

In addition to the psychological correlates of excess weight, there may be additional correlates of poor cardiometabolic health. A meta-analysis of adult studies showed a bi-directional relationship between depression and type 2 diabetes, such that depression increases the risk for the onset of type 2 diabetes and having type 2 diabetes contributes to increased depressive symptoms, although the association is weaker for the

latter (143; 168; 211). Preliminary research in youth has shown significantly greater rates of depression, lower quality of life, and binge eating episodes in youth with type 2 diabetes compared to healthy controls (213). Shomaker et al (244) reported depressive symptoms were cross-sectionally linked to low insulin sensitivity in a sample of non-treatment seeking, healthy adolescents. Moreover, depressive symptoms have also been identified as a significant predictor of worsening insulin resistance, even after adjusting for baseline BMI, change in BMI over time, and family history of type 2 diabetes (243). Additional research examining the relationships between psychopathology and cardiometabolic markers can have important clinical implications and assist in identifying youth at high-risk for poorer psychological and physical health.

DISORDERED EATING IN CHILDHOOD AND ADOLESCENCE

The prevalence of eating disorders in children, particularly prior to adolescence, are generally low (167; 258). However, disordered eating behaviors, such as dieting and binge eating, are common in youth (65; 111; 113; 196). The prevalence of disordered eating- and weight-related behaviors ranges from 30% to 45% in girls and 14% to 20% in boys (128; 197; 198). Among adolescents with overweight or obesity, binge eating is highly prevalent with estimated rates of 22% (126). Research suggests a strong relationship between binge eating and obesity. Binge eating in youth has been shown to be predictive of excess weight gain and increases in fat mass over time (95; 255; 261).

Binge Eating

Binge eating, defined as the consumption of an objectively large amount of food accompanied by the experience of lack of control over eating, is the hallmark feature of binge-eating disorder (10). Yet, it may be difficult to assess what constitutes an

objectively large amount of food for children due to developmental differences and varying nutritional needs (264). In fact, the prevalence of full-syndrome binge-eating disorder in a large community sample of adolescents was only 1.6% (258). As a result, researchers and clinicians working with children and adolescents have spent over a decade distinguishing objective binge episodes from subjective binge episodes; the former occurs when the amount of food consumed is unambiguously large, while the latter occurs when the amount is ambiguously large or the individual considers the amount of food consumed as excessive, but it is not objectively large. Among non-treatment seeking youth, the estimated prevalence of recent objective binge episodes are between 4.8% and 12.5% while rates of recent subjective binge episodes range from 9.3% and 11.4% (113; 242).

Youth who report objectively and/or subjectively large episodes appear to report similar levels of eating- and mood-related psychopathology and BMI. Among a community sample of adolescents reporting recent objectively large episodes, recent subjectively large binge episodes, or a combination of the two, Goossens et al (113) found no significant differences between the recent objectively or subjectively large episode groups on eating, weight, and shape concern, restraint, body dissatisfaction, self-worth, and depressive symptoms. However, compared to their peers with either objective or subjective binge episodes, youth reporting both demonstrated higher levels of eating pathology. In another study with a sample of non-treatment seeking youth, the only significant difference was that youth reporting recent objectively large binge episodes had significantly greater eating concern than youth reporting recent subjectively large binge episodes (242); youth reporting objectively and subjectively large binge episodes

endorsed similar levels of depressive and anxiety symptoms. Furthermore, in comparing recent objective and subjective binge eating episodes on predicted BMI growth over an eight year study period, Tanofsky-Kraff et al (270) found no significant differences based on the size of the eating episodes; instead, it was the presence of LOC eating, compared to no LOC eating, that accounted for the change in BMI over time. These findings suggest that the size of the binge episode may not be as important as other factors related to the disordered eating behavior.

Loss of Control Eating

Given the challenges in assessing binge eating in youth and the aforementioned studies showing similarities between youth who report objectively and subjectively large episodes, researchers have instead focused on loss of control (LOC) eating. Loss of control eating is defined as the subjective experience of being unable to control eating independent of amount of food consumed (264). Among children and adolescents with overweight and obesity, the prevalence of LOC eating is estimated to be 31% (126), while in community samples of youth, rates of LOC eating range from 23% (235) to 28% (82). These data indicate LOC eating is likely more common for youth with higher BMI; data also suggest higher rates of LOC eating in girls than boys, particularly in adolescence (82; 265). Among adolescents reporting LOC eating, data suggest that approximately 65% (82) to 82% (164) are female; by contrast, a study investigating adolescent military dependents reported rates of 10.3% for boys (214).

LOC eating has been associated with disordered eating attitudes and behaviors. Compared to youth without LOC eating, youth endorsing LOC eating had significantly greater global eating pathology, as well as restraint and eating, shape, and weight concern

(271). Harrison et al (123) reported that girls with LOC eating and overvaluation of shape and weight experienced higher levels of eating disorder psychopathology than girls with LOC eating only, suggesting the presence of disordered eating attitudes may exacerbate eating pathology among girls with LOC eating. Dieting and LOC eating also commonly co-occur, with the majority of children reporting LOC eating as the precipitant to dieting (262). This complicates the consequences of LOC eating, as dieting behaviors have been positively correlated with higher weight status, more binge eating, and unhealthy weight control behaviors (198).

In a prospective study of 6-13 year olds, children who reported LOC eating ever were at significantly greater risk of developing partial or full-syndrome binge eating disorder; the presence of LOC eating was also predictive of greater disordered eating attitudes, specifically restraint and shape and weight concern (267). This relationship appears to be bi-directional, as in a community sample of children, shape concern and weight-related teasing were significant predictors of subsequent LOC eating (129). Among children at high risk for adult obesity, binge eating and dieting attempts were significant predictors of fat gain (261). In addition, prospective data show that dietary restraint was predictive of excess weight gain (270). These data suggest that dieting may be a potential marker for LOC eating, as numerous dieting attempts and disordered eating attitudes may frequently be followed by LOC eating, which promote excessive weight gain.

Loss of Control Eating and Obesity

Youth of higher weight are more likely to report LOC eating than youth of healthy weight. Cross-sectionally, children with overweight reported a higher prevalence

of LOC eating episodes than children without overweight. Furthermore, compared to youth without LOC eating, youth reporting LOC eating had significantly higher BMI and more adiposity (265; 271). Prospectively, LOC eating appears to lead to excess weight gain as well. LOC eating in youth has been predictive of a greater increase in BMI over time (250; 270). The data indicate a robust relationship between LOC eating and weight and suggest LOC eating may be a particularly important behavioral marker to address for the prevention of unhealthy weight gain.

Loss of Control Eating and Psychological Correlates

In addition to the potential negative impacts on health, youth endorsing LOC eating are susceptible to adverse psychological outcomes. Among a sample of children with overweight, the presence of LOC eating was associated with significantly greater externalizing behaviors, lower self-esteem, and decreased self-efficacy (262). Moreover, Tanofsky-Kraff et al (263) reported greater negative affect, such as shame and guilt, prior to and following LOC eating episodes, and a sense of numbing while engaging in LOC eating (263). In laboratory test meal studies, children with LOC eating, compared to those without, reported increased post-meal anxiety (220; 265). Interestingly, Ranzenhofer et al (220) found that girls with LOC eating had a decrease in negative affect immediately following their laboratory test meal. This discrepancy suggests there may be brief improvements in affect following LOC eating episodes but potentially poorer long-term implications. Furthermore, in another study, LOC eating moderated the relationship between anxiety and cardiometabolic markers (45). Specifically, among girls and boys with high anxiety, the presence of LOC eating was significantly associated with a measure of insulin resistance.

In prospective studies of preadolescents, LOC eating has predicted increased eating disorder pathology (129), disordered eating attitudes, and anxiety symptoms (267). Data from a large cohort study found that binge eating was predictive of the onset of elevated depressive symptoms (250). Conversely, increases in depressive symptoms also appeared to predict the maintenance of LOC eating into from preadolescence into adolescence (129). Furthermore, youth were at elevated risk for developing partial or full-syndrome binge eating disorder if they ever experienced LOC eating (267). In sum, studies consistently link pediatric LOC eating to adverse weight, cardiometabolic, and psychological outcomes, both cross-sectionally and longitudinally, suggesting it is a critical risk factor for youth at high risk for adult overweight or obesity. Indeed, psychological factors also increase LOC eating in childhood and adolescence, which indicates they may be vital to target in prevention efforts for these at-risk youth.

Loss of Control Eating and Cardiometabolic Markers

Research has shown a number of psychological factors have been linked to cardiometabolic markers, including LOC eating. The risk for metabolic syndrome may be increased by youth who report LOC eating due to physiological dysregulation from excess adiposity. For example, leptin is a hormone found in adipose tissues and interacts with the hypothalamus to regulate energy and body weight (174). The dysregulation of leptin has been implicated in adiposity and obesity (225) and may affect the body's ability to achieve energy and metabolic homeostasis (174). Obesity has also been linked to a chronic inflammatory state (74; 173), and chronic inflammation has also been associated with insulin resistance and cardiovascular disease (74). In a sample of children and adolescents with obesity, high-sensitivity C-reactive protein, a marker of chronic

inflammation, was positively correlated with BMI and blood pressure (237). Data from a meta-analysis of adult studies show that elevated C-reactive protein levels are significantly associated with increased risk for type 2 diabetes (281) and predictive of cardiovascular events (83). Indeed, these findings support a link between obesity, inflammation, and cardiometabolic risk factors.

Given the links between obesity and LOC eating, the associations between high BMI and cardiometabolic factors are concerning. However, in a more direct link, even independent of adiposity, youth with LOC eating appear to be at increased risk of adverse health outcomes. Cross-sectionally, youth with LOC eating have been shown to have higher systolic blood pressure, fasting insulin, LDL cholesterol, and insulin resistance, even after adjusting for adiposity (44; 216). Furthermore, Shank et al (240) investigated high-sensitivity C-reactive protein in relation to LOC eating and found that compared to youth without LOC eating, youth with LOC eating had significantly higher concentrations of high-sensitivity C-reactive protein, indicating higher levels of inflammation (240). Together, the data indicate LOC eating is associated with worsening cardiometabolic factors and may render youth more vulnerable to developing type 2 diabetes and obesity.

In a longitudinal study examining the impact of LOC with overeating (binge eating) on the development of metabolic dysfunction in children, LOC with overeating at baseline independently predicted worsening triglycerides and increases in visceral fat and systolic blood pressure compared to overweight youth without LOC eating or neither (268). Supporting a potential causal link between LOC eating and metabolic health, Shank et al (241) examined cardiometabolic markers in girls reporting persistence or

remission of LOC eating following a 12-week intervention. At a six-month follow up, compared to girls whose LOC eating persisted, girls who reported remission of LOC eating had lower fasting plasma glucose and triglycerides and higher HDL cholesterol (241). This suggests LOC eating may be particularly relevant in improving metabolic health.

There are several potential mechanisms in the relationship between LOC eating and adverse health outcomes, above and beyond the contribution of excess weight. For example, youth with LOC eating may have altered eating patterns. Poor diet quality (i.e., diets high in carbohydrates, sugar, and saturated fatty acids) appear to lead to the hyperactivation of the immune system, thereby resulting in elevations of inflammatory markers such as C-reactive protein and interleukin-6 (3; 85; 206). In laboratory test meal studies, participants who endorsed LOC eating consumed more carbohydrates and snacks and dessert-type foods than their peers without LOC eating (220; 265). It is possible that the imbalanced intake of carbohydrates and sugar during LOC eating episodes (220; 265) contribute to these worsening cardiometabolic findings (216). For example, in a sample of African American children of high BMI, greater intake of carbohydrates was associated with higher triglycerides and insulin resistance, even after adjusting for gender, pubertal stage, and waist circumference. Furthermore, among adolescents, Ambrosini et al (8) reported that the consumption of sugar-sweetened beverages was inversely correlated with cardiometabolic risk factors, such as increased triglycerides and reduced HDL cholesterol.

Another potential mechanism is increased psychopathology and stress. Compared to youth without LOC eating, children with LOC eating endorsed higher depressive and

anxiety symptoms (242). Utilizing ecological momentary assessment, Ranzenhofer et al (219) found that interpersonal stressors predicted LOC eating in adolescent girls. Moreover, in a sample of adolescent girls, Shank et al (239) reported pre-meal state anxiety, but not other components of negative affect, mediated the relationship between recent social stress and palatable food consumption during a laboratory test meal. Research has shown that stress-induced eating is associated with an unhealthier diet, potentially due to cortisol, a hormone released by the hypothalamic-pituitary-adrenal axis (36) in response to chronic or high-stress situations (27). While cortisol itself has been shown to promote increased adiposity and insulin resistance (170; 224), hyperactivation of the hypothalamic-pituitary-adrenal axis and subsequent elevations in cortisol levels have also been associated with an increase in palatable food intake (84). In a study examining the impact of stress on dietary practices in adolescents, there was a positive relationship between self-reported stress and the consumption of high-fat and snack-type foods (49). In addition, Michels et al (169) reported that higher levels of stressors were correlated with increased consumption of sweet and high-fat foods and decreased consumption of fruits and vegetables. Taken together, negative affect and stress may be risk factors for increased LOC eating, as well as worsened cardiometabolic health. Given the links among metabolic dysfunction, cardiovascular disease, and type 2 diabetes, LOC eating in childhood and adolescence is a significant risk factor for adverse health outcomes in adulthood.

SELF-COMPASSION

An area that is not well studied but has been consistently linked to improvements in psychological functioning, weight, and disordered eating is self-compassion. Neff

(184) broadly conceptualized self-compassion as openly and non-judgmentally confronting one's own shortcomings and generating the desire to alleviate one's suffering through kindness. It is comprised of three basic components: self-kindness, common humanity, and mindfulness (184). Self-kindness involves extending kindness and understanding to oneself rather than harsh self-criticism, common humanity is viewing personal experiences as part of the human experience rather than as isolating, and mindfulness is immersing oneself in a balanced awareness of difficult thoughts and feelings rather than over-identifying with them (184). The practice of self-compassion emphasizes self-soothing techniques when distressing events occur and remembering that those experiences are part of being human (187). Data in adults suggest that women report lower levels of self-compassion than men (293); however, compared to women, men appear to have a higher fear of self-compassion (108). Among adolescent samples, girls and boys generally appear to exhibit similar levels of self-compassion (179). Interestingly, differences have emerged when examining by age and gender, such that older adolescent girls report the lowest levels of self-compassion compared to younger girls and both younger and older boys (29; 31). Preliminary data indicate there are no differences in self-compassion by race and ethnicity (154). Since this is a construct that has only begun to receive attention in the past two decades, most of the literature reviewed will be in adult samples and will conclude with discussing relevant findings in adolescent populations.

Self-Compassion Compared to Self-Esteem

Studies examining self-compassion and self-esteem report significant overlap between the two constructs (191). Yet, they are still distinguishable and research suggests

self-compassion may be more adaptive than self-esteem. Self-esteem is defined as an individual's positive or negative appraisal of his or her value in important life domains based on past experiences (159; 230). Self-esteem is also derived from perceived evaluations from others. In comparing the two constructs, self-compassion, but not self-esteem, was negatively correlated with self-worth from receiving social approval, having successful performances, or being physically attractive (191). This suggests that, compared to self-esteem, self-compassion is less dependent on external situations. In a separate study where participants were asked to consider an event that evoked negative reactions (e.g., failure, humiliation, or rejection), those assigned to the self-compassion condition reported significantly less negative affect than those in the self-esteem condition (148). Another important difference is self-esteem has demonstrated a significant positive association with narcissism; by contrast, there was no significant (close to zero) correlation between self-compassion and narcissism (186; 191). In short, self-esteem and self-compassion both work towards having positive self-regard. However, the former is achieved through evaluations of the self and social comparisons whereas the latter is not focused on performance evaluations or making comparisons with others. Instead, it involves treating oneself with compassionate regard and not making positive or negative self-judgments (184).

Psychological Correlates of Self-Compassion

The majority of research conducted on self-compassion has been in relation to psychological functioning. One of the key components of self-compassion, self-kindness, is being able to transform negative affect toward oneself into positive self-affect. Self-compassion can be an adaptive emotion regulation strategy, since individuals engage with

distressing thoughts or emotions with kindness, understanding, and a sense of shared humanity (186). When evaluated in relation to coping strategies, self-compassion was most closely related to positive cognitive restructuring and not linked to problem-solving; this suggests individuals who practice self-compassion think in a way to promote optimal coping and are not as preoccupied with trying to fix their problems (7)

Self-compassion is negatively correlated with depression and anxiety and has a positive relationship with life satisfaction (186). A meta-analysis of the literature found a large negative association between self-compassion and psychopathology; specifically, higher reports of self-compassion were associated with lower levels of depression, anxiety, and stress (158). In a series of studies examining the effect of self-compassion while experiencing unpleasant self-relevant events, self-compassion was linked to numerous psychological benefits. For example, self-compassion was negatively correlated with anxiety, sadness, and being self-conscious, and positively linked to participants' ratings of their reaction to a difficult situation; self-compassion also predicted improvements in cognitive appraisals, such as less catastrophizing and personalization, and greater ability to regulate emotions in response to unpleasant events (148). Furthermore, when college-aged participants were asked to consider their greatest weakness as a job interview question, those with higher ratings of self-compassion had significantly less anxiety in response to the experimental task (189).

Not only does self-compassion protect against negative cognitions and affect, but it may also increase positive emotions. Among a sample of undergraduate students, self-compassion was significantly associated with happiness and optimism (192). Another study with an undergraduate sample consisting primarily of women examined how a

change in self-compassion would impact changes in psychological well-being. An increase in self-compassion over a one-month period was linked to increased social connectedness and decreased depression, self-criticism, rumination, and anxiety; this finding also demonstrates that self-compassion can be modifiable (189). Taken together, self-compassion appears to serve as a buffer against negative responses to difficult situations and, in fact, replace negative emotions and cognitions with more positive ones. This is likely achieved through the self-compassionate process of not being self-critical, recognizing that people are imperfect, fail, and make mistakes, and accepting distressing experiences as is instead of ruminating on them.

Physiological Correlates of Self-Compassion

In addition to improving psychological well-being, self-compassion appears to be linked to beneficial changes in metabolic health. Given the inverse relationship between self-compassion and stress, Breines et al (41) examined if self-compassion would be correlated with an inflammatory marker sensitive to stress called interleukin-6. After adjusting for self-esteem, depressive symptoms, age, and BMI, trait self-compassion was associated with a decreased inflammatory response to stress following a psychosocial stressor (41). Other studies reported that increases in self-compassion were associated with a decrease in cortisol and increase heart rate variability, two biological indicators of the body's stress response, in response to a laboratory manipulation (13; 226). These findings suggest self-compassion may attenuate the physiological effect of stress on the body and serve as a valuable self-soothing tool.

Limited research has examined self-compassion in relation to weight-related chronic health conditions. In a study investigating self-compassion in individuals with

type 2 diabetes, self-compassion was inversely related to depression and diabetes-distress (102); diabetes-distress has significantly predicted hemoglobin A1c (HbA1c) values, a commonly used diagnostic tool for type 2 diabetes that measures average blood glucose over the past three months (183). Interestingly, while self-compassion was not predictive of lower HbA1c, it appeared to moderate the relationship between diabetes-distress and HbA1c, such that individuals with greater self-compassion had diminished diabetes-distress and improved metabolic health (102). Friis et al (103) conducted a randomized controlled trial to examine the effect of a self-compassion intervention on mood and HbA1c in individuals with type 2 diabetes. Participants were assigned to either a self-compassion training or wait-list control group and assessed at baseline, post-intervention, and at a three-month follow-up. Results showed that the self-compassion intervention was superior to the control group, evidenced by statistically and clinically significant decreases in mood and HbA1c (103). This pair of studies suggests that self-compassion may have important implications on the health of individuals with type 2 diabetes. Further research is warranted to explore if self-compassion can provide additional benefits on other aspects of metabolic health.

Self-Compassion in Relation to Disordered Eating and Weight

One area where self-compassion may be particularly important is among individuals with disordered eating behaviors or high body weight. For example, Adams and Leary (2) investigated the effect of self-compassion on dieting practices among a sample of female undergraduate students. Select participants were subject to a food pre-load where they were asked to consume one glass of water and one doughnut and then received either a self-compassion or control manipulation. Following the manipulation,

women were asked to participate in a bogus taste test and complete questionnaires related to breaking their diet. Results indicated that the self-compassion manipulation did not affect the amount of candy low-restrictive dieters consumed. However, among high-restrictive dieters in the self-compassion condition, the amount of candy consumed during the bogus taste test was similar to low-restrictive dieters. According to restraint theory (127), restrained eaters use significant energy to manage their eating behaviors and may engage in disinhibited eating behaviors following a lapse in restraint due to self-criticism or negative affect. The findings from this study suggest self-compassion may have attenuated the distress associated with having a lapse in restrained eating.

Further supporting self-compassion as a protective factor for disordered eating behaviors, Breines et al (39) found that higher daily evaluations of self-compassion were associated with lower levels of disordered eating, even after adjusting for self-esteem. In a subsequent study investigating the relationships among body shame, self-compassion, and disordered eating, Breines et al (39) reported that self-compassion significantly predicted lower body shame and disordered eating. Moreover, body shame mediated the relationship between self-compassion and disordered eating behaviors, indicating that one's evaluation of body image drives the negative relationship between self-compassion and disordered eating (39). These findings indicate self-compassion may be effective in reducing the negative outcomes associated with body image concerns and disordered eating behaviors.

Clinically, self-compassion has demonstrated efficacy for full-syndrome eating disorders. Kelly et al (138) reported that, among a sample of treatment-seeking patients with eating disorders, greater increases in self-compassion were associated with more

rapid reductions of shame over the course of treatment. Additional analyses indicated that patients with greater decreases of shame early on in treatment evidenced decrease eating disorder symptomatology earlier on in treatment and had an overall reduction in eating pathology at the end-of-treatment. This provides further support for shame as a mediating variable between self-compassion and eating pathology. In a study with a sample of individuals with binge-eating disorder, participants were randomly assigned to a self-compassion intervention, behavioral intervention, or wait-list control condition for three weeks (137). Compared to the control condition, both active conditions reduced participants' average weekly binge days at end-of-treatment. More importantly, participants in the self-compassion intervention experienced greater reduction of global eating disorder pathology and eating and weight concerns than the behavioral and control groups.

In another study of female undergraduate students, self-compassion moderated the relationship between BMI and eating pathology; BMI was positively associated with eating pathology in women with low self-compassion whereas these variables were unrelated in women with high self-compassion (140). In addition to protecting against disordered eating behaviors, self-compassion may moderate weight loss outcomes. Mantzios and Wilson (161) compared mindfulness mediation, mindfulness meditation combined with a self-compassion focus, and a control condition in a diverse sample of foreign military service members seeking to lose weight. While the mindfulness meditation group also evidenced weight loss, participants in the mindfulness meditation with self-compassion focus demonstrated greater weight loss following the five-week intervention and in the six months post-intervention compared to the other conditions.

This finding suggests that the addition of self-compassion training may increase the efficacy weight loss interventions.

By contrast, concern of increasing self-compassion is that complacency and decreased motivation to change may be promoted (40). This may be particularly relevant to disordered eating and weight, as this possibility suggests individuals with eating or weight concerns who are more self-compassionate may continue to engage in disordered eating and potentially continue to have excess weight gain. However, preliminary data does not appear to support this notion. Indeed, Taylor et al (273) investigated self-compassion, eating disorder symptomatology, and BMI in a sample of undergraduate students and found that higher self-compassion was predictive of lower BMI and decreased disordered eating symptoms. Other studies examining self-compassion and body image concerns and have found an inverse relationship, such that more self-compassion is associated with greater body acceptance or less body dissatisfaction (38). Further, when comparing a self-compassion and self-esteem intervention in relation to body dissatisfaction and self-improvement motivation, participants in the former treatment group demonstrated lower weight and body dissatisfaction and higher self-improvement motivation (172). This suggests that individuals with more self-compassion may, in fact, be more motivated than their counterparts with less self-compassion to engage in healthier eating behaviors.

Taken together, the preliminary data support self-compassion as a mechanism to reduce disordered eating behaviors, which may mitigate subsequent impact on weight. However, much of the existing literature is on self-compassion in relation to body image, dissatisfaction, shame, and disordered eating attitudes (38). As there is a noticeable gap in

studies investigating the relationships among self-compassion, physiological health, and weight, additional research on these variables is warranted.

Self-Compassion in Adolescents

A growing body of literature has been focusing on the role of self-compassion in youth. Among a sample of adolescents with a history of childhood physical and emotional abuse or neglect, Tanaka et al (260) reported self-compassion had an inverse relationship with anxiety symptoms, alcohol abuse, and suicide attempts in late adolescence. Further examining developmental factors, maternal support and family functioning have been positively associated with self-compassion; in contrast, maternal criticism and having a stressful home environment have been associated with lower self-compassion (190). The study also found that self-compassion was positively linked to well-being, assessed through self-reported depression, anxiety, and connectedness. It is possible that experiencing childhood maltreatment or growing up in an invalidating environment inhibits youths' abilities to treat themselves with kindness, which may have longer-term adverse outcomes on psychological functioning. Notably, among a sample of youth in the 7th-12th grade, self-compassion was reported to moderate the relationships between perceived stress and internalizing symptoms, such that the associations between perceived stress and depression and anxiety were weaker among students with more self-compassion (147). These findings suggest that self-compassion may serve as a protective factor against unhealthy stress levels and decrease the risk of subsequent mood concerns.

Self-compassion has also been noted to impact eating behaviors in adolescents. Gouveia et al (115) examined mindfulness, self-compassion, emotion regulation, and emotional eating among a sample of adolescents with overweight or obesity and found

that emotion regulation mediated the relationship between self-compassion and emotional eating. While there was no direct effect of self-compassion on emotional eating, the significant indirect effect indicates that the negative association between self-compassion and emotional eating is attributed to improved emotion regulation (115). In addition, mindfulness skills were directly and indirectly associated with emotional eating. As mindfulness is one of three major components of self-compassion, this finding further supports the benefits of self-compassion on disordered eating behaviors.

One study has been conducted to explore the relationship between self-compassion and physiological responses to a laboratory social stressor. Specifically, Bluth et al (35) measured blood pressure, heart rate, salivary cortisol, and heart rate variability, and found that adolescents high in self-compassion had lower systolic blood pressure reactivity during the social stress test. The remaining physiological markers were non-significant, suggesting self-compassion may only partially attenuate the body's response to stressful situations in adolescents. However, consistent with previous data in adult and adolescent samples, baseline self-compassion was cross-sectionally linked to reduced anxiety, stress, and negative affect, and greater life satisfaction and positive affect, further supporting the notion that self-compassion may be instrumental in improving well-being (35).

Measuring Self-Compassion

Based on the three core elements of self-compassion, Neff (186) developed the Self-Compassion Scale [SCS (186)], which consists of six subscales that contribute to a global score. The six subscales were derived from the three main components of self-compassion and their counterparts. These include self-kindness versus self-judgment,

common humanity versus isolation, and mindfulness versus over-identification (186). In the development of the SCS (186), items were evaluated on content and convergent validity, along with a social desirability scale to determine if there were any response biases. Assessing convergent validity was critical to ensure the subscales were not measuring the same construct as the comparison scales. For instance, it was hypothesized that the SCS (186) would be positively related to a measure of social connectedness based on the component of common humanity (186). In order to determine if self-compassion was related to psychological health, additional measures, such as depression, anxiety, and life satisfaction screeners, were included. The final product consisted of 26 items that measures six factors of self-compassion and was not influenced by social desirability biases (186).

Another validated method to measure self-compassion is the Self-Compassion Scale Short-Form [SCS-SF (217)]. Similar to the original SCS (186), the SCS-SF (217) has six components of self-compassion, with two items for each component. The SCS-SF (217) has shown a near perfect correlation with SCS (186) total and subscale scores; internal consistency for the total score was excellent while internal consistencies for subscale scores had wider variability. Overall, data support the use of the SCS-SF (217) and it may be particularly useful in situations where a long questionnaire may not be ideal (e.g., research or clinical settings). With regard to scoring for the SCS (186), the use of total (194) and subscale scores are supported (193). Due to lower and more variable internal consistencies for subscale scores, the use of a total score is recommended for the SCS-SF (217).

Change in Self-Compassion

As data consistently supports psychological benefits of self-compassion, researchers have started to explore if this construct is a skill that can be taught and practiced to promote psychological well-being. Neff and Germer (187) developed an eight-week program called Mindful Self-Compassion (MSC) geared towards enhancing an individual's self-compassion. Participants engage in experiential exercises and discussions to learn how to be kinder towards themselves and leave with a variety of strategies to incorporate into their lives. In order to assess the effectiveness of the MSC program, Neff and Germer (187) conducted two studies with a predominantly white, female, middle-aged adult sample. In the first study, a baseline level of self-compassion was measured two weeks prior to the MSC program, two weeks after completion, and at a six-month follow-up. After completing the MSC program, participants demonstrated significant increases in self-compassion, mindfulness, and life satisfaction, as well as decreases in depression, anxiety, and stress (187). Importantly, six-month follow-up data indicated that improvements in self-compassion and mindfulness persisted. The second study examined similar outcome variables, but added a waitlist control group for comparison. Findings from this study replicated the results from the initial study, specifically with regard to enhanced psychological functioning and maintenance of increased self-compassion (103; 187).

Other efforts have been made to demonstrate the benefits of self-compassion in varying formats. Smeets et al (249) created a three-week intervention with the aim of teaching a sample of college students to treat themselves with compassion in times of personal suffering. When compared to an active control group, the self-compassion group displayed significant increases in self-compassion, optimism, and self-efficacy (249). In

contrast to much of the existing literature, this three-week program was not associated with changes in positive or negative affect. While a briefer intervention may be sufficient for improvements in self-compassion, it is possible a longer intervention is needed to reach desired improvements in affect.

Few studies have examined change in self-compassion in adolescent samples. Since mindfulness is a key component of self-compassion, preliminary studies have employed mindfulness-based interventions and investigated their impact on self-compassion. Bluth et al (34) examined how a six session mindfulness curriculum would affect perceived stress, life satisfaction, mindfulness, and self-compassion in a sample of adolescents aged 10 to 18 years old. Results indicated that from pre- to post-intervention, perceived stress decreased while the remaining three outcome variables increased (34). Expanding these findings, Bluth et al (33) formalized a mindful self-compassion program for adolescents (“Making Friends with Yourself”) and examined its efficacy in a sample of high school students. Compared to a waitlist control group, participants in the active treatment condition reported significantly higher self-compassion and life satisfaction and significantly lower depression at the conclusion of the program (33). Other studies have investigated the effect of mindfulness-based groups and have reported similar findings of decreased psychopathology and increased levels of self-compassion (32; 80). Taken together, the existing research clearly supports that self-compassion is a modifiable trait. However, as the described studies are limited in scope, it may be particularly helpful if future research with adolescent samples examines aspects of self-compassion other than mindfulness to elucidate the impact of self-compassion interventions in youth.

IMPORTANCE OF ADOLESCENT MILITARY DEPENDENTS

Military populations are not immune to high rates of overweight and obesity (81). High weight is problematic for military communities, as it can impact mission-readiness and increase the financial burden of healthcare (266). The prevalence of adult obesity in active duty personnel across services was 14.7%, an increase from 12.4% four years prior, while rates of overweight have remained stable at approximately 51% over the same timeframe (17; 166). Likewise, the percentage of active duty service members in a healthy weight range decreased from 35.7% in 2011 to 33.8% in 2015. Among adolescent military dependents, approximately 10.9% had obesity (81). While this figure is slightly lower than a prevalence of 17% in their civilian counterparts (104), the unique stressors that children of service members experience secondary to their parents' military occupations may place them at increased risk for future weight gain and disordered eating (266). Examples of stressors common to military families include relocations approximately every two to three years, parental separations due to training exercises or deployments, and having increased responsibilities at home (55).

Furthermore, it may affect military recruitment, as nearly one in four young adults are ineligible for military service due to their weight status (50). A study with over 5,000 Army recruits found that 38% had fathers and 6% had mothers who served in the military (233) and among a sample of over 11,000 Navy recruits, 52% reported that at least one parent served in the military (253). These data show that children growing up in military households are more likely to enter military service themselves (142). However, as having one or more parents with overweight or obesity increases risk for adult obesity (101; 247; 286), this is problematic for military recruitment and further research with adolescent military dependents at high risk for adult overweight or obesity is warranted.

Impact of Military Stressors on Adolescent Psychological Health

The constellation of stressors to which military families are exposed can have adverse consequences on psychological well-being. Generally, children in military families have more internalizing and externalizing problems than their civilian counterparts (64). Having a parent deployed is a major stressor for children and is associated with poor academic performance (47) and increased emotional distress, such as anxiety about their parent's safety (171). In addition to coping with a parent being absent for an extended period of time, readjusting after the parent returns from deployment is particularly challenging (171). Non-deployed caretakers also experience increased parenting stress, which is positively correlated with the length of deployment (86). Among families with a deployed service member, parenting stress has been linked to poorer psychosocial functioning in adolescent military dependents (97). However, compared to peers without a parent deployed, children with a deployed parent exhibited more behavioral symptoms, even after adjusting for the non-deployed parent's stress and depressive symptoms (53).

Relocation is another experience common to military families, typically occurring every two to three years (43). Moving frequently has been shown to disrupt several aspects of family life, including marital satisfaction and spousal employment, financial stability, and community connections (78; 205). Military adolescent dependents also exhibit adverse psychological correlates, such as anger and anxiety, behavioral problems, and adjustment difficulties (64). Conversely, some studies report that frequent relocation is not associated with poor psychological health in youth (64) and may actually improve children's behavior (284). After adjusting for age, the frequency of relocations was positively correlated with behavior, such that children who experienced a greater number

of moves evidenced improvements in behavior (284). Indeed, military adolescents may be developing better coping skills to manage the transitions and view moving as providing them with new opportunities. While children from military families may be more resilient than their civilian peers (78), stressors unique to military families, such as deployments and frequent moves, may place adolescent dependents at increased risk of emotional distress and externalizing behaviors. Given the robust relationship between mood and eating patterns, military adolescent dependents may also be at greater risk of disordered eating behaviors and inappropriate weight gain.

Disordered Eating in Adolescent Military Dependents

Few studies have examined disordered eating behaviors among adolescent military dependents. Although not direct comparisons to civilians, the prevalence of disordered eating among female adolescent military dependents at high-risk for adult obesity is approximately 17% (236), while for a community sample of female adolescent military dependents it has been estimated at 21% (278). By contrast, rates for civilian adolescent girls are estimated to be between 2% (236) and 10% (195). Among male military adolescent dependents, the estimated prevalence of disordered eating is 10% (214), while civilian adolescent boys evidence rates of approximately 3% (195). Given that very preliminary, albeit incomplete research suggests rates of disordered eating may be higher for military than civilian youth, stressors associated with being in a military family may place adolescent dependents at disproportionate rates of disordered eating and subsequent high weight.

Cardiometabolic Health in Adolescent Military Dependents

While there is evidence suggesting adolescent military dependents are at increased risk for adult overweight or obesity, there are limited data examining cardiometabolic health associated with disordered eating behaviors in these youth. Compared to civilian girls with LOC eating, female military adolescents with LOC eating evidenced higher fasting insulin and insulin resistance, which may make them more vulnerable to metabolic dysfunction (236). These preliminary data suggest there may be physical health consequences for disordered eating in military youth. However, as only one study has investigated this relationship in girls, further research on cardiometabolic outcomes and male military adolescents is warranted.

Self-Compassion in Adolescent Military Dependents

In the adult literature, cross-sectional data consistently show that having more self-compassion is correlated with less psychopathology (158), including disordered eating attitudes and behaviors (2; 39). Prospectively, increases in self-compassion over time were associated with improved social connection and decreased psychopathology (189) and several intervention studies have demonstrated that self-compassion is modifiable (103; 138; 189). Among civilian boys and girls, self-compassion was inversely correlated with depression and anxiety and positively associated with social connectedness (190). Moreover, longitudinal data suggests self-compassion may be negatively impacted by invalidating and stressful childhood environments (190; 260); by contrast, prospective data suggest that having higher levels of self-compassion may partially attenuate physiological reactions to stressful situations (35). However, no study has yet examined the role of self-compassion in adolescent military dependents. As research employing self-compassion interventions has shown that increases in self-

compassion may decrease disordered eating (137; 138) and aid weight loss (161) in adults, self-compassion may be a promising coping mechanism that protects military youth against adverse psychological and physical health outcomes and should be investigated further. Given the unique stressors placed on adolescent military dependents, this research endeavor is warranted. Considering the negative correlates and outcomes of LOC eating among youth and the preliminarily positive findings for self-compassion on psychological well-being and disordered eating, the present study aims to better understand the relationships between self-compassion, BMI, disordered eating and cardiometabolic factors (Figure 1). Specifically, we will investigate how changes in self-compassion from pre- to post-treatment are associated with changes in BMI, disordered eating, and cardiometabolic risk factors (Figure 2).

THE PRESENT STUDY

Taken together, the literature supports that LOC eating has been associated with higher BMI (270), poorer psychological health, such as lower self-esteem and self-efficacy (262), and more negative affect (263). In studies utilizing laboratory test meals, youth reported increases in anxiety (220; 265) following LOC eating episodes and prospective studies suggest LOC eating is predictive of eating pathology (129) and depressive and anxiety symptoms (250; 267). Moreover, LOC eating has been cross-sectionally (44; 240) and prospectively (241; 268) linked to worsening cardiometabolic health factors. Among adults, one aspect of psychological health that has been associated with less depressive and anxiety symptoms and greater life satisfaction (184) is higher levels of self-compassion. Furthermore, self-compassion was shown to have an inverse relationship with disordered eating, such that higher levels of self-compassion were

associated with less disordered eating (39). While limited among adolescents, the data show that self-compassion has been positively correlated with psychological functioning (190) and may be a moderator in partially attenuating the body's response to stressful situations (35).

While the SCS (186) is considered the gold-standard for assessing self-compassion and has been validated for use with adolescents (67), it was not included in the parent study from which the data of the present study was derived. Therefore, we seek to use items from assessments included in the parent study that demonstrate face validity with items from the SCS (186) to develop our own measure of self-compassion. As this is a newly-developed measure, we will assess its psychometrics properties and examine convergent validity. Prior research with the SCS (186) has reported significant negative correlations with depression, trait anxiety, stress (67), social anxiety (109), and perceived stress (31; 34) and a significant positive correlation with social connectedness (190). Since the developed measure of self-compassion includes items from the depression inventory included in the parent study, it restricts our ability to use the depression measure from the parent study to assess construct validity. However, we are able to use scales from the parent study that examine anxiety, perceived stress, and social dissatisfaction to assess convergent validity.

This assessment tool may be useful for future studies and inform how self-compassion may be derived from frequently used screening measures of psychological health (e.g., depression, self-esteem). Furthermore, as there has been no study examining self-compassion in adolescent military dependents, we seek to broaden the literature by investigating self-compassion among this population. In particular, the present study will

examine the relationships among self-compassion and BMI, disordered eating, and cardiometabolic factors. The study will also examine how self-compassion changes following a 12-week group interpersonal psychotherapy or health education intervention. Finally, we seek to investigate how changes in self-compassion impact BMI, disordered eating, and cardiometabolic factors following the 12-week intervention period.

AIMS AND HYPOTHESES

Aim 1

To develop and examine the internal consistency and construct validity of a measure of perceived self-compassion, the Self-Compassion Assessment Form (SCAF).

Hypothesis 1a: The SCAF will demonstrate a unidimensional model as indicated by an exploratory factor analysis.

Hypothesis 1b: The SCAF will demonstrate acceptable internal consistency, with a Cronbach's $\alpha \geq .70$.

Hypothesis 1c: The SCAF will demonstrate convergent validity with a scale measuring the construct of self-compassion and measures of theoretically associated constructs including anxiety, perceived stress, and social dissatisfaction.

Aim 2

To examine the baseline relationships between the SCAF with BMI, disordered eating, and components of the metabolic syndrome.

Hypothesis 2a: At baseline, lower levels of self-compassion will be associated with higher BMI.

Hypothesis 2b: At baseline, after adjusting for BMI, lower levels of self-compassion will be associated with more disordered eating attitudes as measured by the Eating Disorder Examination (EDE).

Hypothesis 2c: At baseline, after adjusting for BMI, lower levels of self-compassion will be associated with higher systolic blood pressure, diastolic blood pressure, triglycerides, fasting glucose, and hemoglobin A1c, as well as lower HDL cholesterol.

Aim 3

To explore the change in self-compassion from pre- to post-intervention.

Hypothesis 3a: On average, the full sample will show higher self-compassion scores at post-intervention compared to pre-intervention.

Hypothesis 3b: Participants assigned to Interpersonal Psychotherapy will have a greater improvement in self-compassion from pre- to post-intervention compared to participants assigned to Health Education.

Aim 4

To explore the impact of change in self-compassion on post-intervention BMI, disordered eating, and components of the metabolic syndrome.

Hypothesis 4a: After adjusting for baseline self-compassion and BMI, greater change in self-compassion will be associated with lower post-intervention BMI.

Hypothesis 4b: After adjusting for baseline self-compassion and LOC eating status, greater change in self-compassion will be associated with lower odds of LOC eating as measured by the EDE.

Hypothesis 4c: After adjusting for baseline self-compassion and respective metabolic components, greater change in self-compassion will be associated with lower post-

intervention blood systolic pressure, diastolic blood pressure, triglycerides, fasting glucose, and hemoglobin A1c, as well as greater HDL cholesterol.

CHAPTER 2: METHODS

RESEARCH DESIGN

This dissertation used data from the Preventing Obesity in Military Communities – Adolescents study (ClinicalTrials.gov ID: NCT02671292). Only the procedures and methods relevant to this dissertation are described. This dissertation used a cross-sectional and longitudinal design to examine the relationships among self-compassion, BMI, disordered eating, and components of the metabolic syndrome.

PARTICIPANTS AND RECRUITMENT

Adolescent military dependents (12-17 years old) at high risk for adult obesity and eating disorders were recruited to participate in a randomized controlled trial investigating the efficacy of group interpersonal psychotherapy to prevent excess weight gain and binge-eating disorder in adolescent military dependents. Adolescents were recruited through referrals from healthcare providers, in-person recruitment at Walter Reed National Military Medical Center (WRNMMC) and Ft. Belvoir Community Hospital (FBCH), mailings, and advertisements. This study was approved by the USUHS Institutional Review Board and the FBCH Research Office.

Adolescents were eligible if they had a BMI greater than or equal to the 85th percentile for age and sex (146) and endorsed high anxiety symptoms [State-Trait Anxiety Inventory – Children (STAI-C) (252) ≥ 32] and/or LOC eating, as determined by the EDE, in the three months prior to the baseline assessment. Youth were excluded from the study if they had obesity-related complications (e.g., type 2 diabetes), a major

medical illness, self-reported pregnancy, weight loss over the past two months exceeding 3% of their body weight, a current eating disorder diagnosis (e.g., anorexia or bulimia nervosa), current use of prescribed medications known to impact appetite or body weight, current involvement in psychotherapy or a structured weight loss program, or mental health disorders that would hinder participation in the study.

PROCEDURE

Interested youth were screened by trained research assistants via telephone and were scheduled for a baseline assessment visit if they were deemed preliminarily eligible (i.e., BMI %ile ≥ 85 and the presence of elevated anxiety symptoms and/or LOC eating episodes). Written consent by parents/guardians and assent by the adolescent were obtained during the baseline visit.

Baseline Visit

Fasting anthropometric measures and cardiometabolic markers were assessed. Participants then completed two semi-structured interviews assessing disordered eating and psychiatric symptoms. Following these interviews, the adolescent and accompanying guardian completed various questionnaires pertaining to psychological and social functioning and eating patterns.

Interventions

Using a cluster randomization scheme, adolescents who met inclusion criteria were assigned to an Interpersonal Psychotherapy (IPT) or a Health Education (HE) group program. Participants were initially stratified by gender and location. Then, each

consecutive group of 4-7 girls or boys at FBCH or WRNMMC were randomized to either IPT or HE, with the goal of randomizing 50% of participants to each condition.

Interpersonal Psychotherapy (IPT)

Adolescents assigned to the IPT group participated in one initial 90-minute individual session and 12 weekly 90-minute group sessions that took place after school hours. During the initial individual session, an interpersonal inventory, which helps identify interpersonal problems that may contribute to or be exacerbated by LOC eating and anxiety symptoms, was completed. Similar to the original IPT for depression (141) and all adaptations (89; 90; 287; 288), IPT group sessions consisted of three phases (i.e., initial, middle, and termination) and focused on psychoeducation and general skill-building that could be applied to four interpersonal problem areas: interpersonal role disputes, role transitions, interpersonal deficits, and grief. Co-leaders for each group taught interpersonal problem-solving and communication skills and educated participants about the risk factors for excessive weight gain and warning signs, such as eating in response to negative affect as opposed to hunger or feeling a sense of LOC while eating. IPT group sessions were co-led by post-doctoral fellows, graduate students in uniform, and military healthcare trainees who completed intensive didactics trainings. All group sessions were audio recorded and weekly supervision was provided by licensed clinical psychologists who reviewed weekly sessions.

Health Education (HE)

Adolescents assigned to the HE group participated in one initial 60-minute initial session and 12 weekly 90-minute group sessions that took place after school hours. The HE group sessions focused on psychoeducation of a curriculum that encompasses various

health topics, including alcohol, drug, and tobacco use, depression and suicide, nutrition and body image, nonviolent conflict resolution, sun safety, exercise, and domestic violence. HE group sessions are co-led by post-doctoral fellows, graduate students in uniform, and military healthcare trainees. All co-leaders were provided with the weekly lesson plans and study investigators were available to provide guidance if any questions or issues arose.

Follow-up Visit

All participants were assessed at the conclusion of their respective 12-week groups. During this visit, height, weight, and cardiometabolic markers were re-measured. Participants also completed a semi-structured interview to assess disordered eating and LOC eating and were re-administered all baseline questionnaires.

MEASURES

Physiological Measures

Height and Weight

Participants were asked to remove their shoes and height and fasting weight were measured using a stadiometer and calibrated scale, respectively. After obtaining both values, BMI percentile was calculated, adjusting for age and sex (146).

Cardiometabolic Risk Factors

Cardiometabolic markers, including HDL cholesterol, triglycerides, fasting glucose, and HbA1c, were collected using a standard panel for youth with overweight and were measured through blood samples drawn by a trained phlebotomist or registered nurse at FBCH or WRNMMC. See Table 1 for details on how blood samples were

analyzed at each site. Blood pressure (diastolic and systolic) was obtained by a trained practitioner.

Interviews

Eating Disorder Examination (EDE)

The EDE (88) is a semi-structured clinical interview that was administered by trained interviewers to determine study eligibility. The EDE assesses the presence or absence of LOC eating in the past three months, as well as the DSM-5 (10) eating disorder diagnoses. Responses load onto four subscales (i.e., restraint, eating, and weight, and shape concern) and the average across subscale scores is calculated to obtain an EDE global score of disordered eating. The EDE has demonstrated acceptable psychometric properties (228) and has been shown to be valid and reliable in adolescents (110; 279). For the present study, disordered eating at baseline will be defined using the EDE global score. Since the full EDE was not administered at the follow-up visit, disordered eating at post-treatment will be defined using LOC eating status.

Psychological Questionnaires

Self-Compassion Assessment Form (SCAF)

The SCAF is a 9-item self-report questionnaire, developed by the investigators, derived from the RSES (229) and BDI (23) to measure self-compassion. The SCAF was designed to match the constructs measured by the SCS (186), a commonly used measure of self-compassion. While the original SCS (186) consists of 26 items, a shorter version [SCS-SF (217)] containing 12 items was developed and has shown good internal consistency ($\alpha = 0.86$) and a high correlation ($r = 0.97$) with the long form.

Using measures from the parent study, the investigator will create the SCAF by mapping the constructs of the 12 items from the SCS-SF onto items that represent similar constructs from questionnaires that participants have already completed as part of an ongoing intervention study. Given the limited number of measures that are directly relevant to self-compassion in the ongoing study, the final scale was generated from a total of 9 items. The SCAF score is a composite score, for a minimum score of 9 and a maximum score of 36, with higher scores representing more self-compassion. See Table 2 for the items used and the respective items that they represent from the SCS-SF (217). The following sections describe the questionnaires from which items were used to develop the SCAF and the questionnaires that were used to determine convergent validity.

Rosenberg Self-Esteem Scale (RSES)

The RSES (229) is a 10-item self-report questionnaire designed to assess global self-esteem. The RSES asks respondents on a scale of 1 (strongly agree) to 4 (strongly disagree) how strongly they agree with a statement (e.g., at times, I think I am no good at all); five items are positively valenced and five items are negatively valenced. The RSES has demonstrated acceptable internal consistency (246) and has been validated with adolescent populations (16; 119). The SCAF used items 4 (“I am able to do things as well as most other people”), 7 (“I feel that I am a person of worth, at least on an equal plane with others”), 8 (“I wish I could have more respect for myself”), 9 (“All in all, I am inclined to feel that I am a failure”), and 10 (“I take a positive attitude toward myself”) from the RSES.

Beck Depression Inventory (BDI)

The BDI (23) is a 21-item self-report questionnaire aimed to assess depressive symptoms over the past two weeks. Respondents rate each item on how it best describes how they have been feeling on a scale of 0 to 3, with higher numbers indicating greater severity of depressive symptoms. The BDI has been shown to have good internal consistency with psychiatric (0.86) and non-psychiatric (0.81) populations (22) and is reliable in adolescent samples (274). The SCAF used items 2 (“I feel my future is hopeless and will only get worse”), 3 (“I feel I am a complete failure as a person”), 7 (“I dislike myself”), and 8 (“I blame myself for everything bad that happens”) from the BDI.

Loneliness and Social Dissatisfaction Scale (LSDS)

The LSDS (14) is a 24-item self-report questionnaire used to assess children’s satisfaction with their peer relationships. The LSDS uses 16 primary items to measure children’s feelings of loneliness (e.g., “I feel alone”), social adequacy (e.g., “It’s easy for me to make new friends at school”), and estimations of peer status (e.g., “I am well-liked by the kids in my class”). An additional 8 items about activities and interests were included to help children feel more comfortable in providing their responses. All items were evaluated on a five-point Likert scale (i.e., always true, true most of the time, true sometimes, hardly ever true, or not true at all) and only the 16 primary items are used to compute the total score, with higher scores suggesting greater loneliness or social dissatisfaction. The scale has shown excellent internal consistency and is appropriate in school-aged children (14; 15). The total score of the LSDS (14) was used to determine convergent validity with the SCAF.

State-Trait Anxiety Inventory for Children (STAI-C)

The STAI-C (252) is a 20-item self-report questionnaire used to assess trait anxiety symptoms in children. Respondents are asked to use a scale of 1 (hardly ever) to 3 (often) to rate the frequency of feelings (e.g., “I feel like crying” or “I am troubled”). The STAI-C has shown good internal consistency (18; 96). The total score of the STAI-C (252) was used to determine convergent validity with the SCAF.

Perceived Stress Scale (PSS)

The PSS (57) is a 14-item self-report measure designed to measure the extent to which life events impact an individual’s level of perceived psychological stress. Respondents are asked to use a scale of 0 (never) to 4 (very often) to indicate the frequency of a particular thought (e.g., “In the last month, how often have you been upset because of something that happened unexpectedly” or feeling (e.g., “In the last month, how often have you felt that you were unable to control the important things in your life”) during the last month. The PSS (57) has demonstrated good internal reliability with community (0.84-0.85) and laboratory (0.86) samples. The total score of the PSS (57) was used to determine convergent validity with the SCAF.

DATA ANALYTIC PLAN

All analyses were completed using SPSS Version 25.0. Data were examined using descriptive statistics to screen for outliers and check for violations of the assumptions for all analyses. Outliers, defined as greater than 1.5 times the interquartile range below the 25th or above the 75th percentile, were recoded to the next lowest or highest score, respectively, that is not an outlier to minimize its influence on data analyses (94). Missing data were imputed using multiple imputation if the amount of missing data exceeds 5%. Unless otherwise noted, BMI, race, age, sex, presence/absence of LOC eating, and

anxiety symptoms were considered as covariates for all analyses. Relationships for all tests were considered significant when $p \leq .05$.

Aim 1

To develop and examine the internal consistency of a measure of perceived self-compassion, the SCAF.

Hypothesis 1a: In order to examine psychometric properties of the SCAF, an exploratory factor analysis was used to determine if the SCAF represented a unidimensional model. Given mixed findings pertaining to the appropriate sample size to conduct an exploratory factor analysis (289), we used Kaiser-Meyer-Olkin's Measure of Sample Adequacy (134; 135) and Bartlett's Test of Sphericity (19) to assess the suitability of the data. The sample size was considered adequate if Kaiser-Meyer-Olkin's Measure of Sample Adequacy generated a value greater than 0.50 and Bartlett's Test of Sphericity had a p -value $< .05$. The investigator examined the scree plot to determine the number of factors to be retained (204). When utilizing a scree plot to determine the number of factors to retain, the criteria is to identify the point where the scree (cluster of variables that account for minor factors) begins and retain factors that do not belong to the scree (125). Given a theoretical underpinning to expect correlations among factors, Promax (oblique) rotation was used.

Hypothesis 1b: For any dimension determined by the exploratory factor analysis, internal consistency will be assessed by calculating Cronbach's α .

Hypothesis 1c: In order to examine the convergent validity of the SCAF with a scale measuring the construct of self-compassion, the total score of the nine-items from the SCS-SF (217) was calculated. While the SCS-SF consists of 12 items, only 9 items were

considered due to the limited number of measures from the parent study that mapped onto the construct of self-compassion to create the SCAF. In order to examine convergent validity of the SCAF with measures of theoretically associated constructs, the total scores for the PSS (57), STAI-C (252), and LSDS (14) were calculated. Across measures, significant Pearson's correlations with the SCAF total score will indicate good construct validity.

Aim 2

To examine the baseline relationships between the SCAF with BMI, disordered eating, and components of the metabolic syndrome.

Hypothesis 2a: A multiple linear regression was conducted with the baseline self-compassion composite score as the independent variable and baseline BMI as the dependent variable. Race, age, sex, LOC eating, and anxiety symptoms were considered as covariates.

Hypothesis 2b: A multiple linear regression was conducted with the baseline self-compassion composite score as the independent variable and disordered eating attitudes, measured by the EDE global score, as the dependent variable.

Hypothesis 2c: Six multiple linear regressions were conducted with the baseline self-compassion composite score as the independent variable and baseline cardiometabolic factors (systolic and diastolic blood pressure, triglycerides, fasting glucose, hemoglobin A1c, and HDL cholesterol) as dependent variables. To adjust for multiple comparisons across regression models, the investigator used the Holm Šidák (1) correction in GraphPad Prism to analyze *p*-values for significance.

Aim 3

To explore the change in self-compassion from pre- to post-intervention.

Hypothesis 3a: A paired samples *t*-test was conducted to examine the change in self-compassion from pre- to post-intervention. No covariates were considered in this analysis.

Hypothesis 3b: A one-way analysis of covariance (ANCOVA) was conducted with group assignment (IPT or HE) as the between-subjects IV and post-treatment SCAF score as the DV. Baseline self-compassion and relevant sociodemographic variables were included as covariates in the model.

Aim 4

To explore the impact of change in self-compassion on post-intervention BMI, disordered eating, and components of metabolic syndrome.

Hypothesis 4a: A multiple linear regression was conducted with the difference score of the SCAF from pre- to post-treatment as the independent variable and post-intervention BMI as the dependent variable. Baseline BMI was considered as an additional covariate.

Hypothesis 4b: A multiple logistic regression was conducted with the difference score of the SCAF from pre- to post-treatment as the independent variable and post-intervention disordered eating, measured by LOC eating status, as the dependent variable. Baseline disordered eating was considered as an additional covariate.

Hypothesis 4c: Six multiple linear regressions were conducted with the difference score of the SCAF from pre- to post-treatment as the independent variable and post-intervention cardiometabolic components (systolic and diastolic blood pressure, triglycerides, fasting glucose, hemoglobin A1c, and HDL cholesterol) as dependent variables. The baseline cardiometabolic values of each respective dependent variable was

considered as an additional covariate. To adjust for multiple comparisons across regression models, the investigator used the Holm Šídák (1) correction in GraphPad Prism to analyze *p*-values for significance.

POWER ANALYSES

The data set from the parent study contains 105 participants. The adequacy of sample size for Aim 1 was determined using a 10:1 subject-to-item ratio that is commonly utilized in exploratory factor analyses (204). Since the SCAF has 9 items, the expected sample size needed is 90. Power analyses for Aims 2, 3, and 4 were conducted using G*Power 3.1 (92). Based on meta-analytic data in the self-compassion literature that suggest medium to large effect sizes (180; 295), a medium effect size for analyses was used. All power analyses were conducted using a targeted power of 80% and an alpha level of 0.05. Based on the power analyses conducted (see Table 3), the maximum sample size required will be 128.

CHAPTER 3: RESULTS

RESULTS

Participant Characteristics at Baseline

The majority of participants were female (56.2%), 44.4% of participants were Non-Hispanic White, and 79.0% of participants had obesity ($BMI \geq 95^{th}$ percentile). At baseline, the average age of participants was 14.3 ($SD = 1.5$) years, the mean BMI was 30.5 ($SD = 4.4$) kg/m^2 , and the mean BMIz was 2.0 ($SD = 0.4$). Sixty-two (59.0%) adolescents reported the presence of at least one LOC episode in the three months prior to baseline assessment. The range of reported LOC episodes was 0-56, with a mean of 6.9 ($Mdn = 2.0$, $SD = 14.2$). The majority (93.3%) of participants reported elevated anxiety

symptoms (≥ 32) on the State Trait Anxiety Inventory for Children (STAI-C). The range of STAI-C scores was 28-51, with a mean of 38.35 ($SD = 5.3$). Participant demographics at baseline are shown in Table 4.

Aim 1

To develop and examine the internal consistency, reliability, and construct validity of a measure of perceived self-compassion, the SCAF.

Hypothesis 1a: The SCAF will demonstrate a unidimensional model as indicated by an exploratory factor analysis.

Results of Hypothesis 1a: An exploratory factor analysis was conducted on the nine items of the SCAF using the principal axis factoring extraction method and varimax (orthogonal) rotation. The Kaiser-Meyer-Olkin test, $KMO = 0.81$, verified the sample adequacy of the analysis; Bartlett's Test of Sphericity, $\chi^2(36) = 268.46, p < .001$, indicated the correlations between variables were sufficient for a factor analysis; and the determinant of the correlation matrix (.069) indicated that there was no problematic multi-collinearity among the items. When utilizing a scree plot to determine the number of factors to retain, the criteria is to identify the point where the scree (cluster of variables that account for minor factors) begins and retain factors that do not belong to the scree (125). Examination of the scree plot (see Figure 3) supported retaining a one-factor structure that explained 41.6% of the variance and retained all nine items based on a factor loading cutoff of $> .40$. See Table 5 for factor loadings by item (range: .44 to .79).

Hypothesis 1b: The SCAF will demonstrate acceptable internal consistency, with a Cronbach's $\alpha \geq .70$.

Results of Hypothesis 1b: The SCAF demonstrated good internal consistency with a Cronbach's $\alpha = .82$.

Hypothesis 1c: The SCAF will demonstrate convergent validity with a scale measuring the construct of self-compassion and measures of theoretically associated constructs including anxiety, perceived stress, and social dissatisfaction.

Results of Hypothesis 1c: The total score of the SCAF ($M = 29.93$, $SD = 4.16$) and total score of matched items from the SCS-SF ($M = 26.79$, $SD = 6.42$), were found to be strongly positively correlated, $r(12) = 0.83$, $p < .001$. There were significant small-to-medium inverse correlations with the State-Trait Anxiety Inventory for Children, $r(103) = -0.22$, $p = .03$, and Perceived Stress Scale, $r(101) = -0.24$, $p = .01$, such that more self-compassion was associated with lower reported anxiety and stress symptoms. There was a significant medium-to-large positive correlation with the Loneliness and Social Dissatisfaction Scale (higher scores reflect less loneliness and social dissatisfaction), $r(101) = 0.44$, $p < .001$, such that more self-compassion was associated with lower loneliness and social dissatisfaction.

Aim 2

To examine the relationships of the SCAF score with baseline BMI, disordered eating, and metabolic syndrome components.

Hypothesis 2a: At baseline, lower levels of self-compassion will be associated with higher BMI.

Results of Hypothesis 2a: The model for BMI was significant, $F(6, 92) = 2.23$, $p = .047$, $R^2_{adj} = 0.07$, but self-compassion was not uniquely associated with BMI, $b = 0.05$, $SE(b) = 0.10$, $\beta = 0.05$, $p = .64$. See Table 6 for full model statistics.

Hypothesis 2b: At baseline, after adjusting for BMI, lower levels of self-compassion will be associated with more disordered eating attitudes as measured by the Eating Disorder Examination (EDE).

Results of Hypothesis 2b: A significant model for disordered eating attitudes and behaviors was found, $F(7, 91) = 4.60, p < .001, R^2_{adj} = 0.20$. Self-compassion was uniquely associated with disordered eating attitudes, $b = -0.07, SE\ b = 0.02, \beta = -0.42, p < .001$, such that more self-compassion was associated with lower disordered eating attitudes. Exploratory analyses of the four EDE subscales were also conducted to determine which domain contributed to the decrease in disordered eating attitudes. Results indicated that restraint, $b = -0.06, SE\ b = 0.02, \beta = -0.30, p < .01$, eating, $b = -0.04, SE\ b = 0.02, \beta = -0.25, p = .02$, shape, $b = -0.13, SE\ b = 0.02, \beta = -0.48, p < .001$, and weight, $b = -0.06, SE\ b = 0.02, \beta = -0.25, p = .02$, subscales were all significant, suggesting more self-compassion was associated with lower restraint and eating, shape, and weight concern. See Table 7 for full model statistics.

Hypothesis 2c: At baseline, after adjusting for BMI, lower levels of self-compassion will be associated with higher systolic blood pressure, diastolic blood pressure, triglycerides, fasting glucose, and hemoglobin A1c, as well as lower HDL cholesterol.

Results of Hypothesis 2c: A series of multiple linear regressions were conducted using the six metabolic markers as dependent variables. The systolic blood pressure model was significant, $F(7, 89) = 6.70, p < .001, R^2_{adj} = 0.29$, and self-compassion was uniquely associated with systolic blood pressure, $b = -0.58, SE(b) = 0.24, \beta = -0.23, p = .02$, such that more self-compassion was associated with lower systolic blood pressure. However, self-compassion was no longer significantly associated with systolic blood pressure, $p =$

.11 after adjusting for multiple comparisons using the Holm Šídák test. The diastolic blood pressure model was significant, $F(7, 89) = 3.43, p < .01, R^2_{adj} = 0.15$; however, self-compassion was not uniquely associated with diastolic blood pressure, $b = -0.23, SE(b) = 0.18, \beta = -0.13, p = .21$. Likewise, the high-density lipoprotein cholesterol model was significant, $F(7, 89) = 3.16, p < .01, R^2_{adj} = 0.14$, but , self-compassion was not uniquely associated with high-density lipoprotein cholesterol, $b = -0.18, SE(b) = 0.22, \beta = -0.08, p = .41$. The triglycerides model was not significant, $F(7, 89) = 1.78, p = .10, R^2_{adj} = 0.05$, and self-compassion was not uniquely associated with triglycerides, $b = -0.21, SE(b) = 0.92, \beta = -0.03, p = .81$. Likewise, the hemoglobin A1c model was not significant, $F(7, 89) = 1.00, p = .44, R^2_{adj} = 0.00$, and self-compassion was not uniquely associated with hemoglobin A1c, $b = 0.01, SE(b) = 0.01, \beta = 0.13, p = .23$. The fasting glucose model was significant, $F(7,89) = 5.32, p < .001, R^2_{adj} = 0.24$; but, self-compassion was not uniquely associated with fasting glucose, $b = -0.11, SE(b) = 0.13, \beta = -0.08, p = .41$. See Table 8 for full model statistics.

Aim 3

To explore differences in self-compassion between pre- and post-intervention assessments.

Hypothesis 3a: On average, the full sample will show higher self-compassion scores at post-intervention compared to pre-intervention.

Results of Hypothesis 3a: A paired-samples t-test revealed that participants had significantly higher self-compassion scores at post-treatment ($M = 29.06, SD = 4.10$) compared to baseline [$M = 27.49, SD = 4.61$; change = 1.57, 95% CI [0.81, 2.32], $t(104) = 4.12, p < .001, d = 0.40$].

Hypothesis 3b: Adjusting for baseline self-compassion, participants assigned to Interpersonal Psychotherapy will have a greater self-compassion at post-treatment compared to participants assigned to Health Education.

Results of Hypothesis 3b: A one-way ANCOVA was conducted to examine the main effect of intervention assignment on post-treatment self-compassion, while adjusting for relevant baseline sociodemographic covariates and self-compassion. The model indicated that the main effect for intervention, $F(1, 89) = 0.01, p = .95$, was not significant. See Table 9 for full model statistics.

Aim 4

To explore the impact of change in self-compassion on post-intervention BMI, disordered eating, and components of the metabolic syndrome.

Hypothesis 4a: After adjusting for baseline self-compassion and BMI, greater change in self-compassion will be associated with lower post-intervention BMI.

Results of Hypothesis 4a: A significant model was found for BMI, $F(7, 91) = 106.17, p < .001, R^2_{adj} = 0.88$, and change in self-compassion was uniquely associated with BMI at post-treatment, $b = -0.08, SE(b) = 0.04, \beta = -0.07, p = .04$, such that more improvement in self-compassion was linked to lower BMI. See Table 10 for full model statistics.

Hypothesis 4b: After adjusting for baseline self-compassion and LOC eating status, greater change in self-compassion will be associated with lower odds of LOC eating as measured by the EDE.

Results of Hypothesis 4b: Adjusting for covariates, the omnibus model for post-treatment LOC eating status (presence vs. absence) was not significant, $\chi^2(7) = 5.80, p = .56, R^2 = 0.08$, and the change in self-compassion was not significantly associated with LOC eating

status, Wald $\chi^2(1) = 0.44, p = .51, OR = 0.96, 95\% CI [0.87, 1.07]$. See Table 11 for full model statistics.

Hypothesis 4c: After adjusting for baseline self-compassion and respective metabolic components, greater change in self-compassion will be associated with lower post-intervention blood systolic pressure, diastolic blood pressure, triglycerides, fasting glucose, and hemoglobin A1c, as well as greater high-density lipoprotein cholesterol.

Results of Hypothesis 4c: A series of multiple linear regressions were conducted using the six metabolic markers as dependent variables; each model adjusted for the respective component at baseline. The systolic blood pressure model was significant, $F(8, 88) = 3.30, p < .01, R^2_{adj} = 0.16$; however, change in self-compassion was not uniquely associated with systolic blood pressure at post-treatment, $b = -0.26, SE(b) = 0.30, \beta = -0.09, p = .38$. The post-treatment diastolic blood pressure model was not significant, $F(8, 88) = 1.49, p = .17, R^2_{adj} = 0.04$, and change in self-compassion was not uniquely associated with diastolic blood pressure at post-treatment, $b = -0.31, SE(b) = 0.23, \beta = -0.14, p = .17$. The post-treatment high-density lipoprotein cholesterol model was significant, $F(8, 88) = 24.41, p < .001, R^2_{adj} = 0.66$, but change in self-compassion was not uniquely associated with high-density lipoprotein cholesterol at post-treatment, $b = .09, SE(b) = 0.16, \beta = 0.03, p = .58$. The post-treatment triglyceride model was significant, $F(8, 88) = 10.58, p < .001, R^2_{adj} = 0.44$; however, change in self-compassion was not associated with triglycerides at post-treatment, $b = -1.54, SE(b) = 0.85, \beta = -0.14, p = .07$. The post-treatment hemoglobin A1c model was significant, $F(8, 88) = 9.13, p < .001, R^2_{adj} = 0.40$; however, change in self-compassion was not associated with hemoglobin A1c at post-treatment, $b = -0.01, SE(b) = 0.01, \beta = -0.07, p = .39$. The fasting

glucose model was significant, $F(8, 88) = 7.51, p < .001, R^2_{adj} = 0.35$; however, change in self-compassion was not a unique predictor of fasting glucose at post-treatment, $b = -0.07, SE(b) = 0.13, \beta = -0.04, p = .60$. See Table 12 for full model statistics.

CHAPTER 4: DISCUSSION

The primary purpose of this study was to develop a measure of self-compassion using commonly administered psychological measures, and conduct a preliminary examination of its psychometric properties. In addition, we sought to investigate the relationships among self-compassion and BMI, disordered eating, and markers of the metabolic syndrome, as well as change in self-compassion after participation in an obesity prevention trial. The following sections will highlight the results and interpretation of findings by study aims.

Aim 1

Aim 1 examined the psychometric properties and construct validity of the SCAF. It was hypothesized that the SCAF (Self-Compassion Assessment Form), would demonstrate a unidimensional factor, good internal consistency, and adequate construct validity, which would support its utility in this study as a measure of perceived self-compassion. As hypothesized, the exploratory factor analysis supported retaining a one-factor structure and the scale demonstrated good internal consistency. Further, the total score of the SCAF was significantly correlated with the total score of paired items from the SCS-SF [Self-Compassion Scale – Short Form; (217)], as well as the total scores of theoretically related constructs (i.e., anxiety, loneliness, and stress).

Despite not having data available from an existing measure of self-compassion in the parent study, these findings provide preliminary support for the utility of the SCAF as

an alternative measure of self-compassion. Specifically, the present study found that all items were adequately loaded ($> .40$) onto one-factor and the measure had good internal consistency. Of note, while the scree plot indicated it was appropriate to retain a single factor, the Eigenvalues for Factors 1 and 2 were 3.74 and 1.16, respectively. Since Eigenvalues greater than 1 are often used as the criteria to determine the number of factors to retain in an exploratory factor analysis (125), a two-factor solution was also examined to determine which model would have a better fit with the data.

Unsurprisingly, extracting two factors using a non-orthogonal (Promax) rotation divided the SCAF by the measures used to create the scale (i.e., BDI and RSES). In addition, item loadings were poor (.09 - .38), the Eigenvalue for Factor 1 (3.74) was substantially higher than the Eigenvalue for Factor 2 (1.16), and Factor 1 explained 41.6% of the variance whereas Factor 2 only explained an additional 12.9%. Based on these results and with a goal of parsimony, a one-factor solution was determined to have the best fit with the data.

While the SCS (186) is the most widely used measure of self-compassion, there has been criticism behind its psychometric validity and use of a total score. In developing the scale, Neff (186) found that the SCS fit a six-factor model (i.e., self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification) and a single high-order factor (i.e., self-compassion), which justified the use of a total score. Brenner et al (42) later examined the factor structure of the SCS (186) and reported that a two-factor model (i.e., self-compassion and self-coldness) had a better fit with their data than a general one-factor structure (i.e., self-compassion). Other studies also found support for a two-factor solution; for example, positively and negatively valenced items (155), items depicting a self-compassionate versus self-critical attitude (63), and items

reflecting self-caring or self-disparaging stances (124). These studies claim that the SCS (186) is essentially measuring compassionate and uncompassionate self-responding rather than a single construct of self-compassion. However, Neff (185) stated that the factors are theoretically related, such that increasing compassionate responding inherently reduces uncompassionate responding. Although the SCAF also found support for a two-factor model, the factors were strongly correlated (0.66), which is consistent with Neff (186) theory, and suggests it may be appropriate to use single higher order factor and resulting total score. Indeed, since the SCAF was developed using only two measures, it is still unclear whether all aspects of self-compassion are adequately represented. To provide additional evidence supporting the use of the SCAF as an alternative self-compassion measure in future research, studies should continue investigating the SCAF's construct and content validity, as well as examine its test-retest reliability. If additional psychometric support for the SCAF is found, the measure may facilitate the investigation of self-compassion in studies that administered the BDI and RSES but did not collect data on the construct using the standard measures (i.e., SCS or SCS-SF).

Aim 2

Aim 2 examined the cross-sectional relationships of self-compassion with BMI, disordered eating attitudes, and cardiometabolic health at baseline, adjusting for relevant covariates. Contrary to our hypotheses, self-compassion was not correlated with BMI or any of the cardiometabolic markers at baseline. However, self-compassion was uniquely associated with disordered eating attitudes at baseline, such that greater self-compassion was linked to lower disordered eating attitudes.

BMI

Prior research found that self-compassion was negatively correlated with BMI in a sample of undergraduate students (273). However, compared to this study where all participants had overweight or obesity at baseline, only 26% of their sample had overweight or obesity. Thus, it is possible that this range restriction attenuated the ability to detect a significant linear relationship between self-compassion and BMI. With regard to age differences, Neff and McGehee (190) reported that adolescents in high school displayed comparable degrees of self-compassion with young adults in college. However, in a sample of middle- and high-school students, Bluth et al (31) found differences by age and sex, such that older females had the lowest levels of self-compassion and males reported similar degrees of self-compassion across age groups. Since the participants in Taylor et al (273) were older and predominately female (85%), self-compassion may have been lower overall and could explain the relationship between self-compassion and BMI. Rates of adolescent depression and anxiety are disproportionately higher in girls than boys (294), which may make it more difficult for adolescent girls to treat themselves with self-compassion. In contrast, our study consisted of a younger and more proportionate sample of female (56.2%) and male (43.8%) participants, which may have led a more even distribution of self-compassion scores and potentially attenuated the relationship between self-compassion and BMI. Given the limited data and variable findings from previous studies, additional research is needed to elucidate the relationship between self-compassion and BMI, as well as how it is impacted by age and sex. Inspection of our data appear to support this possibility, such that the relationship between self-compassion and BMI were positively (but not significantly) related among

girls and older teens (15-17 years old) and inversely (but not significantly) associated among boys and younger teens (12-14 years old).

Disordered Eating

The significant finding between self-compassion and disordered eating attitudes is consistent with prior findings that self-compassion is negatively correlated with disordered eating pathology (140; 153; 273). Exploratory analyses examining the subscales of the EDE found significant relationships for all four subscales, suggesting that more self-compassion was associated with lower restraint and eating, shape, and weight concern. Although not directly linked to our measure of disordered eating pathology, self-compassion has been linked to greater body acceptance (38) and lower body shame (39). One potential explanation for this finding is that self-compassion may protect against poor body esteem that would otherwise contribute to greater disordered eating attitudes. Objectification theory (99), which posits that individuals (particularly females) internalize an observer's perspective as the primary perception of their body, has been theorized to contribute to negative psychological correlates such as body image concerns (215) and disordered eating (201). Further, media portrayals and internalization of gender-specific body ideals that are unreachable for most individuals (131; 210) can contribute to increased body dissatisfaction. In fact, women with higher self-objectification scores reported a desire to have a less muscular body shape while men with higher scores reported a desire to have a more muscular body shape (202). Since self-compassion has been linked to numerous psychological benefits, studies have explored how it may alleviate the distress stemming from objectification.

When examining self-compassion in relation to objectification theory, self-compassion was inversely correlated with fear of negative evaluation, body shame, and body consciousness (72; 178). Women with more self-compassion also reported lower body shame and surveillance (72), less self-judgment, and less vulnerability to external evaluations of their body (77). Interestingly, for women with high self-compassion, there was no relationship between body comparison and body appreciation or self-worth, indicating that self-compassionate women do not derive their body satisfaction or self-worth from external sources (131). These findings suggest that having more self-compassion could lessen the degree that individuals engage in social comparisons and evaluate themselves based on body appearance, which may decrease body dissatisfaction and subsequent disordered eating pathology. As female (236) and male (214) military dependents report high rates of disordered eating and experience unique stressors that may exacerbate eating and weight concerns (43), understanding and improving self-compassion may be particularly beneficial for this population.

Cardiometabolic Markers

Much of the existing literature on self-compassion in relation to physiological measures has focused on hallmark stress indicators such as cortisol, heart rate variability, and IL-6 (41; 156; 226). Findings from these studies suggest that self-compassion is associated with an attenuated stress response through an increase in heart rate variability and decreases in cortisol and IL-6. However, the current study examined health-related cardiometabolic risk factors, which are distinctly different than physiological markers of stress. In addition, studies that have found links between self-compassion and physiological functioning typically involve social stress tests in laboratory settings.

Within these study designs, physiological markers of stress are measured throughout or closely after the completion of the stress manipulation. However, our study measured cardiometabolic factors using a blood draw during a baseline study visit prior to any intervention. It is possible that the relationship between physiological reactivity and self-compassion may be more easily observed if assessed in close proximity to an actual self-compassion manipulation as evidenced in laboratory studies. Another potential explanation is that cardiometabolic health factors reflect long-term physiological functioning, in contrast to the more immediate or short-term physiological responses measured in the laboratory setting. Last, because our sample consisted entirely of youth who have overweight or obesity and no significant health concerns, these criteria may have narrowed the range of metabolic values and minimized potential relationships between self-compassion and physiological measures. Given the significant physical and psychological risks associated with elevated cardiometabolic markers (66; 213), future research should continue to explore if self-compassion is associated with metabolic health with a sample that has a wider range of weight statuses and array of health concerns.

Aim 3

Aim 3 investigated how self-compassion differed at pre- versus post-intervention in the sample as a whole, and whether intervention assignment (IPT or HE) was a unique predictor of post-intervention self-compassion, adjusting for pre-intervention self-compassion and relevant covariates. The average self-compassion score in the full sample was significantly higher at post-intervention compared to pre-intervention. However,

group assignment was not a significant unique predictor of post-intervention self-compassion.

The higher average post-intervention self-compassion score is consistent with findings from the Mindful Self-Compassion (MSC) program, a group-based intervention co-led by two clinical psychologists, that showed significant increases in self-compassion after eight weekly sessions (187). Importantly, the MSC program included specific curriculum on the tenets of self-compassion (i.e., self-kindness, common humanity, and mindfulness), while the interventions for the present study did not. However, the higher post-intervention self-compassion scores in the sample as a whole may be attributed to dynamics of participating in group therapy. *Universality* is a key feature of all group-based interventions and involves group members hearing about similar problems from others and thus feeling less alone in their struggles (292). Participants in the current study may have benefitted from hearing other group members share personal information and experiences to which they related, which is consistent with the common humanity aspect of self-compassion (i.e., recognizing that experiences, positive or negative, are shared among others). As group counseling has been found to reduce symptoms of depression and improve self-esteem (144; 149; 162), another potential explanation is that participation in the IPT and HE groups may have contributed to improvements in depressive symptomatology and self-esteem. As these are the constructs assessed by the two measures from which SCAF items were selected, this may translate to increases in self-compassion. Future research using group-based interventions should administer the SCAF to better understand if the improvement in self-compassion is attributed to general group dynamics or specific treatment approaches.

Our findings did not support the hypothesis that assignment to IPT (versus HE) would be associated with higher post-intervention self-compassion scores. This is consistent with previous research that found no group differences between IPT and HE on the frequency of LOC eating and symptoms of depression and anxiety, or weight gain prevention at post-treatment and over 12-month follow up (269). The comparable change in self-compassion between groups may be attributed to the sample being treatment-seeking, as data suggest that youths' willingness to engage and active participation in treatment are strong predictors for positive outcomes from therapy (136). Further, the overall increase in self-compassion across participants regardless of group assignment may be best explained through common group factors. In addition to universality mentioned above, another example is group cohesiveness, which focuses on the connections between group members (291) and has been identified as an important factor in improving psychological outcomes in group treatment (162; 163). Despite treatment approaches for IPT and HE being vastly different, as IPT addresses interpersonal problem areas by teaching communication skills while HE is psychoeducational and focuses on having discussions about an array of issues that adolescents may encounter (e.g., substance abuse, nutrition, interpersonal violence), all group members identify as adolescent military dependents, which means they are connected to the military through a parent or primary caregiver. This shared identity may increase group cohesion, as youth might be able to better relate with one another and find comfort in meeting other military children who have experienced similar stressful situations (e.g., frequent moves or adjusting to a new environment).

Indeed, many of the studies examining the modifiability of self-compassion often involved protocols that intentionally trained the core aspects of self-compassion (34; 187; 249). Examples of these interventions include guided imagery, writing a letter expressing kindness and empathy inwardly (137), mindfulness (199), or compassionate self-talk (106). It is possible that intervention type in this study was not a significant predictor of post-intervention self-compassion because neither group included a focus on how to be more self-compassionate. Incorporating these activities into future groups may be beneficial for improving the well-being of group participants and help determine if they contribute to greater increases in self-compassion.

Aim 4

Aim 4 explored the degree to which change in self-compassion from pre- to post-intervention was uniquely associated with post-intervention BMI, disordered eating, and cardiometabolic markers. As hypothesized, a greater change in self-compassion was uniquely associated with lower post-treatment BMI. However, change in self-compassion was not uniquely related to post-intervention disordered eating or any of the cardiometabolic health factors.

BMI

A greater change in self-compassion was associated with a lower post-intervention BMI, which suggests that self-compassion may be an important construct to consider in future research on excess weight prevention or intervention. Prior research has found that participants assigned to self-compassion interventions evidenced significant weight loss compared to those in control groups (38; 160). Moreover, a study comparing two active treatment conditions (mindfulness and mindfulness with self-

compassion meditation) found that the self-compassion group demonstrated significantly more weight loss at post-intervention and six-month follow up (161). A potential explanation for decreased BMI at post-treatment is through a reduction in frequency of LOC eating episodes. Tanofsky-Kraff et al (265) found that compared to youth without LOC eating episodes, youth reporting LOC eating episodes ate foods higher in carbohydrates and sugar. By engaging in less LOC eating, youth may be consuming less of these energy dense and snack-type foods, which may contribute to decreased weight.

In the present study, the increase in self-compassion after participating in IPT or HE groups may have allowed participants to be more accepting of emotionally distressing cognitions such as body image concerns and self-critical thoughts. Self-compassionate individuals are less likely to catastrophize, ruminate, and experience anxiety following stressful situations (7); self-compassion was shown to be as effective as reappraisal and acceptance for depressive symptoms (75). Taken together, these data further support self-compassion as an adaptive coping strategy (188). It is possible that participants with more self-compassion are better able to regulate their emotions, which may lessen the likelihood of disordered eating in response to aversive affective experiences. This may be attributed to two of the core aspects of self-compassion that focus on having a balanced perspective of one's emotions by not overexaggerating or minimizing and treating oneself with kindness (186). Given the observed inverse relationship between self-compassion and disordered eating attitudes at baseline in this study, it is possible that changes in disordered eating attitudes at post-treatment mediates the relationship between improvement in self-compassion and decreased BMI at post-treatment. As we were unable to measure disordered eating attitudes at post-treatment, future research can

examine this model to potentially identify the mechanisms connecting increased self-compassion and decreased BMI.

LOC Eating

The change in self-compassion from pre- to post-treatment was not uniquely associated with the risk of LOC eating presence at post-treatment. This is in contrast to data reporting decreases in binge-eating severity for treatment-seeking participants assigned to self-compassion interventions (137; 208). However, there are important differences that may explain the discrepancy in findings. First, the samples for those studies comprised of adult participants with binge eating disorder while our study considered adolescents for inclusion if they endorsed at least one LOC eating episode. Thus, it is possible that the benefits of self-compassion may not be as apparent in this mostly healthy adolescent sample with a lower severity of disordered eating. Second, the outcome variable for those studies was the frequency of binge-eating episodes, measured continuously, whereas our outcome variable examined LOC eating episodes dichotomously (i.e., presence or absence). Therefore, future research should examine LOC eating as a continuous variable (i.e., the number of episodes) to determine if self-compassion can decrease the frequency of LOC eating episodes. As there are limited data examining self-compassion and disordered eating behaviors in adults and none in youth, additional research in this area and with adolescent samples is warranted.

Cardiometabolic Markers

The change in self-compassion from pre- to post-treatment was not uniquely associated with any cardiometabolic markers at post-treatment. As previously mentioned, the existing research on self-compassion and physiology involves stress markers (e.g.,

cortisol or heart rate variability). The discrepancy between stress markers and the cardiometabolic markers used in this study may explain the lack of significant findings. Further, only two studies have examined self-compassion in relation to a component of metabolic syndrome [i.e., HbA1c; (102; 103)]. While these studies did not find a direct link between self-compassion and HbA1c, data indicated that self-compassion moderated the relationship between diabetes distress and HbA1c, such that higher diabetes distress was associated with higher HbA1c among those with low, but not high self-compassion. Friis et al (103) suggested that individuals with higher self-compassion may engage in less rumination and self-criticism while having more motivation to improve behaviors. It may be that self-compassion, while not directly related to cardiometabolic risk factors, can positively influence psychological and behavioral changes that are associated with improvements in cardiometabolic health. Further studies are needed to identify the role of self-compassion in improving physical health. Another potential explanation is that self-compassion may not have a demonstrable impact on these risk factors. As this was the first study to look at how the change in a measure of self-compassion over time affects physiological functioning, additional longitudinal research would be beneficial to elucidate the long-term benefits of self-compassion on physiological functioning.

STRENGTHS AND LIMITATIONS

Strengths

Strengths of the study include the objective measurement of height, fasting weight, and cardiometabolic factors. In addition, a semi-structured clinical interview was used to assess disordered eating attitudes at baseline and LOC eating episodes at baseline and post-treatment. A further strength is the nature of the sample, as adolescent military

dependents are an understudied and vulnerable population that encounters unique stressors and is difficult to recruit for longitudinal research (e.g., due to frequent relocations arising from caregivers' military career).

Limitations

One of the main limitations was the sample size. Given the transient nature of military families, many participants' data were not available at post-treatment, which impacted the overall sample size for the study. As a result, 2 of 18 analyses were underpowered and their results should be interpreted with caution. Clustering of responses is an additional limitation since participants in both treatment conditions (i.e., Health Education and IPT) received an intervention. This may violate the assumption that residuals are independent of one another because the intervention type affects the outcome variable of self-compassion; further, this may influence inferences when testing the impact of change in self-compassion on BMI. Of note, simulation studies of multilevel regression modeling have reported reasonably robust findings even with smaller sample sizes (157). Another limitation was not being able to modify the parent study to administer the SCS (186) or SCS-SF (217). Although support was found for the internal consistency and convergent validity of the self-compassion measure developed for this study (i.e., SCAF), the items selected for this measure do not fully reflect the content of the standard self-compassion measure that was used as a basis for comparison (i.e., SCS-SF). Thus, it is possible that the SCAF does not represent the entire construct of self-compassion. Previous research found, while adjusting for negative affect, that self-compassion was inversely predictive of mood symptoms [e.g., depression and anxiety (186; 189)], which supports the notion that self-compassion uniquely contributes to

decreased psychopathology. Since the SCAF consists of items from the BDI (23), another limitation was being unable to investigate whether the change in self-compassion we observed in this study was due to improvements in depressive symptoms or the components comprising self-compassion (i.e., self-kindness, common humanity, and mindfulness). Future studies need to include another affective measure such as the Positive and Negative Affect Schedule (283) in order to elucidate the mechanisms for change in self-compassion. Last, the full EDE was administered only at baseline, thus precluding our ability to examine the unique association of change in self-compassion with post-intervention disordered eating attitudes. Last, the sample consisted entirely of intervention-seeking adolescent military dependents with overweight or obesity who reported LOC eating and/or elevated symptoms of anxiety. Therefore, future research will need to be conducted to investigate the generalizability of the findings to other populations.

CLINICAL IMPLICATIONS

This study identified relationships among self-compassion, BMI, and disordered eating, which may have notable implications for future intervention studies examining weight and disordered eating behaviors. Prior research has shown that highly restrictive eaters assigned to receive a self-compassion manipulation, compared to highly restrictive eaters who did not receive the self-compassion instruction, decreased their food intake following a pre-load (2). For example, individuals who had a lapse in their healthier eating behaviors but were able to be self-compassionate might be able to tell themselves that it is acceptable to not be strictly adherent to their diet (self-kindness), recognize that no one is perfect (common humanity), and prevent catastrophizing the situation to

suggest that they will never be able to achieve their goals (mindfulness). Employing these skills may allow individuals to have a more self-compassionate stance and encourage them to remain motivated towards their goals. Self-compassion is also an adaptive emotion regulation technique that enables individuals to more effectively manage distressing emotions or cognitions, which may function as the mechanism for decreasing disordered eating attitudes and behaviors and aid in the prevention of unhealthy weight gain. Given the multitude of psychological benefits that self-compassion offers, it might be particularly helpful to teach adolescent military dependents how to be more self-compassionate due to the unique stressors they face. Improving their levels of self-compassion may help them develop an internal coping strategy that allows them to better cope with difficult situations they face and foster a stronger sense of resilience.

Equally important is understanding barriers to being self-compassionate, which Gilbert et al (108) labeled as fear of compassion. This phenomenon encompasses three domains: fear of compassion for the self, from others, and for others. Studies have found that higher fear of self-compassion was correlated with lower trait self-compassion, higher self-criticism, and more anxiety and depressive symptoms (107; 108). In a 12-week eating disorder treatment program, individuals with a lower fear of self-compassion displayed a significant decrease in shame while those with higher fear of self-compassion did not have a meaningful change in shame (139). Further, it may be helpful to examine the interaction between self-compassion and fear of self-compassion, as having low self-compassion and high fear of self-compassion contributed to poor treatment outcomes in a clinical sample of individuals with eating disorders (139). Interestingly, independent of individuals' fear of self-compassion, higher trait self-compassion was associated with

decreased eating disorder symptoms, which suggests that bolstering self-compassion will still yield benefits. Despite this finding, fear of self-compassion is still necessary to address in order to improve one's ability to be self-compassionate.

FUTURE DIRECTIONS

Future studies of self-compassion in relation to the variables that were the focus in this study should seek to incorporate a standard measure of self-compassion to elucidate its psychological and physiological impact. Preliminary findings for the SCAF suggest that it may be a feasible option for investigators that wish to examine self-compassion when data from a standard measure are not available. To further validate the psychometric properties of the SCAF, it is critical to develop studies where the SCAF is administered in tandem with multiple measures of self-compassion (i.e., SCS, SCS-SF) and at multiple time points to determine test-retest reliability. As we were only able to examine convergent validity for the SCAF, future research should also investigate discriminant validity to further support its construct validity. Potential constructs to explore are thought suppression or rumination because self-compassionate individuals are more likely to engage with their thoughts and less likely to dwell on negative experiences. Another construct may be emotional expression; while self-compassion is considered an emotion approach style of coping, it is conceptualized as an internal process and thus, may manifest as low in outwardly expression.

With regard to self-compassion trainings, the extant research focuses on using virtual group-based formats such as the 8-week MSC program that accommodates 10-25 participants (187). Given the large time commitment required to complete the MSC program, Albertson et al (5) explored the efficacy of a shorter program to be completed

individually and found significant increases in self-compassion at the conclusion of the 3-week training. Interestingly, both programs were delivered virtually, such that the MSC program used video conference calls and the latter used pre-recorded podcasts.

Additional studies comparing group versus individual and in-vivo versus virtual self-compassion interventions will be useful in determining the most effective methods of delivery. In addition, the SCAF needs to be included in longitudinal studies to examine how self-compassion changes over time, as well as in self-compassion training studies to determine how self-compassion is affected from pre- to post-intervention. Should the SCAF be fully supported, and the current findings confirmed by well-designed studies to test its validity, treatment protocols aimed at decreasing disordered eating behaviors and excess weight gain can also implement a self-compassion manipulation. Examples of these exercises include mindfulness and practicing positive self-talk; another possibility is to have participants describe how they would speak to a friend or loved one who is going through a difficult time and turn that language inward.

While our study utilized BMI to categorize weight status, there may be shortcomings in using it to determine cardiometabolic risk (248) and it does not identify where fat is distributed in the body. Further, there may be limitations in using BMI to identify health problems with overweight or obesity across cultures. For example, compared to Caucasians, Black or African American individuals exhibit fewer co-morbidities at a given BMI (24). Future studies should consider alternatives such as visceral adiposity, as it has been shown to be a better predictor of metabolic syndrome in adolescents (6). Although the literature supports a relationship between self-compassion and various constructs related to stress, the research on cardiometabolic health factors are

not clear and need to be examined in more depth. Indeed, as changes in the cardiometabolic risk factors we examined in this study may require longer periods of time to demonstrate meaningful change, additional research employing more proximal measurements to stressors is warranted; examples include measuring heart rate variability (156) or using continuous glucose monitoring (93). As this was the first study to examine self-compassion in adolescent military dependents, more research needs to be conducted to determine the short- and long-term implications of improving self-compassion in this population.

CONCLUSION

In conclusion, the findings from this study add to the existing literature on self-compassion, disordered eating, and weight. Additionally, the SCAF shows promise as an alternative approach to measuring self-compassion. Future studies should continue to examine self-compassion in relation to weight, disordered eating, and cardiometabolic markers to clarify mechanisms underlying potential associations that may serve as promising targets for the prevention and/or treatment of overweight and obesity. As adolescent military dependents continue to face unique stressors from being part of a military family, additional research on self-compassion in this population in particular is warranted to understand the potential utility of intervening on the construct as a method of enhancing resilience in this vulnerable group.

REFERENCES

1. Abdi H. 2007. Bonferroni and Šidák corrections for multiple comparisons. *Encyclopedia of Measurement and Statistics* 3:103-7
2. Adams CE, Leary MR. 2007. Promoting self-compassionate attitudes toward eating among restrictive and guilty eaters. *Journal of Social and Clinical Psychology* 26:1120-44
3. Akbaraly TN, Shipley MJ, Ferrie JE, Virtanen M, Lowe G, et al. 2015. Long-term adherence to healthy dietary guidelines and chronic inflammation in the Prospective Whitehall II Study. *American Journal of Medicine* 128:152-60
4. Alberti KG, Zimmet P, Shaw J. 2005. The metabolic syndrome - a new worldwide definition. *The Lancet* 366:1059-62
5. Albertson ER, Neff KD, Dill-Shackleford KE. 2015. Self-compassion and body dissatisfaction in women: A randomized controlled trial of a brief meditation intervention. *Mindfulness* 6:444-54
6. Ali O, Cerjak D, W. KJJ, James R, Blangero J, Y. Z. 2014. Obesity, central adiposity and cardiometabolic risk factors in children and adolescents: A family-based study. *Pediatric Obesity* 9:58-62
7. Allen AB, Leary MR. 2010. Self-compassion, stress, and coping. *Social and Personality Psychology Compass* 4:107-18
8. Ambrosini GL, Oddy WH, Huang RC, Mori TA, Beilin LJ, Jebb SA. 2013. Prospective associations between sugar-sweetened beverage intakes and cardiometabolic risk factors in adolescents. *The American Journal of Clinical Nutrition* 98:327-34
9. American Diabetes Association. 2015. *Facts about type 2*. <http://www.diabetes.org/diabetes-basics/type-2/facts-about-type-2.html>
10. American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders*. Washington, DC
11. Anderson SE, Cohen P, Naumova EN, Jacques PF, Must A. 2007. Adolescent obesity and risk for subsequent major depressive disorder and anxiety disorder: Prospective evidence. *Psychosomatic Medicine* 69:740-7
12. Anderson SE, Cohen P, Naumova EN, Must A. 2006. Association of depression and anxiety disorders with weight change in a prospective community-based study of children followed up into adulthood. *Archives of Pediatrics and Adolescent Medicine* 160:285-91
13. Arch JJ, Brown KW, Dean DJ, Landy LN, Brown K, Laudenslager ML. 2014. Self-compassion training modulates alpha-amylase, heart rate variability, and subjective responses to social evaluative threat in women. *Psychoneuroendocrinology* 42:49-58
14. Asher SR, Hymel S, Renshaw PD. 1984. Loneliness in children. *Child Development* 55:1456-64
15. Asher SR, Wheeler VA. 1985. Children's loneliness: A comparison of rejected and neglected peer status. *Consulting and Clinical Psychology* 53:500-5

16. Bagley C, Mallick K. 2001. Normative data and mental health construct validity for the Rosenberg Self-Esteem Scale in British adolescents. *International Journal of Adolescence and Youth* 9:117-26
17. Barlas FM, Higgins WB, Pflieger JC, Diecker K. 2013. 2011 health related behaviors survey of active duty military personnel. ed. Do Defense
18. Barnes LLB, Harp D, Jung WS. 2002. Reliability generalizations of scores on the Spielberger state-trait anxiety inventory. *Educational and Psychological Measurement* 62:603-18
19. Bartlett MS. 1950. Tests of significance in factor analysis. *British Journal of Psychology* 3:77-85
20. Bassali R, Waller JL, Gower B, Allison J, Davis CL. 2010. Utility of waist circumference percentile for risk evaluation in obese children. *International Journal of Pediatric Obesity* 5:97-101
21. Beck AR. 2016. Psychosocial aspects of obesity. *NASN School Nurse* 31:23-7
22. Beck AT, Steer RA, Carbin MG. 1988. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review* 8:77-100
23. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. 1961. An inventory for measuring depression. *Archives of General Psychiatry* Jun:561-71
24. Billington CJ, Epstein LH, Goodwin NJ, Hill JO, Pi-Sunyer FX, et al. 2000. Overweight, obesity, and health risk. *Archives of Internal Medicine* 160:898-904
25. Birch LL, Ventura AK. 2009. Preventing childhood obesity: What works? *International Journal of Obesity* 33:S74-S81
26. Biro FM, Wien M. 2010. Childhood obesity and adult morbidities. *The American Journal of Clinical Nutrition* 91:1499S-505S
27. Björntorp P, Holm G, Rosmond R, Folkow B. 2000. Hypertension and the metabolic syndrome: Closely related central origin? *Blood Pressure* 9:71-82
28. Blaine B. 2008. Does depression cause obesity? A meta-analysis of longitudinal studies of depression and weight control. *Journal of Health Psychology* 13:1190-7
29. Bluth K, Blanton P. 2015. The influence of self-compassion on emotional well-being among early and older adolescent males and females. *Journal of Positive Psychology* 10:219-30
30. Bluth K, Blanton PW. 2014. Mindfulness and self-compassion: Exploring pathways to adolescent emotional well-being. *Journal of Child and Family Studies* 23:1298-309
31. Bluth K, Campo RA, Futch WS, Gaylord SA. 2016. Age and gender differences in the associations of self-compassion and emotional well-being in a large adolescent sample. *Journal of Youth and Adolescence* 46:840-53
32. Bluth K, Eisenlohr-Moul TA. 2017. Response to a mindful self-compassion intervention in teens: A within-person association of mindfulness, self-compassion, and emotional well-being outcomes. *Journal of Adolescence* 57:108-18
33. Bluth K, Gaylord SA, Campo RA, Mullarkey MC, Hobbs L. 2016. Making friends with yourself: A mixed methods pilot study of a mindful self-compassion program for adolescents. *Mindfulness* 7:479-92

34. Bluth K, Roberson PNE, Gaylord SA. 2015. A pilot study of a mindfulness intervention for adolescents and the potential role of self-compassion in reducing stress. *Explore* 11:292-5
35. Bluth K, Roberson PNE, Gaylord SA, Faurot KR, Grewen KM, et al. 2016. Does self-compassion protect adolescents from stress? *Journal of Child and Family Studies* 25:1098-109
36. Bose M, Oliván B, Laferrère B. 2010. Stress and obesity: The role of the hypothalamic-pituitary-adrenal axis in metabolic disease. *Current Opinion in Endocrinology, Diabetes, and Obesity* 16:340-6
37. Bouchard C. 2012. Gene-environment interactions in the etiology of obesity: Defining the fundamentals. *Obesity* 16:S5-S10
38. Braun TD, Park CL, Gorin A. 2016. Self-compassion, body image, and disordered eating: A review of the literature. *Body Image* 17:117-31
39. Breines J, Toole A, Tu C, Chen S. 2014. Self-compassion, body image, and self-reported disordered eating. *Self and Identity* 13:432-48
40. Breines JG, Chen S. 2012. Self-compassion increases self-improvement motivation. *Personality and Social Psychology Bulletin* 38:1133-43
41. Breines JG, Thoma MV, Gianferante D, Hanlin L, Chen X, Rohleder N. 2014. Self-compassion as a predictor of interleukin-6 response to acute psychosocial stress. *Brain, Behavior, and Immunity* 37:109-14
42. Brenner RE, Heath PJ, Vogel DL, Credé M. 2017. Two is more valid than one: Examining the factor structure of the Self-Compassion Scale (SCS). *Journal of Counseling Psychology* 64:696
43. Burrell LM, Adams GA, Durand DB, Castro CA. 2006. The impact of military lifestyle demands on well-being, army, and family outcomes. *Armed Forces & Society* 33:43-58
44. Byrne ME, LeMay-Russell S, Tanofsky-Kraff M. 2019. Loss-of-control eating and obesity among children and adolescents. *Current Obesity Reports* 8:33-42
45. Byrne ME, Tanofsky-Kraff M, Kelly NM, Grammer AC, Jaramillo M, et al. 2019. Pediatric loss-of-control eating and anxiety in relation to components of metabolic syndrome. *Journal of Pediatric Psychology* 44:220-8
46. Calcaterra V, Klersy C, Muratori T, Telli S, Caramagna C, et al. 2008. Prevalence of metabolic syndrome (MS) in children and adolescents with varying degrees of obesity. *Clinical Endocrinology* 68:868-72
47. Card NA, Bosch L, Casper DM, Wiggs CB, Hawkins SA, et al. 2011. A meta-analytic review of internalizing, externalizing, and academic adjustment among children of deployed military service members. *Journal of Family Psychology* 25:508-20
48. Carlton JR, Manos GH, Van Slyke JA. 2005. Anxiety and abnormal eating behaviors associated with cyclical readiness testing in a naval hospital active duty population. *Military Medicine* 170:663-7
49. Cartwright M, Wardle J, Steggle N, Simon AE, Croker H, Jarvis MJ. 2003. Stress and dietary practices in adolescents. *Health Psychology* 22:362-9
50. Cawley J, Maclean JC. 2011. Unfit for service: The implications of rising obesity for US military recruitment. *Health Economics* 21:1348-66

51. Centers for Disease Control and Prevention. 2018. *Overweight & obesity: Childhood obesity facts*. <https://www.cdc.gov/obesity/data/childhood.html>
52. Chandra A, Lara-Cinisomo S, Jaycox S, Tanielian T, Han B, et al. 2011. Views from the homefront: The experiences of youth and spouses from military families. *Rand Health Quarterly* 1
53. Chartrand MM, Frank DA, White LF, Shope TR. 2008. Effect of parents' wartime deployment on the behavior of young children in military families. *Archives of Pediatrics and Adolescent Medicine* 162:1009-14
54. Choy CS, Chan WY, Chen TL, Shih CC, Wu LC, Liao CC. 2011. Waist circumference and risk of elevated blood pressure in children: A cross-sectional study. *BMC Public Health* 11:613
55. Clever M, Segal DR. 2013. The demographics of military children and families. *The Future of Children* 23:13-39
56. Cohen DA. 2008. Obesity and the built environment: Changes in environmental cues cause energy imbalances. *International Journal of Obesity* 32:S137-S42
57. Cohen S, Kamarck T, Mermelstein R. 1983. A global measure of perceived stress. *Journal of Health and Social Behavior* 24:385-96
58. Constantino MI, Molyneaux L, Limacher-Gisler F, Al-Saeed A, Luo C, et al. 2013. Long-term complications and mortality in young-onset diabetes. *Diabetes Care* 36:3863-9
59. Cook S, Auinger P, Chaoyang L, Ford ES. 2008. Metabolic syndrome rates in United States adolescents, from the national health and nutrition examination survey, 1999-2002. *The Journal of Pediatrics* 152:165-70
60. Cook S, Auinger P, Li C, Ford ES. 2008. Metabolic syndrome rates in United States adolescents, from the National Health and Nutrition Examination Survey, 1999-2002. *The Journal of Pediatrics* 152:165-70
61. Cook S, Weitzman M, Auinger P, Nguyen M, Dietz WH. 2003. Prevalence of a metabolic syndrome phenotype in adolescents: Findings from the third National Health and Nutrition Examination Survey, 1988-1994. *Archives of Pediatrics and Adolescent Medicine* 157:821-7
62. Cornier M, Dabelea D, Hernandez TL, Lindstrom RC, Steig AJ, et al. 2008. The metabolic syndrome. *Endocrine Reviews* 29:777-822
63. Costa J, Marôco J, Pinto-Gouveia J, Ferreira C, Castilho P. 2015. Validation of the psychometric properties of the Self-Compassion Scale. Testing the factorial validity and factorial invariance of the measure among borderline personality disorder, anxiety disorder, eating disorder and general populations. *Clinical Psychology & Psychotherapy* 23:460-8
64. Cramm H, McColl MA, Aiken AB, Williams A. 2019. The mental health of military-connected children: A scoping review. *Journal of Child and Family Studies*:1-11
65. Crow S, Eisenberg ME, Story M, Neumark-Sztainer D. 2006. Psychosocial and behavioral correlates of dieting among overweight and non-overweight adolescents. *Journal of Adolescent Health* 38:569-74
66. Cruz ML, Goran MI. 2004. The metabolic syndrome in children and adolescents. *Current Diabetes Reports* 4:53-62

67. Cunha M, Xavier A, Castilho P. 2016. Understanding self-compassion in adolescents: Validation study of the self-compassion scale. *Personality and Individual Differences* 93:56-62
68. D'Agostino Jr. RB, Hamman RF, Karter AJ, Mykkanen L, Wagenknecht LE, Haffner SM. 2004. Cardiovascular disease risk factors predict the development of type 2 diabetes: The insulin resistance atherosclerosis study. *Diabetes Care* 27
69. Dabelea D, Mayer-Davis EJ, Saydah S, Imperatore G, Linder B, et al. 2014. Prevalence of type 1 and type 2 diabetes among children and adolescents from 2001 to 2009. *JAMA* 311:1778-86
70. Daniels SR. 2006. The consequences of childhood overweight and obesity. *The Future of Children* 16:47-67
71. Dart AB, Martens PJ, Rigatto C, Brownell MD, Dean HJ, Sellers EA. 2014. Earlier onset of complications in youth with type 2 diabetes. *Diabetes Care* 37:436-43
72. Daye CA, Webb JB, Jafari N. 2014. Exploring self-compassion as a refuge against recalling the body-related shaming of caregiver eating messages on dimensions of objectified body consciousness in college women. *Body Image* 11:547-56
73. de Ferranti SD, Gauvreau K, Ludwig DS, Neufeld EJ, Newburger JW, Rifai N. 2004. Prevalence of the metabolic syndrome in American adolescents. *110* 16
74. DeBoer MD. 2013. Obesity, systemic inflammation, and increased risk for cardiovascular disease and diabetes among adolescents: A need for screening tools to target interventions. *Nutrition* 29:379-86
75. Diedrich A, Grant M, Hofmann SG, Hiller W, Berking M. 2014. Self-compassion as an emotion regulation strategy in major depressive disorder. *Behaviour Research and Therapy* 58:43-51
76. Dietz WH. 2017. Time to adopt new measures of severe obesity in children and adolescents. *Pediatrics* 140
77. Duarte C, Ferreira C, Trindade IA, Pinto-Gouveia J. 2015. Body image and college women's quality of life: The importance of being self-compassionate. *Journal of Health Psychology* 20:754-64
78. Easterbrooks MA, Ginsburg K, Lerner RM. 2013. Resilience among military youth. *The Future of Children* 23:99-120
79. Eckel RH, Grundy SM, Zimmet PZ. 2005. The metabolic syndrome. *The Lancet* 365
80. Edwards M, Adams EM, Waldo M, Hadfield OD, Biegel GM. 2014. Effects of a mindfulness group on Latino adolescent students: Examining levels of perceived stress, mindfulness, self-compassion, and psychological symptoms. *The Journal for Specialists in Group Work* 39:145-63
81. Eilerman PA, Herzog CM, Luce BK, Chao SY, Walker SM, et al. 2014. A comparison of obesity prevalence: Military health system and United States populations, 2009-2012. *Military Medicine* 179:462-70
82. Elliott C, Tanofsky-Kraff M, Shomaker LB, Columbo KM, Wolkoff LE, et al. 2010. An examination of the interpersonal model of loss of control eating in children and adolescents. *Behaviour Research and Therapy* 48:424-8

83. Emerging Risk Factors Collaboration. 2012. C-reactive protein, fibrinogen, and cardiovascular prediction. *New England Journal of Medicine* 367:1310-20
84. Epel E, Lapidus R, McEwen B, Browell K. 2001. Stress may add bite to appetite in women: A laboratory study of stress-induced cortisol and eating behavior. *Psychoneuroendocrinology* 26:37-49
85. Esser N, Paquot N, Scheen AJ. 2015. Inflammatory markers and cardiometabolic diseases. *Acta Clinica Belgica* 70:193-9
86. Everson RB, Darling CA, Herzog JR. 2013. Parenting stress among US Army spouses during combat-related deployments: The role of sense of coherence. *Child & Family Social Work* 18:168-78
87. Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. 2003. Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care* 26:S5-S20
88. Fairburn C, Cooper Z. 1993. The Eating Disorders Examination. In *Binge Eating: Nature, Assessment and Treatment*, ed. CG Fairburn, GT Wilson. New York: Guilford Press. Number of.
89. Fairburn CG, Jones R, Peveler RC, Carr SJ, Solomon RA, et al. 1991. Three psychological treatments for bulimia nervosa. *Archives of General Psychiatry* 48:463-9
90. Fairburn CG, Peveler RC, Jones R, Hope RA, Doll HA. 1993. Predictors of 12-month outcome in bulimia nervosa and the influence of attitudes to shape and weight. *Journal of Consulting and Clinical Psychology* 61:696
91. Fallon EM, Tanofsky-Kraff M, Norman A, McDuffie JR, Taylor ED, et al. 2005. Health-related quality of life in overweight and nonoverweight black and white adolescents. *The Journal of Pediatrics* 147
92. Faul F, Erdfelder E, Buchner A, Lang A. 2009. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods* 41:1149-60
93. Faulenbach M, Uthoff H, Schwegler K, Spinass GA, Schmid C, Wiesli P. 2012. Effect of psychological stress on glucose control in patients with type 2 diabetes. *Diabetic Medicine* 29:128-31
94. Field A. 2013. *Discovering statistics using IBM SPSS statistics*. SAGE Publications Ltd
95. Field AE, Austin SB, Taylor CB, Malspeis S, Rosner B, et al. 2003. Relation between dieting and weight change among preadolescents and adolescents. *Pediatrics* 112:900-6
96. Finch Jr. AJ, Montgomery LE, Deardorff PA. 1974. Reliability of state-trait anxiety with emotionally disturbed children. *Journal of Abnormal Child Psychology* 2:67-9
97. Flake EM, Davis BE, Johnson PL, Middleton LS. 2009. The psychosocial effects of deployment on military children. *Journal of Developmental & Behavioral Pediatrics* 30:271-8
98. Frayling TM, Timpson NJ, Weedon MN, Zeggini E, Freathy RM, et al. 2007. A common variant in the FTO gene is associated with body mass index and predisposes to childhood and adult obesity. *Science* 316:889-94

99. Frederickson BL, Roberts T. 1997. Objectification theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women* 21:173-206
100. Freedman DS, Khan LK, Dietz WH, Srinivasan SR, Berenson GS. 2001. Relationship of childhood obesity to coronary heart disease risk factors in adulthood: The Bogalusa heart study. *Pediatrics* 108:712-8
101. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. 2005. The relation of childhood BMI to adult adiposity: The Bogalusa Heart Study. *Pediatrics* 115:22-7
102. Friis AM, Johnson MH, Cutfield RG, Consedine NS. 2015. Does kindness matter? Self-compassion buffers the negative impact of diabetes-distress on HBA1C. *Diabetic Medicine* 32:1634-40
103. Friis AM, Johnson MH, Cutfield RG, Consedine NS. 2016. Kindness matters: A randomized controlled trial of a mindful self-compassion intervention improves depression, distress, and HBA1c among patients with diabetes. *Diabetes Care* 39:1963-71
104. Fryar CD, Carroll MD, Ogden CL. 2014. Prevalence of overweight and obesity among children and adolescents: United States, 1963-1965 through 2011-2012. Atlanta, GA: National Center for Health Statistics
105. Genovesi S, Antolini L, Giussani M, Pieruzzi F, Galbiati S, et al. 2008. Usefulness of waist circumference for the identification of childhood hypertension. *Journal of Hypertension* 26:1563-70
106. Germer CK, Neff KD. 2013. Self-compassion in clinical practice. *Journal of Clinical Psychology* 69:856-67
107. Gilbert P, McEwan K, Gibbons L, Chotai S, Duarte J, Matos M. 2012. Fears of compassion and happiness in relation to alexithymia, mindfulness, and self-criticism. *Psychology and Psychotherapy: Theory, Research and Practice* 85:374-90
108. Gilbert P, McEwan K, Matos M, Ravis A. 2011. Fears of compassion: Development of three self-report measures. *Psychology and Psychotherapy: Theory, Research and Practice* 84:239-55
109. Gill C, Watson L, Williams C, Chan SW. 2018. Social anxiety and self-compassion in adolescents. *Journal of Adolescence* 69:163-74
110. Glasofer DR, Tanofsky-Kraff M, Eddy KT, Yanovski SZ, Theim KR, et al. 2007. Binge eating in overweight treatment-seeking adolescents. *Journal of Pediatric Psychology* 32:95-105
111. Goldschmidt AB, Aspen VP, Sinton MM, Tanofsky-Kraff M, Wilfley DE. 2008. Disordered eating attitudes and behaviors in overweight youth. *Obesity* 16:257-64
112. Goodman E, Whitaker RC. 2002. A prospective study of the role of depression in the development and persistence of adolescent obesity. *Pediatrics* 110:497-504
113. Goossens L, Soenens B, Braet C. 2009. Prevalence and characteristics of binge eating in an adolescent community sample. *Journal of Clinical Child & Adolescent Psychology* 38:342-53
114. Gorman GH, Eide M, Hisle-Gorman E. 2010. Wartime military deployment and increased pediatric mental and behavioral health complaints. *Pediatrics* 126:1058-66

115. Gouveia MJ, Canavarro MC, Moreira H. 2019. Associations between mindfulness, self-compassion, difficulties in emotion regulation, and emotional eating among adolescents with overweight/obesity. *Journal of Child and Family Studies* 28:273-85
116. Griffiths LJ, Parson TJ, Hill AJ. 2010. Self-esteem and quality of life in obese children and adolescents: A systematic review. *International Journal of Pediatric Obesity* 5:282-304
117. Grundy SM. 2002. Obesity, metabolic syndrome, and coronary atherosclerosis. *Circulation* 105:2696-8
118. Grundy SM, Cleeman JI, Daniels SR, Donato KA, Eckel RH, et al. 2005. Diagnosis and management of the metabolic syndrome. *Circulation* 112:2735-52
119. Hagborg WJ. 1993. The Rosenberg Self-Esteem scale and Harter's Self-Perception profile for adolescents: A concurrent validity study. *Psychology in the Schools* 30:132-6
120. Hale DE. 2005. Type 2 diabetes and diabetes risk factors in children and adolescents. *Clinical Cornerstone* 6:17-27
121. Hales CM, Carroll MD, Fryar CD, Ogden CL. 2017. Prevalence of obesity among adults and youth: United States, 2015-2016. NCHS Data Brief, 288
122. Hannon TS, Rao G, Arslanian S. 2005. Childhood obesity and type 2 diabetes mellitus. *Pediatrics* 116:473-80
123. Harrison C, Mond J, Bentley C, Gratwick-Sarll K, Rieger E, Rodgers B. 2014. Loss of control eating with and without the undue influence of weight or shape on self-evaluation: Evidence from an adolescent population. *International Journal of Eating Disorders* 2:31-8
124. Hayes JA, Lockard AJ, Janis RA, Locke BD. 2016. Construct validity of the self-compassion scale-short form among psychotherapy clients. *Counselling Psychology Quarterly*
125. Hayton JC, Allen DG, Scarpello V. 2004. Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods* 7:191-205
126. He J, Cai Z, Fan X. 2016. Prevalence of binge and loss of control eating among children and adolescents with overweight and obesity: An exploratory meta-analysis. *International Journal of Eating Disorders* 50:91-103
127. Herman CP, Polivy J. 1984. A boundary model for the regulation of eating. *Eating and Its Disorders*:141-56
128. Herpertz-Dahlmann B, Wille N, Hölling H, Vloet TD, Ravens-Sierberer U, the BELLA study group. 2008. Disordered eating behaviour and attitudes, associated psychopathology and health-related quality of life: Results of the BELLA study. *European Child & Adolescent Psychiatry* 17:82-91
129. Hilbert A, Hartmann AS, Czaja J, Schoebi D. 2013. Natural course of preadolescent loss of control eating. *Journal of Abnormal Psychology* 122:684-93
130. Hillier TA, Pedula KL. 2003. Complications in young adults with early-onset type 2 diabetes: Losing the relative protection of youth. *Diabetes Care* 26:2999-3005
131. Homan KJ, Tylka TL. 2015. Self-compassion moderates body comparison and appearance self-worth's inverse relationships with body appreciation. *Body Image* 15:1-7

132. Huang TT, Nansel TR, Belsheim AR, Morrison JA. 2008. Sensitivity, specificity, and predictive values of pediatric metabolic syndrome components in relation to adult metabolic syndrome: The Princeton LRC follow-up study. *Journal of Pediatrics* 152:185-90
133. Juonala M, Magnussen CG, Berenson GS, Venn A, Burns TL, et al. 2011. Childhood adiposity, adult adiposity, and cardiovascular risk factors. *The New England Journal of Medicine* 365:1876-86
134. Kaiser HF. 1970. A second-generation little jiffy. *Psychometrika* 35:401-15
135. Kaiser HF. 1974. Little jiffy, Mark IV. *Educational and Psychological Measurement* 34:111-7
136. Karver MS, Handelsman JB, Fields S, Bickman L. 2006. Meta-analysis of therapeutic relationship variables in youth and family therapy: The evidence for different relationship variables in the child and adolescent treatment outcome literature. *Clinical Psychology Review* 26:50-65
137. Kelly AC, Carter JC. 2015. Self-compassion training for binge eating disorder: A pilot randomized controlled trial. *Psychology & Psychotherapy: Theory, Research, & Practice* 88:285-303
138. Kelly AC, Carter JC, Borairi S. 2014. Are improvements in shame and self-compassion early in eating disorders treatment associated with better patient outcomes? *International Journal of Eating Disorders* 47:54-64
139. Kelly AC, Carter JC, Zuroff DC, Borairi S. 2013. Self-compassion and fear of self-compassion interact to predict response to eating disorders treatment: A preliminary investigation. *Psychotherapy Research* 23:252-64
140. Kelly AC, Vimalakanthan K, Miller KE. 2014. Self-compassion moderates the relationship between body mass index and both eating disorder pathology and body image flexibility. *Body Image* 11:446-53
141. Klerman GL, Weissman MM, Rounsaville BJ. 1984. *Interpersonal psychotherapy for depression*. New York: Basic Books
142. Kleykamp MA. 2006. College, jobs, or the military? Enlistment during a time of war. *Social Science Quarterly* 87:272-90
143. Knol MJ, Twisk JWR, Beekman ATF, Heine RJ, Snoek FJ, Pouwer F. 2006. Depression as a risk factor for the onset of type 2 diabetes mellitus. A meta-analysis. *Diabetologia* 49:837
144. Koutra A, Katsiadrami A, Diakogiannis G. 2010. The effect of group psychological counseling in Greek university students' anxiety, depression, and self-esteem. *European Journal of Psychotherapy & Counseling* 12:101-11
145. Kral TV, Rauh EM. 2010. Eating behaviors of children in the context of their family environment. *Physiology & Behavior* 100:567-73
146. Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, et al. 2002. 2000 CDC growth charts for the United States: Methods and development. *Vital Health Statistics Series 11* 246:1-190
147. Lathren C, Bluth K, Park J. 2019. Adolescent self-compassion moderates the relationship between perceived stress and internalizing symptoms. *Personality and Individual Differences* 143:36-41

148. Leary MR, Tate EB, Adams CE, Allen AB, Hancock J. 2007. Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself kindly. *Journal of Personality and Social Psychology* 92:887-904
149. Lee EJ. 2015. The effect of positive group psychotherapy on self-esteem and state anger among adolescents at Korean immigrant churches. *Archives of Psychiatric Nursing* 29:108-13
150. Li C, Ford ES, Zhao G, Mokdad AH. 2009. Prevalence of pre-diabetes and its association with clustering of cardiometabolic risk factors and hyperinsulinemia among U.S. adolescents: National Health and Nutrition Examination Survey 2005-2006. *Diabetes Care* 32:342-7
151. Li S, Chen W, Srinivasan SR, Bond MG, Tang R, et al. 2003. Childhood cardiovascular risk factors and carotid vascular changes in adulthood: The Bogalusa Heart Study. *JAMA* 290:2271-6
152. Lim CS, Espil FM, Viana AG, Janicke DM. 2015. Associations between child anxiety symptoms and child and family factors in pediatric obesity. *Journal of Developmental & Behavioral Pediatrics* 36:664-72
153. Liss M, Erchull MJ. 2015. Not hating what you see: Self-compassion may protect against negative mental health variables connected to self-objectification in college women. *Body Image* 14:5-12
154. Lockard AJ, Hayes JA, Neff K, Locke BD. 2014. Self-compassion among college counseling center clients: An examination of clinical norms and group differences. *Journal of College Counseling* 17:249-59
155. López A, Sanderman R, Smink A, Zhang Y, van Sonderen E, et al. 2015. A reconsideration of the Self-Compassion Scale's total score: Self-compassion versus self-criticism. *PloS One* 10:e0132940
156. Luo X, Qiao L, Che X. 2018. Self-compassion modulates heart rate variability and negative affect to experimentally induced stress. *Mindfulness* 9:1522-8
157. Maas CJM, Hox JJ. 2005. Sufficient sample sizes for multilevel modeling. *Methodology* 1:86-92
158. MacBeth A, Gumley A. 2012. Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review* 32:545-52
159. Mann M, Hosman CMH, Schaalma HP, de Vries NK. 2004. Self-esteem in a broad spectrum approach for mental health promotion. *Health Education Research* 19:357-72
160. Mantzios M, Wilson JC. 2014. Making concrete construals mindful: A novel approach for developing mindfulness and self-compassion to assist weight loss. *Psychology & Health* 29:422-41
161. Mantzios M, Wilson JC. 2015. Exploring mindfulness and mindfulness with self-compassion-centered interventions to assist weight loss: Theoretical considerations and preliminary results of a randomized pilot study. *Mindfulness* 6:824-35
162. Marmarosh C, Holtz A, Schottenbauer M. 2005. Group cohesiveness, group-derived collective self-esteem, group-derived hope, and the well-being of group therapy members. *Group Dynamics: Theory, Research, and Practice* 9:32-44

163. Marziali E, Munroe-Blum H, McCleary L. 1997. The contribution of group cohesion and group alliance to the outcome of group psychotherapy. *International Journal of Group Psychotherapy* 47:475-97
164. Matheson BE, Tanofsky-Kraff M, Shafer-Berger S, Sedaka NM, Mooreville M, et al. 2012. Eating patterns in youth with and without loss of control eating. *International Journal of Eating Disorders* 45:957-61
165. McNulty P. 2001. Prevalence and contributing factors of eating disorder behaviors in active duty service women in the Army, Navy, Air Force, and Marines. *Military Medicine* 166:53-8
166. Meadows SO, Engel CC, Collins RL, Beckman R, Cefalu M, et al. 2018. 2015 department of defense health related behaviors survey (HRBS). ed. Do Defense. Santa Monica, CA: RAND Corporation
167. Merikangas KR, He JP, Brody D, Fisher PW, Bourdon K, Koretz DS. 2010. Prevalence and treatment of mental disorders among US children in the 2001-2004 NHANES. *Pediatrics* 125:75-81
168. Mezuk B, Eaton WW, Albrecht S, Golden SH. 2008. Depression and type 2 diabetes over the lifespan: A meta-analysis. *Diabetes Care* 31:2383-90
169. Michels N, Sioen I, Braet C, Eiben G, Hebestreit A, et al. 2012. Stress, emotional eating behaviour and dietary patterns in children. *Appetite* 59:762-9
170. Misra M, Bredella MA, Tsai P, Mendes N, Miller KK, Klibanski A. 2008. Lower growth hormone and higher cortisol are associated with greater visceral adiposity, intramyocellular lipids, and insulin resistance in overweight girls. *American Journal of Physiology-Endocrinology and Metabolism* 295:E385-92
171. Mmari KN, Bradshaw CP, Sudhinaraset M, Blum R. 2010. Exploring the role of social connectedness among military youth: Perceptions from youth, parents, and school personnel. *Child & Youth Care Forum* 39:351-66
172. Moffitt RL, Neumann DL, Williamson SP. 2018. Comparing the efficacy of a brief self-esteem and self-compassion intervention for state body dissatisfaction and self-improvement motivation. *Body Image* 27:67-76
173. Monteiro R, Azevedo I. 2010. Chronic inflammation in obesity and the metabolic syndrome. *Mediators of Inflammation* 2010:1-10
174. Morris DL, Rui L. 2009. Recent advances in understanding leptin signaling and leptin resistance. *American Journal of Physiology-Endocrinology and Metabolism* 297:E1247-E59
175. Morrison JA, Friedman LA, Gray-McGuire C. 2007. Metabolic syndrome in childhood predicts adult cardiovascular disease 25 years later: The Princeton Lipid Research Clinics follow-up study. *Pediatrics* 120:340-5
176. Morrison JA, Friedman LA, Wang P, Glueck CJ. 2008. Metabolic syndrome in childhood predicts adult metabolic syndrome and type 2 diabetes mellitus 25 to 30 years later. *The Journal of Pediatrics* 152:201-6
177. Morrison KM, Shin S, Tarnopolsky M, Taylor VH. 2015. Association of depression & health related quality of life with body composition in children and youth with obesity. *Journal of Affective Disorders* 172:18-23
178. Mosewich AD, Kowalski KC, Sabiston CM, Sedgwick WA, Tracy JL. 2011. Self-compassion: A potential resource for young women athletes. *Journal of Sport and Exercise Psychology* 33:103-23

179. Muris P, Meesters C, Pierik A, Kock B. 2016. Good for the self: Self-compassion and other self-related constructs in relation to symptoms of anxiety and depression in non-clinical youths. *Journal of Child and Family Studies* 25:607-17
180. Muris P, Petrocchi N. 2016. Protection or vulnerability? A meta-analysis of the relations between the positive and negative components of self-compassion and psychopathology. *Clinical Psychology & Psychotherapy* 24:373-83
181. Musunuru K. 2010. Atherogenic dyslipidemia: Cardiovascular risk and dietary intervention. *Lipids* 45:907-14
182. Nader PR, O'Brien M, Houts R, Bradley R, Belsky J, et al. 2006. Identifying risk factors for obesity in early childhood. *Pediatrics* 118:e594-e601
183. National Institute of Diabetes and Digestive and Kidney Diseases. 2018. Insulin resistance & prediabetes. ed. USDoHaH Services
184. Neff K. 2003. Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity* 2:85-101
185. Neff K. 2019. Setting the record straight about the Self-Compassion Scale. *Mindfulness* 10:200-2
186. Neff KD. 2003. The development and validation of a scale to measure self-compassion. *Self and Identity* 2:223-50
187. Neff KD, Germer CK. 2013. A pilot study and randomized controlled trial of the mindful self-compassion program. *Journal of Clinical Psychology* 0:1-17
188. Neff KD, Hseih Y, Dejithirath K. 2005. Self-compassion, achievement goals, and coping with academic failure. *Self and Identity* 4:263-87
189. Neff KD, Kirkpatrick KL, Rude SS. 2007. Self-compassion and adaptive psychological functioning. *Journal of Research in Personality* 41:139-54
190. Neff KD, McGehee P. 2010. Self-compassion and psychological resilience among adolescents and young adults. *Self and Identity* 9:225-40
191. Neff KD, Roos V. 2009. Self-compassion versus global self-esteem: Two different ways of relating to oneself. *Journal of Personality* 77:23-50
192. Neff KD, Rude SS, Kirkpatrick KL. 2007. An examination of self-compassion in relation to positive psychological functioning and personality traits. *Journal of Research in Personality* 41:908-16
193. Neff KD, Tóth-Király I, Yarnell LM, Arimitsu K, Castilho P, et al. 2019. Examining the factor structure of the self-compassion scale in 20 diverse samples: Support for use of a total score and six subscale scores. *Psychological Assessment* 31:27
194. Neff KD, Whittaker TA, Karl A. 2017. Examining the factor structure of the self-compassion scale in four distinct population: Is the use of a total score justified? *Journal of Personality Assessment* 99:596-607
195. Neumark-Sztainer D, Wall M, Larson NI, Eisenberg ME, Loth K. 2011. Dieting and disordered eating behaviors from adolescence to young adulthood: Findings from a 10-year longitudinal study. *Journal of the American Dietetic Association* 111:1004-11
196. Neumark-Sztainer D, Wall MM, Story M, Perry CL. 2003. Correlates of unhealthy weight-control behaviors among adolescents: Implications for prevention programs. *Health Psychology* 22:88-98

197. Neumark-Sztainer DR, Hannan PJ. 2000. Weight-related behaviors among adolescent girls and boys: Results from a national survey. *Archives of Pediatrics and Adolescent Medicine* 154:569-77
198. Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA. 2007. Shared risk and protective factors for overweight and disordered eating in adolescents. *American Journal of Preventive Medicine* 33:359-69
199. Newsome S, Waldo M, Gruszka C. 2012. Mindfulness group work: Preventing stress and increasing self-compassion among helping professionals in training. *The Journal for Specialists in Group Work* 37:297-311
200. Nolan CJ, Damm P, Prentki M. 2011. Type 2 diabetes across generations: From pathophysiology to prevention and management. *The Lancet* 378:169-81
201. Noll SM, Frederickson BL. 1998. A mediational model linking self-objectification, body shame, and disordered eating. *Psychology of Women Quarterly* 22:623-36
202. Oehlhof ME, Musher-Eizenman DR, Neufeld JM, Hauser JC. 2009. Self-objectification and ideal body shape for men and women. *Body Image* 6:308-10
203. Orsi CM, Hale DE, Lynch JL. 2011. Pediatric obesity epidemiology. *Current Opinion in Endocrinology, Diabetes, and Obesity* 18:14-22
204. Osborne JW, Costello AB, Kellow JT. 2008. Best practices in exploratory factor analysis. *Best Practices in Quantitative Methods*
205. Palmer C. 2008. A theory of risk and resilience factors in military families. *Military Psychology* 20:205-17
206. Park KH, Zaichenko L, Peter P, Davis CR, Crowell JA, Mantzoros CS. 2014. Diet quality is associated with circulating C-reactive protein but not irisin levels in humans. *Metabolism* 63:233-41
207. Pinhas-Hameil O, Zeitler P. 2007. Clinical presentation and treatment of type 2 diabetes in children. *Pediatric Diabetes* 8:16-27
208. Pinto-Gouveia J, Carvalho SA, Palmeira L, Castilho P, Duarte C, et al. 2016. Incorporating psychoeducation, mindfulness, and self-compassion in a new programme for binge eating (BEfree): Exploring process of change. *Journal of Health Psychology* 24:466-79
209. Pirgon O, Aslan N. 2015. The role of urbanization in childhood obesity. *Journal of Clinical Research in Pediatric Endocrinology* 7:163-7
210. Pope HG, Phillips KA, Olivardia R. 2000. *The Adonis complex: The secret crisis of male body obsession*. New York, NY: The Free Press
211. Pouwer F, Kupper N, Adriaanse MC. 2010. Does emotional stress cause type 2 diabetes mellitus? A review from the European depression in diabetes (EDID) research consortium. *Discovery Medicine* 9:112-8
212. Pulgarón ER. 2013. Childhood obesity: A review of increased risk for physical and psychological comorbidities. *Clinical Therapeutics* 35:A18-A32
213. Pulgarón ER, Delamater AM. 2014. Obesity and type 2 diabetes in children: Epidemiology and treatment. *Current Diabetes Reports* 14:508
214. Quattlebaum M, Burke NL, Higgins-Neyland K, Leu W, Schvey NA, et al. 2019. Sex differences in eating related behaviors and psychopathology among adolescent military dependents at risk for adult obesity and eating disorders. *Eating Behaviors* 33:73-7

215. Quinn DM, Kallen RW, Cathey C. 2006. Body on my mind: The lingering effect of state self-objectification. *Sex Roles* 55
216. Radin RM, Tanofsky-Kraff M, Shomaker LB, Kelly NR, Pickworth CK, et al. 2015. Short communication: Metabolic characteristics of youth with loss of control eating. *Eating Behaviors* 19
217. Raes F, Pommier E, ., Neff KD. 2011. Construction and factorial validation of a short form of the self-compassion scale. *Clinical Psychology & Psychotherapy* 18:250-5
218. Rankinen T, Zuberi A, Chagnon YC, Weisnagel J, Argyropoulos G, et al. 2006. The human obesity gene map: The 2005 update. *Obesity* 14:529-644
219. Ranzenhofer LM, Engel SG, Crosby RD, Anderson M, Vannucci A, et al. 2014. Using ecological momentary assessment to examine interpersonal and affective predictors of loss of control eating in adolescent girls. *International Journal of Eating Disorders* 47:748-57
220. Ranzenhofer LM, Hannallah L, Field SE, Shomaker LB, Stephens M, et al. 2013. Pre-meal affective state and laboratory test meal intake in adolescent girls with loss of control eating. *Appetite* 68
221. Redline S, Storfer-Isser A, Rosen CL, Johnson NL, Kirchner HL, et al. 2007. Association between metabolic syndrome and sleep-disordered breathing in adolescents. *American Journal of Respiratory and Critical Care Medicine* 176:401-8
222. Reilly JJ, Kelly J. 2011. Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: Systematic review. *International Journal of Obesity* 35:891-8
223. Reinehr T. 2013. Type 2 diabetes mellitus in children and adolescents. *World Journal of Diabetes* 4:270-81
224. Reinehr T, Andler W. 2004. Cortisol and its relation to insulin resistance before and after weight loss in obese children. *Hormone Research in Paediatrics* 62:107-12
225. Reinehr T, Roth C. 2010. A new link between skeleton, obesity and insulin resistance: Relationships between osteocalcin, leptin and insulin resistance in obese children before and after weight loss. *International Journal of Obesity* 34:852-8
226. Rockliff H, Gilbert P, McEwan K, Lightman S, Glover D. 2008. A pilot exploration of heart rate variability and salivary cortisol responses to compassion-focused imagery. *Clinical Neuropsychiatry* 5:132-9
227. Rofey DL, Kolko RP, Iosif A, Silk JS, Bost JE, et al. 2009. A longitudinal study of childhood depression and anxiety in relation to weight gain. *Child Psychiatry & Human Development* 40:517-26
228. Rosen CL, Vara L, Wendt S, Leitenberg H. 1990. Validity studies of the Eating Disorder Examination. *International Journal of Eating Disorders* 9:519-28
229. Rosenberg M. 1989. *Society and the Adolescent Self-Image*. Middletown, CT: Wesleyan University Press
230. Rosenberg M, Schooler C, Schoenbach C, Rosenberg F. 1995. Global self-esteem and specific self-esteem: Different concepts, different outcomes *American Sociological Review* 60:141-56

231. Rosenbloom AL, Silverstein JH, Amemiya S, Zeitler P, Kilingsmith GJ. 2008. Type 2 diabetes mellitus in the child and adolescent. *Pediatric Diabetes* 9:512-26
232. Rosenbloom AL, Silverstein JH, Amemiya S, Zeitler P, Klingensmith G. 2009. Type 2 diabetes in children and adolescents. *Pediatric Diabetes* 10:17-32
233. Rostker BD, Klerman JA, Zander-Cotugno M. 2014. Recruiting older youths: Insights from a new survey of Army recruits. ed. OotSo Defense. Santa Monica, CA: RAND Corporation
234. Saunders TJ, Chaput J, Tremblay MS. 2014. Sedentary behaviour as an emerging risk factor for cardiometabolic diseases in children and youth. *Canadian Journal of Diabetes* 38:53-61
235. Schlüter N, Schmidt R, Kittel R, Tetzlaff A, Hilbert A. 2015. Loss of control eating in adolescents from the community. *International Journal of Eating Disorders* 49:413-20
236. Schvey NA, Sbrocco T, Stephens M, Bryant EJ, Ress R, et al. 2015. Comparison of overweight and obese military-dependent and civilian adolescent girls with loss-of-control eating. *International Journal of Eating Disorders* 48:790-4
237. Semiz S, Rota S, Özdemir Ö, Özdemir A, Kaptanoglu B. 2008. Are c-reactive protein and homocysteine cardiovascular risk factors in obese children and adolescents? *Pediatrics International* 50:419-23
238. Shah AS, Dolan LM, Kimball TR, Gao Z, Khoury PR, et al. 2009. Influence of duration of diabetes, glycemic control, and traditional cardiovascular risk factors on early atherosclerotic vascular changes in adolescents and young adults with type 2 diabetes mellitus. *Journal of Clinical Endocrinology and Metabolism* 94:3740-5
239. Shank LM, Crosby RD, Grammer AC, Shomaker LB, Vannucci A, et al. 2017. Examination of the interpersonal model of loss of control eating in the laboratory. *Comprehensive Psychiatry* 76:36-44
240. Shank LM, Tanofsky-Kraff M, Kelly NR, Schvey NA, Marwitz SE, et al. 2017. Pediatric loss of control eating and high-sensitivity c-reactive protein concentrations. *Childhood Obesity* 13:1-8
241. Shank LM, Tanofsky-Kraff M, Radin RM, Shomaker LB, Wilfley DE, et al. 2018. Remission of loss of control eating and changes in components of the metabolic syndrome. *International Journal of Eating Disorders* 51:565-73
242. Shomaker LB, Tanofsky-Kraff M, Elliott C, Wolkoff LE, Columbo KM, et al. 2010. Salience of loss of control for pediatric binge episodes: Does size really matter? *International Journal of Eating Disorders* 43:707-16
243. Shomaker LB, Tanofsky-Kraff M, Stern EA, Miller R, Zocca JM, et al. 2011. Longitudinal study of depressive symptoms and progression of insulin resistance in youth at risk for adult obesity. *Diabetes Care* 34
244. Shomaker LB, Tanofsky-Kraff M, Young-Hyman D, Han JC, Yanoff LB, et al. 2010. Psychological symptoms and insulin sensitivity in adolescents. *Pediatric Diabetes* 11:417-23
245. Siervo M, Wells JCK, Cizza G. 2009. The contribution of psychosocial stress to the obesity epidemic: An evolutionary approach. *Hormone and Metabolic Research* 41:261-70

246. Sinclair SJ, Blais MA, Gansler DA, Sandberg E, Bistis K, LoCicero A. 2010. Psychometric properties of the Rosenberg Self-Esteem Scale: Overall and across demographic groups living within the United States. *Evaluation & the Health Professions* 33:56-80
247. Singh AS, Mulder C, Twisk JWR, Van Mechelen W, Chinapaw MJM. 2008. Tracking of childhood overweight into adulthood: A systematic review of the literature. *Obesity Reviews* 9:474-88
248. Skinner AC, Mayer ML, Flower K, Perrin EM, Weinberger M. 2009. Using BMI to determine cardiovascular risk in childhood: How do the BMI cutoffs fare? *Pediatrics* 124:905-12
249. Smeets E, Neff K, Alberts H, Peters M. 2014. Meeting suffering with kindness: Effects of a brief self-compassion intervention for college students. *Journal of Clinical Psychology* 70:794-807
250. Sonnevile KR, Horton NJ, Micali N, Crosby RD, Swanson SA, et al. 2013. Longitudinal associations between binge eating and overeating and adverse outcomes among adolescents and young adults: Does loss of control matter? *JAMA Pediatrics* 167:149-55
251. Sorof JM, Lai D, Turner J, Poffenbarger T, Portman RJ. 2004. Overweight, ethnicity, and the prevalence of hypertension in school-aged children. *Pediatrics* 113:475-82
252. Spielberger CD. 1973. *Manual for the State-Trait Anxiety Inventory for Children*. Palo Alto: Consulting Psychologists Press
253. Stander VA, Merrill LL. 2000. The relationship of parental military background to the demographic characteristics of 11,195 Navy recruits. ed. BoN Personnel. Washington, DC: Bureau of Medicine and Surgery
254. Steinberger J, Daniels SR, Eckel RH, Hayman L, Lustig RH, et al. 2009. Progress and challenges in metabolic syndrome in children and adolescents: A scientific statement from the American Heart Association Atherosclerosis, Hypertension, and Obesity in the Young Committee of the Council on Cardiovascular Disease in the Young; Council on Cardiovascular Nursing; and Council on Nutrition, Physical Activity, and Metabolism. *Circulation* 119:628-847
255. Stice E, Presnell K, Spangler D. 2002. Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology* 21:131
256. Subramanian S, Chait A. 2012. Hypertriglyceridemia secondary to obesity and diabetes. *Biochimica et Biophysica Acta (BBA) - Molecular and Cell Biology of Lipids* 1821:819-25
257. Sun SS, Grave GD, Siervogel RM, Pickoff AA, Arslanian S, Daniels SR. 2007. Systolic blood pressure in childhood predicts hypertension and metabolic syndrome later in life. *Pediatrics* 119:237-46
258. Swanson SA, Crow SJ, Le Grange D, Swendsen J, Merikangas KR. 2011. Prevalence and correlates of eating disorders in adolescents: Results from the national comorbidity survey replication adolescent supplement. *Archives of General Psychiatry* 68:714-23
259. Tamayo T, Herder C, Rathmann W. 2010. Impact of early psychosocial factors (childhood socioeconomic factors and adversities) on future risk of type 2

- diabetes, metabolic disturbances and obesity: A systematic review. *BMC Public Health* 10:525-40
260. Tanaka M, Wekerle C, Schmuck ML, Paglia-Boak A, The MAP Research Team. 2011. The linkages among childhood maltreatment, adolescent mental health, and self-compassion in child welfare adolescents. *Child Abuse & Neglect* 35:887-98
 261. Tanofsky-Kraff M, Cohen ML, Yanovski SZ, Cox C, Thiem KR, et al. 2006. A prospective study of psychological predictors of body fat gain among children at high risk for adult obesity. *Pediatrics* 117:1203-9
 262. Tanofsky-Kraff M, Faden D, Yanovski SZ, Wilfley DE, Yanovski JA. 2005. The perceived onset of dieting and loss of control eating behaviors in overweight children. *International Journal of Eating Disorders* 38:112-22
 263. Tanofsky-Kraff M, Goossens L, Kamryn E, Ringham R, Goldschmidt A, et al. 2007. A multisite investigation of binge eating behaviors in children and adolescents. *Journal of Consulting and Clinical Psychology* 75:901-13
 264. Tanofsky-Kraff M, Marcus MD, Yanovski SZ, Yanovski JA. 2008. Loss of control eating disorder in children age 12 years and younger: Proposed research criteria. *Eating Behaviors* 9:360-5
 265. Tanofsky-Kraff M, McDuffie JR, Yanovski SZ, Kozlosky M, Schvey NA, et al. 2009. Laboratory assessment of the food intake of children and adolescents with loss of control eating. *The American Journal of Clinical Nutrition* 89:738-45
 266. Tanofsky-Kraff M, Sbrocco T, Theim KR, Cohen LA, Mackey ER, et al. 2013. Obesity and the US military family. *Obesity (Silver Spring)* 21:2205-20
 267. Tanofsky-Kraff M, Shomaker LB, Olsen C, Roza CA, Wolkoff LE, et al. 2011. A prospective study of pediatric loss of control eating and psychological outcomes. *Journal of Abnormal Psychology* 120:108-18
 268. Tanofsky-Kraff M, Shomaker LB, Stern EA, Miller R, Sebring N, et al. 2012. Children's binge eating and development of metabolic syndrome. *International Journal of Obesity* 36:956-62
 269. Tanofsky-Kraff M, Shomaker LB, Wilfley DE, Young JF, Sbrocco T, et al. 2014. Targeted prevention of excess weight gain and eating disorders in high-risk adolescent girls: A randomized controlled trial. *The American Journal of Clinical Nutrition* 100:1010-8
 270. Tanofsky-Kraff M, Yanovski SZ, Schvey NA, Olsen CH, Gustafson J, Yanovski JA. 2009. A prospective study of loss of control eating for body weight gain in children at high risk for adult obesity. *International Journal of Eating Disorders* 42:26-30
 271. Tanofsky-Kraff M, Yanovski SZ, Wilfley DE, Marmarosh C, Morgan CM, Yanovski JA. 2004. Eating-disordered behaviors, body fat, and psychopathology in overweight and normal-weight children. *Journal of Consulting and Clinical Psychology* 72:53-61
 272. Tauman R, Gozal D. 2006. Obesity and obstructive sleep apnea in children. *Paediatric Respiratory Reviews* 7:247-59
 273. Taylor MB, Daiss S, Krietsch K. 2015. Associations among self-compassion, mindful eating, eating disorder symptomatology, and body mass index in college students. *Translational Issues in Psychological Science*:3

274. Teri L. 1982. The use of the Beck Depression Inventory with adolescents. *Journal of Abnormal Child Psychology* 10:277-84
275. Verhulst SL, Schrauwen N, Haentjens D, Rooman RP, Van Gaal L, et al. 2007. Sleep-disordered breathing and the metabolic syndrome in overweight and obese children and adolescents. *The Journal of Pediatrics* 150:608-12
276. Veugelers PJ, Fitzgerald AL. 2005. Prevalence of risk factors for childhood overweight and obesity. *Canadian Medical Association Journal* 173:607-13
277. Vissers D, Vanroy C, Meulenaere AD, Van de Sompel A, Truijen S, Van Gaal L. 2007. Metabolic syndrome in youth: A cross-sectional school-based survey. *Acta Paediatrica* 96:1809-13
278. Waasdorp CE, Caboot JB, Robinson A, Abraham AA, Adelman WP. 2007. Screening military dependent adolescent females for disordered eating. *Military Medicine* 172:962-7
279. Wade TD, Byrne S, Bryant-Waugh R. 2008. The Eating Disorder Examination: Norms and construct validity with young and middle adolescent girls. *International Journal of Eating Disorders* 41:551-8
280. Wajchenberg BL. 2000. Subcutaneous and visceral adipose tissue: Their relation to the metabolic syndrome. *Endocrine Reviews* 21:697-738
281. Wang X, Bao W, Liu J, Ouyang YY, Wang D, et al. 2013. Inflammatory markers and risk of type 2 diabetes: A systematic review and meta-analysis. *Diabetes Care* 36:166-75
282. Wardle J, Carnell S, Haworth CM, Plomin R. 2008. Evidence for a strong genetic influence on childhood adiposity despite the force of the obesogenic environment. *The American Journal of Clinical Nutrition* 87:398-404
283. Watson D, Clark LA, Tellegen A. 1988. Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology* 54:1063
284. Weber EG, Weber DK. 2005. Geographic relocation frequency, resilience, and military adolescent behavior. *Military Medicine* 170:638-42
285. Weiss R, Dziura J, Burgert TS, Tamborlane WV, Taksali SE, et al. 2004. Obesity and the metabolic syndrome in children and adolescents. *The New England Journal of Medicine* 350:2362-74
286. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. 1997. Predicting obesity in young adulthood from childhood and parental obesity. *The New England Journal of Medicine* 337:869-73
287. Wilfley D, Frank M, Welch R, Spurrell E, Rounsaville B. 1998. Adapting interpersonal psychotherapy to a group format (IPT-G) for binge eating disorder: Toward a model for adapting empirically supported treatments. *Psychotherapy Research* 8:379-91
288. Wilfley DE, Welch R, Stein RI, Spurrell EB, Cohen LR, et al. 2002. A randomized comparison of group cognitive-behavioral therapy and group interpersonal psychotherapy for the treatment of overweight individuals with binge-eating disorder. *Archives of General Psychiatry* 59:713-21
289. Williams B, Onsman A, Brown T. 2010. Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine* 8:1-13

290. Williams J, Wake M, Hesketh K, Maher E, Waters E. 2005. Health-related quality of life of overweight and obese children. *JAMA* 293:70-6
291. Yalom ID. 1985. *The theory and practice of group psychotherapy*. New York, NY: Basic Books
292. Yalom ID. 2005. *The theory and practice of group psychotherapy*. New York, NY: Basic Books
293. Yarnell LM, Stafford RE, Neff KD, Reilly ED, Knox MC, Mullarkey M. 2015. Meta-analysis of gender differences in self-compassion. *Self and Identity* 14:499-520
294. Zahn-Waxler C, Shirtcliff EA, Marceau K. 2008. Disorders of childhood and adolescence: Gender and psychopathology. *Annual Review of Clinical Psychology* 4:275-303
295. Zessin U, Dickhäuser O, Garbade S. 2015. The relationship between self-compassion and well-being: A meta-analysis. *Applied Psychology: Health and Well-Being* 7:340-64
296. Zimmet P, George K, Alberti MM, Kaufman F, Tajima N, et al. 2007. The metabolic syndrome in children and adolescents - an IDF consensus report. *Pediatric Diabetes* 8:299-306

Tables

Table 1. Analytical Information for Blood Samples.

	FBCH	WRNMMC
HDL Cholesterol	<u>Company:</u> Roche Diagnostics <u>System:</u> Cobas 6000 c 501 <u>Assay:</u> Homogeneous enzymatic colorimetric test	<u>Company:</u> Roche Diagnostics <u>System:</u> Cobas c 701/702 <u>Assay:</u> Homogeneous enzymatic colorimetric test
Triglycerides	<u>Company:</u> Roche Diagnostics <u>System:</u> Cobas 6000 c 501 <u>Assay:</u> Enzymatic colorimetric test	<u>Company:</u> Roche Diagnostics <u>System:</u> Cobas c 701/702 <u>Assay:</u> Enzymatic colorimetric test
Glucose	<u>Company:</u> Roche Diagnostics <u>System:</u> Cobas 6000 c 501 <u>Assay:</u> UV test with enzymatic reference method with hexokinase	<u>Company:</u> Roche Diagnostics <u>System:</u> Cobas c 701/702 <u>Assay:</u> UV test with enzymatic reference method with hexokinase
HbA1c	*Analyzed at WRNMMC	<u>Company:</u> Bio-Rad <u>System:</u> D-100 <u>Assay:</u> Bio-Rad D-100 assay

Table 2. Construction of the Self-Compassion Assessment Form (SCAF).

Items from the SCS-SF	Items for the SCAF
<u>SCS-SF 6 (Self-Kindness)</u> “When I am going through a hard time, I give myself the caring and tenderness I need”	<u>RSES 10 (Self-Kindness)</u> “I take a positive attitude toward myself”
<u>SCS-SF 8 (Isolation)</u> “When I fail at something that’s something to me, I tend to feel alone in my failure”	<u>RSES 4 (Self-Kindness)</u> “I am able to do things as well as most other people”
<u>SCS-SF 10 (Common Humanity)</u> “When I feel inadequate in some way, I try to remind myself that feelings or inadequacy are shared by most people”	<u>RSES 7 (Common Humanity)</u> “I feel that I’m a person of worth, at least on an equal plane with others”
<u>SCS-SF 5 (Mindfulness)</u> “I try to see my failings as part of the human condition”	<u>RSES 9 (Mindfulness)</u> “All in all, I am inclined to feel that I am a failure”
<u>SCS-SF 2 (Mindfulness)</u> “I try to be understanding and patient towards those aspects of my personality I don’t like”	<u>RSES 8 (Mindfulness)</u> “I wish I could have more respect for myself”
<u>SCS-SF 9 (Self-Judgment)</u> “When I’m feeling down, I tend to obsess and fixate on everything that’s wrong”	<u>BDI 2 (Self-Judgment)</u> “Hopelessness”
<u>SCS-SF 11 (Self-Judgment)</u> “I’m disapproving and judgmental about my own flaws and inadequacies”	<u>BDI 7 (Self-Judgment)</u> “Self-dislike”
<u>SCS-SF 1 (Isolation)</u> “When I fail at something important to me, I become consumed by feelings of inadequacy”	<u>BDI 3 (Isolation)</u> “Failure”
<u>SCS-SF 7 (Isolation)</u> “When something upsets me, I try to keep my emotions in balance”	<u>BDI 8 (Isolation)</u> “Self-blame”

Note. SCS-SF = Self-Compassion Scale – Short Form. SCAF = Self-Compassion Assessment Form. RSES = Rosenberg Self-Esteem Scale. BDI = Beck Depression Inventory.

Table 3. Power Analyses for Aims 2, 3, and 4.

Hypothesis	Type of Test	# of IV/Covariates	Sample Size
2a	Multiple linear regression	1/5	98
2b	Multiple linear regression	1/6	103
2c	Multiple linear regression	1/6	103
3a	Paired samples <i>t</i> -test	Variable 1: Pre-tx SCAF Variable 2: Post-tx SCAF	34
3b	ANCOVA	1/7	128
4a	Multiple linear regression	1/6	103
4b	Multiple logistic regression	1/6	103
4c	Multiple linear regression	1/7	109

Table 4. Participant Characteristics at Baseline.

	Total (<i>N</i> = 105) n (%)	Female (<i>n</i> = 59, 56.2%) n (%)	Male (<i>n</i> = 46, 43.8%) n (%)	<i>p</i>
Race				.79
White/Caucasian	57 (54.3%)	30 (50.8%)	27 (58.7%)	
Black or African American	26 (24.8%)	16 (27.2%)	10 (21.7%)	
Multiple Races	11 (10.5%)	5 (8.5%)	6 (13.0%)	
Asian	5 (4.7%)	3 (5.1%)	2 (4.4%)	
Unknown	6 (5.7%)	5 (8.4%)	1 (2.2%)	
Ethnicity				.44
Hispanic or Latino	21 (42.9%)	10 (16.9%)	11 (23.9%)	
Not Hispanic or Latino	79 (52.4%)	45 (76.3%)	34 (73.9%)	
Unknown	5 (4.7%)	4 (6.8%)	1 (2.2%)	
Weight Status				.49
Overweight	22 (21.0%)	17 (28.8%)	5 (10.9%)	
Obesity	83 (79.0%)	42 (71.2%)	41 (89.1%)	
LOC Eating				.46
Presence	62 (59.0%)	33 (55.9%)	29 (63.0%)	
Absence	43 (41.0%)	26 (44.1%)	17 (37.0%)	
STAI-C				.04
<32	7 (6.7%)	1 (1.7%)	6 (13.0%)	
≥32	98 (93.3%)	58 (98.3%)	40 (87.0%)	
Range	28-51	31-51	28-47	.04

	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	
Age	14.3 (1.5)	14.6 (1.6)	14.0 (1.4)	.02
BMI	30.5 (4.4)	30.3 (4.1)	30.8 (4.8)	.52
BMIz	2.0 (0.4)	1.9 (0.4)	2.1 (0.4)	.003

Note. LOC = Loss of Control, STAI-C = State Trait Anxiety Inventory - Children. BMI = Body Mass Index. BMIz = Body Mass Index adjusted for age and sex.

Table 5. Race and Ethnicity of Participants.

Race	Latino or Hispanic	Not Latino or Hispanic	Total
White	12 (21.1%)	45 (78.9%)	57
Black or African American	5 (19.2%)	21 (80.8%)	26
Multiple Races	3 (27.3%)	8 (72.7%)	11
Asian	0 (0.0%)	5 (100%)	5

Table 6. Means, Standard Deviations, and Ranges of Variables at Baseline and Post-Treatment.

Variable	Mean	SD	Range
SCAF at baseline	27.5	4.6	15 - 36
SCAF at post-treatment	29.1	4.1	20 - 36
BMI at baseline	30.5	4.4	22.6 - 40.5
BMI at post-treatment	31.0	4.9	22.3 - 47.0
Systolic Blood Pressure at baseline	118.8	12.0	88 - 148
Systolic Blood Pressure at post-treatment	119.9	12.1	94 - 147
Diastolic Blood Pressure at baseline	73.7	8.6	56 - 94
Diastolic Blood Pressure at post-treatment	73.5	8.9	53 - 93
HDL Cholesterol at baseline	50.2	9.9	30 - 75
HDL Cholesterol at post-treatment	50.3	10.2	26 - 72
Triglycerides at baseline	89.7	40.2	32 - 188
Triglycerides at post-treatment	93.6	42.5	32 - 188
Hemoglobin A1c at baseline	5.3	0.3	4.6 - 6.0
Hemoglobin A1c at post-treatment	5.2	0.3	4.6 - 5.8
Glucose at baseline	88.7	6.3	75 - 103
Glucose at post-treatment	91.1	6.1	78 - 104

Table 7. Correlation Matrix for the SCAF and Dependent Variables at Baseline.

	1	2	3	4	5	6	7	8	9
1. SCAF	--								
2. BMI	-.03	--							
3. EDE Global	-.43*	.14	--						
4. Systolic BP	-.23*	.36*	.10	--					
5. Diastolic BP	-.07	.38*	.06	.44*	--				
6. HDL-C	-.12	-.31*	.16	-.11	.05	--			
7. Triglycerides	.02	.17	.001	.01	.09	-.43*	--		
8. HbA1c	.12	.24*	.09	.10	-.02	-.01	-.03	--	
9. Glucose	.02	.10	-.01	.18	.10	-.26*	.04	.12	--

Note. * $p < .05$. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. EDE = Eating Disorder Examination. BP = Blood Pressure. HDL-C = High Density Lipoprotein Cholesterol. HbA1c = Hemoglobin A1c.

Table 8. Factor Loadings for Exploratory Factor Analysis of the Self-Compassion Assessment Form.

Item	Factor 1
RSES 10: "I take a positive attitude toward myself"	0.65
RSES 4: "I am able to do things as well as most other people"	0.55
RSES 7: "...I'm a person of worth, at least on an equal plane with others"	0.62
RSES 9: "All in all, I am inclined to feel that I am a failure"	0.79
RSES 8: "I wish I could have more respect for myself"	0.43
BDI 2: "Hopelessness"	0.58
BDI 7: "Self-dislike"	0.57
BDI 3: "Failure"	0.44
BDI 8: "Self-blame"	0.58
Eigenvalue	3.74
% of variance	41.59

Note. RSES = Rosenberg Self-Esteem Scale. BDI = Beck Depression Inventory.

Table 9. Summary of Linear Regression Analysis for Self-Compassion and BMI at Baseline.

Predictor	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>
SCAF	0.05	0.10	0.05	0.47	.64
Sex	0.92	0.89	0.11	1.03	.30
Age	0.90	0.29	0.32	3.11	.002*
Race	0.71	0.86	0.08	0.83	.41
STAI-C	0.01	0.09	0.01	0.09	.93
LOC Presence	1.28	0.90	0.15	1.43	.16

Note. * $p < .05$. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory – Children. LOC = Loss of Control.

Table 10. Summary of Linear Regression Analysis for Self-Compassion and Disordered Eating at Baseline.

Predictor	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>
SCAF	-0.07	0.02	-0.42*	-4.37	<.001*
Sex	-0.06	0.15	-0.04	-0.43	.67
Age	0.002	0.05	0.04	0.04	.97
Race	0.09	0.14	0.06	0.66	.51
BMI	0.01	0.02	0.06	0.57	.57
STAI-C	-0.004	0.01	-0.03	-0.30	.77
LOC Presence	0.33	0.15	0.22	2.24	.03

Note. * $p < .05$. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory – Children. LOC = Loss of Control.

Table 11. Summary of Linear Regression Analyses for Self-Compassion and Metabolic Markers at Baseline.

Dependent Variable	Predictor	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>
Systolic Blood Pressure	SCAF	-0.58	0.24	-0.23	-2.47	.02*
	Sex	6.94	2.22	0.29	3.13	.002*
	Age	3.05	0.76	0.38	4.03	< .001*
	Race	-0.09	2.16	0.004	-0.04	.97
	BMI	0.66	0.27	0.23	2.49	.02*
	STAI-C	-0.33	0.21	-0.14	-1.52	.13
	LOC Presence	-1.94	2.27	-0.08	-0.86	.39
Diastolic Blood Pressure	SCAF	-0.23	0.18	-0.13	-1.25	.21
	Sex	3.17	1.71	0.19	1.85	.07
	Age	0.39	0.59	0.07	0.66	.51
	Race	1.17	1.67	0.07	0.70	.49
	BMI	0.76	0.21	0.38	3.71	<.001*
	STAI-C	0.02	0.17	0.01	0.12	.91
	LOC Presence	-1.19	1.75	-0.07	-0.68	.50
HDL Cholesterol	SCAF	-0.18	0.22	-0.08	-0.83	.41
	Sex	-3.94	2.01	-0.20	-1.96	.053
	Age	0.22	0.69	0.03	0.31	.76
	Race	3.75	1.95	0.19	1.92	.06
	BMI	-0.76	0.24	-0.32	-3.19	.002*
	STAI-C	-0.29	0.20	-0.15	-1.48	.14
	LOC Presence	3.98	2.06	0.20	1.94	.06
Triglycerides	SCAF	-0.21	0.92	-0.03	-0.23	.81
	Sex	4.11	8.50	0.05	0.48	.63

	Age	-4.11	2.91	-0.18	-1.64	.10
	Race	-4.78	8.26	0.14	-1.38	.17
	BMI	2.80	1.00	0.30	2.80	.01
	STAI-C	0.02	0.83	0.003	0.03	.98
	LOC Presence	4.75	8.69	0.06	0.55	.59
Hemoglobin A1c	SCAF	0.01	0.01	0.13	1.22	.23
	Sex	0.002	0.07	0.004	0.03	.98
	Age	-0.02	0.02	-0.10	-0.91	.36
	Race	0.05	0.06	0.08	0.77	.44
	BMI	0.02	0.01	0.21	1.94	.06
	STAI-C	-0.001	0.01	-0.02	-0.22	.83
	LOC Presence	0.03	0.07	0.04	0.39	.70
Glucose	SCAF	-0.11	0.13	-0.08	-0.83	.41
	Sex	5.99	1.20	0.47	5.00	< .001*
	Age	-0.26	0.41	-0.06	-0.63	.53
	Race	-2.20	1.16	-0.17	-1.89	.06
	BMI	0.22	0.14	0.15	1.55	.12
	STAI-C	0.11	0.12	0.09	0.95	.35
	LOC Presence	-3.55	1.22	-0.28	-2.91	.01

Note. * $p < .05$. The table includes unadjusted p -values. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory - Children. LOC = Loss of Control. HDL = High Density Lipoprotein.

Table 12. Summary of One-Way ANCOVA Examining the Effect of Intervention Assignment on Post-Treatment Self-Compassion.

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Intervention	1	0.10	0.10	0.01	0.93
Baseline SCAF	1	436.36	434.36	38.87	<.001*
Intervention*Baseline SCAF	1	0.07	0.07	0.01	0.94
Sex	1	19.21	19.21	1.71	0.19
Age	1	0.18	0.18	0.02	0.90
Race	1	0.001	0.001	0.00	0.99
BMI	1	18.37	18.37	1.64	0.20
LOC Presence	1	7.97	7.97	0.71	0.40
STAI-C	1	11.30	11.30	0.71	0.40
Error	89	999.20	11.23	-	-
Corrected Total	98	1691.54	-	-	-

Note. **p*-value < .05. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory – Children. LOC = Loss of Control.

Table 13. Summary of Linear Regression Analyses for Self-Compassion and BMI at Post-Treatment.

Predictor	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>
Change in SCAF	-0.08	0.04	-0.07	-2.07	.04*
BMI	0.98	0.04	0.93	24.92	<.001*
Sex	0.78	0.33	0.09	2.35	.02*
Age	0.04	0.11	0.01	0.34	.74
Race	0.97	0.32	0.11	3.01	.003*
LOC	-0.15	0.33	-0.02	-0.44	.66
STAI-C	0.02	0.03	0.02	0.57	.57

Note. * $p < .05$. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory - Children. LOC = Loss of Control.

Table 14. Summary of Logistic Regression Analyses for Self-Compassion and Loss of Control Eating at Post-Treatment.

Predictor	<i>b</i>	<i>SE(b)</i>	Wald χ^2	<i>Odds Ratio</i>	95% CI		<i>p</i>
					Lower	Upper	
Change in SCAF	-0.04	0.06	0.44	0.96	0.87	1.07	.51
Baseline LOC Presence	0.54	0.45	1.45	1.72	0.72	4.15	.23
Sex	-0.53	0.45	1.41	0.59	0.24	1.41	.24
Age	0.04	0.15	0.07	1.04	0.78	1.40	.79
Race	-0.11	0.43	0.07	0.90	0.39	2.08	.80
BMI	0.07	0.05	1.88	1.08	0.987	1.19	.17
STAI-C	-0.01	0.04	0.04	0.99	0.91	1.08	.31

Note. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory – Children. LOC = Loss of Control.

Table 15. Summary of Linear Regression Analyses for Self-Compassion and Metabolic Markers at Post-Treatment.

Dependent Variable	Predictor	<i>b</i>	<i>SE(b)</i>	β	<i>t</i>	<i>p</i>
Systolic Blood Pressure	Change in SCAF	-0.26	0.30	-0.09	-0.88	.38
	Baseline Systolic Blood Pressure	0.20	0.11	0.20	1.78	.08
	Sex	3.54	2.50	0.15	1.42	.16
	Age	0.05	0.90	0.01	0.05	.96
	Race	-0.49	2.35	-0.02	-0.21	.84
	BMI	0.94	0.30	0.33	3.16	.002*
	LOC Presence	0.86	2.45	0.04	0.35	.73
	STAI-C	0.11	0.23	0.05	0.49	.62
Diastolic Blood Pressure	Change in SCAF	-0.31	0.23	-0.14	-1.38	.17
	Baseline Diastolic Blood Pressure	0.14	0.12	0.13	1.17	.24
	Sex	1.23	1.87	0.07	0.66	.51
	Age	-0.26	0.63	-0.04	-0.42	.68
	Race	-0.65	1.81	-0.04	-0.36	.72
	BMI	0.40	0.24	0.20	1.70	.09
	LOC	2.00	1.88	0.11	1.06	.30
	STAI-C	0.12	0.18	0.08	0.70	.49
HDL Cholesterol	Change in SCAF	0.09	0.16	0.03	0.56	.58
	Baseline HDL-Cholesterol	0.76	0.07	0.74	11.14	< .001*
	Sex	-2.65	1.33	-0.13	-2.00	.049*
	Age	1.04	0.44	0.15	2.34	.02*

	Race	0.47	1.29	0.02	0.36	.72
	BMI	-0.27	0.16	-0.11	-1.66	.10
	LOC Presence	1.37	1.35	-0.07	-1.01	.31
	STAI-C	-0.20	0.13	-0.10	-1.56	.12
Triglycerides	Change in SCAF	-1.54	0.85	-0.14	-1.81	.07
	Baseline	0.69	0.09	0.65	7.95	< .001*
	Triglycerides					
	Sex	12.88	6.95	0.15	1.85	.07
	Age	0.67	2.42	0.02	0.28	.78
	Race	0.28	6.86	0.003	0.04	.97
	BMI	0.63	0.86	0.06	0.73	.47
	LOC Presence	-13.06	7.08	-0.15	-1.85	.07
	STAI-C	1.42	0.67	0.17	2.11	.04*
Hemoglobin A1c	Change in SCAF	-0.01	0.01	-0.07	-0.87	.39
	Baseline	0.52	0.07	0.58	7.14	< .001*
	Hemoglobin A1c					
	Sex	0.04	0.05	0.07	0.79	.43
	Age	-0.01	0.02	-0.04	-0.47	.64
	Race	0.06	0.04	0.11	1.34	.19
	BMI	0.01	0.01	0.13	1.47	.15
	LOC Presence	0.06	0.05	0.12	1.39	.17
	STAI-C	0.01	0.004	0.15	1.71	.09
Glucose	Change in SCAF	-0.07	0.13	-0.04	-0.53	.60
	Baseline Glucose	0.41	0.09	0.43	4.38	< .001*
	Sex	2.67	1.17	0.22	2.27	.03*
	Age	-0.49	0.36	-0.12	-1.36	.18
	Race	-1.27	1.04	-0.11	-1.22	.23

BMI	0.22	0.12	0.17	1.89	.06
LOC Presence	0.07	1.11	0.01	0.06	.95
STAI-C	0.02	0.10	0.01	0.15	.88

Note. $*p < .05$. SCAF = Self-Compassion Assessment Form. BMI = Body Mass Index. STAI-C = State Trait Anxiety Inventory – Children. LOC = Loss of Control. HDL = High Density Lipoprotein.

Figures

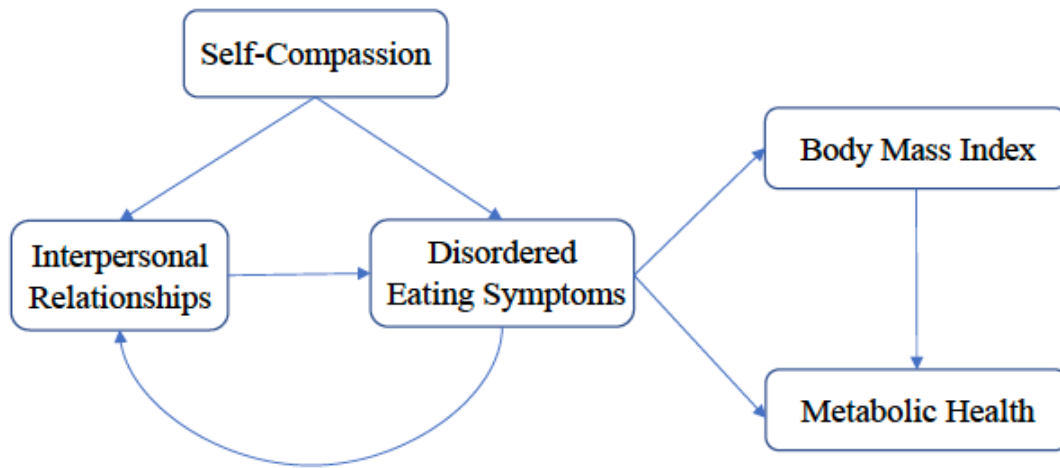
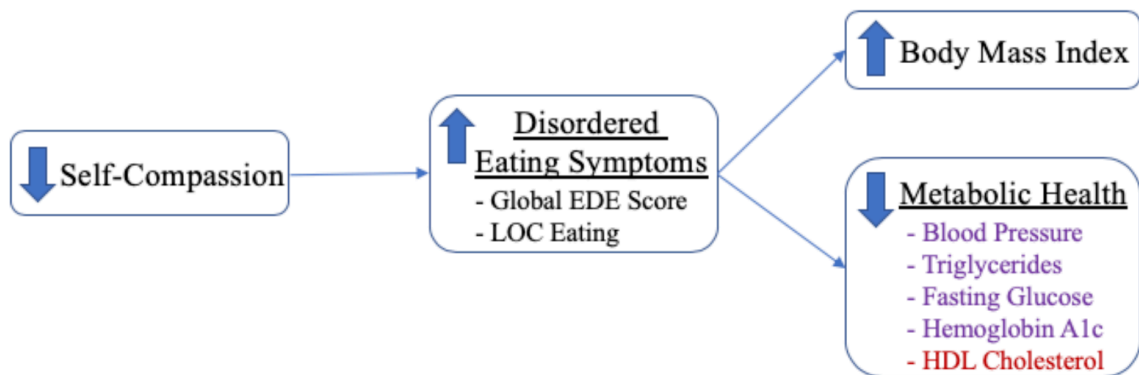


Figure 1. Conceptual Model.

A. Proposed Model for Pre-Intervention Correlates of Study Variables



B. Proposed Model for Post-Intervention Correlates of Study Variables

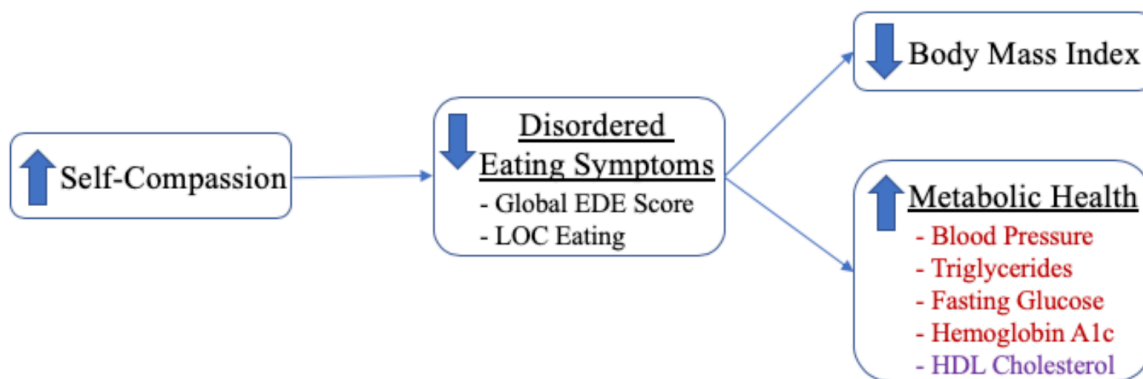


Figure 2. Proposed Model for Correlates of Study Variables.

For Figure A, the downward arrow next to Metabolic Health represents worsening Metabolic Health and will be determined by the variables in purple increasing and the variable in red decreasing. For Figure B, the upward arrow next to Metabolic Health represents improving metabolic health and will be determined by the variables in red decreasing and the variable in purple increasing.

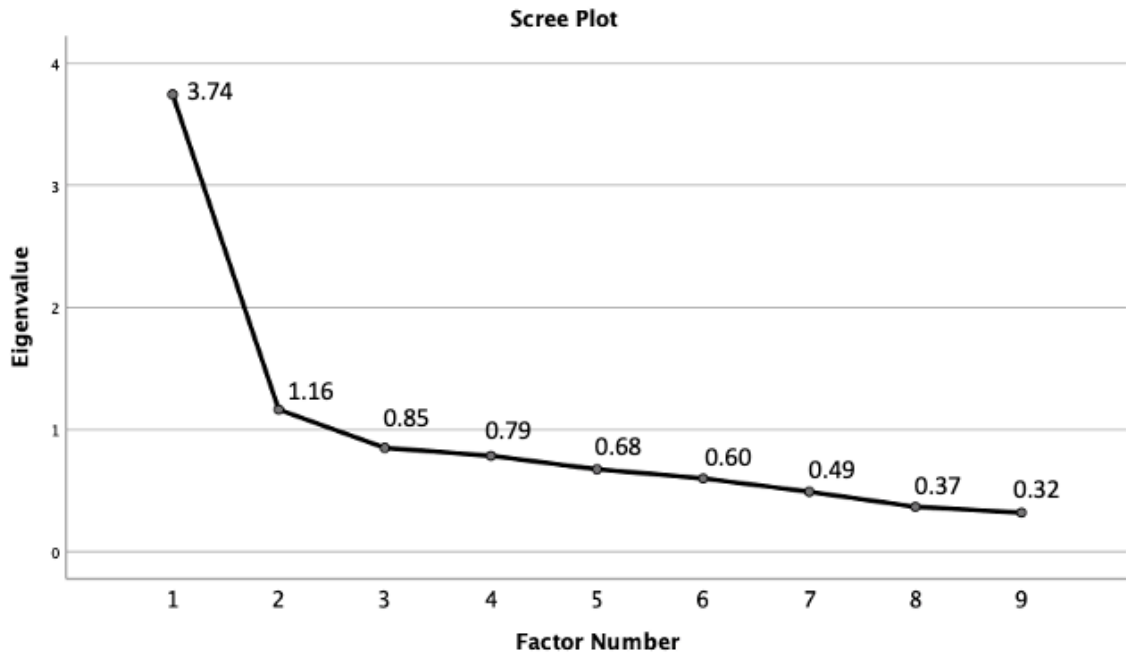


Figure 3. Scree plot used to determine the number of factors retained in the measure. Eigenvalues corresponding to each of the points are listed.