Testing Risk and Protective Pathways between Weight Bias and Psycho-Behavioral Health in Bariatric Surgery Patients: Internalized Weight Bias, Shame, and Self-Compassion

Tosca Braun

University of Connecticut - Storrs, tosca.braun@uconn.edu

Follow this and additional works at: https://opencommons.uconn.edu/dissertations

Recommended Citation


https://opencommons.uconn.edu/dissertations/2204
Testing Risk and Protective Pathways between Weight Bias and Psycho-Behavioral Health in Bariatric Surgery Patients: Internalized Weight Bias, Shame, and Self-Compassion

Tosca D. Braun, Ph.D.
University of Connecticut, 2019

Variable trajectories in psychopathology and weight loss following bariatric surgery have underscored a critical need to identify psychosocial risk and protective factors. Experienced weight bias (EWB, weight-based prejudice) is a risk factor associated with poor psychosocial health in this population, although little research has examined its theorized risk mechanisms, including internalized weight bias (IWB) and shame, or the protective factor of self-compassion, implicated to buffer these sequelae. It is also unknown in any population whether EWB’s adverse sequelae persist after adjusting for the confound of adverse childhood experiences (ACE), important given shared risk trajectories and correlates. The current, cross-sectional study sought to address these gaps in the literature by testing risk and protective pathways between EWB and psycho-behavioral health in 170 bariatric surgery candidates (i.e., pre-operative; 81.4% women, M. BMI = 49.16 kg/m², S.D. = 9.35). A battery of self-report questionnaires assessing dimensions of weight bias, body shame, internalized shame, self-compassion, and psycho-behavioral health (post-traumatic stress symptoms, emotional eating) was aggregated with patient medical chart data (demographics, anxiety, depression). Primary analyses comprised multiple regression and Hayes’ PROCESS macro, serial mediation. Internalized shame emerged the strongest predictor of anxiety, post-traumatic stress, and emotional eating in multiple regression models, and, in risk path models, was the most consistent and proximal mediator of EWB’s indirect effects via IWB on these outcomes. Conversely, IWB was the strongest predictor of depression and the only mediator of EWB’s indirect effects thereon. Protective path models revealed self-compassion to protect against most risk paths; those more self-compassionate reported improved psycho-behavioral health irrespective of preceding sequelae. Results largely retained significance after controlling for ACE. These findings suggest merit in assessing varied etiologies of
EWB/IWB in relation to psycho-behavioral health, and to accounting for ACE in the study of weight bias. They also point to convergences in EWB-related risk and protective sequelae across classes of psychological symptoms and emotional eating, warranting future investigation in prospective designs. Continued elucidation of EWB-related risk and protective factors will inform screening, detection, and treatment targets, with potential to mitigate post-operative risk profiles and enhance health in the bariatric surgery patient population.
Testing Risk and Protective Pathways between Weight Bias and Psycho-Behavioral Health in Bariatric Surgery Patients: Internalized Weight Bias, Shame, and Self-Compassion

Tosca D. Braun

B.A., Reed College, 2008
B.A., SUNY Empire State College, 2011
M.A., University of Connecticut, 2015

A Dissertation
Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy
at the
University of Connecticut

2019
Testing Risk and Protective Pathways between Weight Bias and Psycho-Behavioral Health in Bariatric Surgery Patients: Internalized Weight Bias, Shame, and Self-Compassion

Presented by
Tosca D. Braun, M.A.

Major Advisor __________________________________________________
Amy A. Gorin, Ph.D.

Associate Advisor ________________________________________________
Rebecca M. Puhl, Ph.D.

Associate Advisor ________________________________________________
Diane M. Quinn, Ph.D.

Associate Advisor ________________________________________________
Juliane Fenster, Ph.D.

University of Connecticut
2019
Acknowledgements

The mentors and peers that have contributed to and enriched my matriculation at UConn are too many to cite individually, although I express gratitude to all. Dr. Amy Gorin, thank you for your candid wisdom, and the opportunity to learn from you. You are the forest to my trees, and your encouragement, guidance, and expertise have been tremendously helpful! Dr. Rebecca Puhl, thank you for your wonderful contributions to advance the field of weight bias, without which this study would not exist. I am grateful for your contributing wisdom on my committee, and remain deeply appreciative for your suggestions on the study design and this document. Dr. Diane Quinn, thank you for the inspiration of your Stigma course, the independent study, and your statistical guidance. Your mentorship has shaped my research and will for years to come. Dr. Juliane Fenster, many thanks for your teaching and care throughout my clinical and research training. Your mentoring has shaped me as a clinician, researcher, and person. Dr. Jennifer Ferrand, extending gratitude for your sponsorship of this study and your excellent supervision during my clinical training year. This project would not be here without your unwavering support despite considerable obstacles. Nor would I be the person and clinician I am without your warmth and wisdom having conditioned me.

I want to thank first outside my committee the contributions of Ms. Andrea Stone, an indispensable and adept manager of the study logistics throughout its duration. It is attributable to your diligence, attention to detail, care, and management of study RAs that we met our recruitment benchmark in the allotted timeframe and navigated setbacks/ transitions with ease. Professionally, as well as personally, you have been a deeply appreciated resource and friend the past few years. Many thanks, and you will be greatly missed! This study also would not have happened without the support of the surgeons, Dr. Pavlov Papasavas and Dr. Darren Tishler. Many thanks to you both! A special thank you to study Research Assistants for their notable contributions – Olivia Wilson, Gina Sensale, Nicole Lacasse, Mariana Ward – and to study coordinator Maggie Wise, who has been an invaluable support this last year. Among the other wonderful RAs I had the opportunity to work with at UConn,
a special thank you to Melanie Klinck and Joan Daniels for your excellent contributions to the R34 study.

I am also thankful for all of the wonderful faculty and staff in the psychological sciences department, including Dr. Marianne Barton, whose care, presence, attention, and insight helped everything feel possible, and Dr. Crystal Park, whose mentorship helped shape me as a researcher. Many thanks to lab-mates from the Weight Management and Spirituality and Health labs and my cohort, The Recovery. To Andrea DePetris, whose dear friendship and support has proven a wellspring of support throughout this process, I express heartfelt thanks. Equally to Dr. Kristen Riley, a mentor, colleague and treasured friend, your kindness, collaboration, and wisdom have been appreciated throughout graduate school and beyond.

Outside of UConn, gratitude to my longtime mentor, collaborator, and friend Dr. Sara Lazar, whose work and presence first inspired my career path. Eleven years ago, I couldn't have dreamed all that would transpire and that we would conduct the R34 study together, with all of its twists and turns. I remain humbly thankful for your mentorship, wisdom, and support. Likewise to Dr. Lisa Conboy, my first research mentor, without whom I would not be here today – I’ll remain forever thankful for all that you taught me, and for believing in me! Thank you as well to the Hartford Hospital client who inspired this dissertation – working with you was a gift I will carry always.

To Grandma Fallert – you always believed in my education, and I will be forever grateful. I know you thought this day might never come, but it has! Thank you for your kindly patience. To my dear parents, Cyndi and Steve – thank you for feeding my quest for learning and understanding the world from such a young age. Your faith, love, and acceptance throughout life’s challenges have given me wings, and without them, I wouldn’t be here today. To my siblings – Rachelle, David, Sarah, Jenna, Elena – I cherish you all and am so grateful for your support, as for that of Granny, Grandpa, and all extended relatives. I extend my love to you all. To my beloved Chong, gratitude for the adventure we embarked upon and survived, and your care and support on the path of life we are
sharing together. I love you, and look forward to this next chapter together. Tom and Ok – I love you too, so much. Your presence, love, and support these past few years has touched me deeply.

To my wonderful teachers, Yanai and Catherine, I am so thankful for the opportunity to learn from you both. Your teachings and presence have interwoven every aspect of life these past years in profound and inexplicable ways. Many thanks to my practice as well as friends and colleagues in South Korea, whom were an invaluable resource during this process; Bogwan Sunim, Karen Park, Brian Somers, Mr. Seo, and Professor Min. Thank you to the café at Jogyesa Temple where most of this document was written, and the green tea and *tteok* that fueled it. Warm gratitude likewise to my one-time colleagues and collaborators at Kripalu Center for Yoga and Health’s Institute for Extraordinary Living – Angela Wilson, Steven Cope, Edi Pasalis, and others – who fomented my initial interest in contemplative science, psychology, and behavioral medicine. To Dr. Kristen Neff and Dr. Christopher Germer, thank you for your seminal research and training efforts in the field of self-compassion. And finally, gratitude to the many unmentioned nourishing teachers, mentors, Professors, supervisors, colleagues, and friends that have tilled my soil and helped this come to fruition.

To everyone, I bow in gratitude. Thank you – it really does take a village.
# Table of Contents

Acknowledgments ........................................................................................................ iv-vi

Table of Contents ........................................................................................................ vii

List of Tables ................................................................................................................ viii

List of Figures ................................................................................................................ ix

Introduction .................................................................................................................. 1

Review of the Literature ................................................................................................ 4
  Mental Health in Bariatric Surgery Patients
  Psychosocial Risk and Protective Factors
  Adverse Childhood Experiences

Present Study .................................................................................................................. 32

Methods ......................................................................................................................... 33
  Participants and Procedure
  Measures
  Data Analysis

Results ............................................................................................................................... 41
  Preliminary Analyses
  Demographic Characteristics
  Descriptive Statistics of Main Study Variables
  Multiple Regression Models
  Serial Mediation Models
    Risk pathway models
    Protective pathway models

Discussion ..................................................................................................................... 53
  Study Findings
  Strengths and Limitations
  Future Directions
  Concluding Remarks

References ...................................................................................................................... 89

Tables ............................................................................................................................. 121

Figures .......................................................................................................................... 131
List of Tables (pp. 122 – 131)

Table 1. Sociodemographic sample characteristics

Table 2. Descriptive statistics and intercorrelations for main study variables

Table 3. Anxiety symptom PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 4. Depressive symptom PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 5. Post-traumatic stress symptom PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 6. Emotional eating PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 7. Anxiety symptom PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 8. Depressive symptom PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 9. Post-traumatic stress symptom PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)

Table 10. Emotional eating PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs)
List of Figures (pp. 132 – 140)

Figure 1. Tylka et al.’s (2014) theoretical model of weight bias

Figures 2a – 5b. PROCESS serial mediation results for risk path models; a models control for adverse childhood factors (ACE), b models do not

Figures 2a – b. Risk path models of anxiety symptoms

Figures 3a – 3b. Risk path models of depressive symptoms

Figures 4a – 4b. Risk path models of post-traumatic stress symptoms

Figures 5a – 5b. Risk path models of emotional eating

Figures 6a – 9b. PROCESS results for protective path models; a models control for ACE, b models do not

Figures 6a – 6b. Protective path models of anxiety symptoms

Figures 7a – 7b. Protective path models of depressive symptoms

Figures 8a – 8b. Protective path models of post-traumatic stress symptoms

Figures 9a – 9b. Protective path models of emotional eating
Introduction

Among individuals with extreme obesity, bariatric surgery is the most effective treatment currently available for weight loss and resolution of obesity-related comorbidities (Buchwald et al., 2004; Chang et al., 2014; Sjöström et al., 2004). Recent evidence has documented an increased risk of psychopathology, substance use, and self-harm in some patients (Bhatti et al., 2015; Kanji, Wong, Aikioyamen, Melamed, & Taylor, 2019; Kovacs, Valentin, & Nielsen, 2016; Neovius et al., 2018) and variable post-surgical weight loss trajectories that may implicate these factors (Karmali et al., 2013). Of greatest concern, a recent meta-analysis of 148,643 bariatric surgery patients observed an alarming 24-fold increased risk of suicide relative to the general population (Castaneda, Popov, Wander, & Thompson, 2019). Such findings have led to an increased urgency for research to better understand and address the psychosocial risk factors that contribute to these post-surgical sequelae (Dixon, 2016; Spittal & Frühbeck, 2018). Poor pre-operative psychiatric and behavioral (psycho-behavioral) health are among the factors shown to contribute to analogous post-operative decrements (Bhatti et al., 2015; de Zwaan et al., 2010) and variable weight losses (Kalarchian et al., 2008; Zwaan, Enderle, Wagner, Mühlhans, & Ditzen, 2011), implicating the etiology that fosters both as an important focus of investigation. Better understanding the chain of contributing risk factors will support the development of theory and interventions to improve screening, detection, and treatment targets for enhanced post-operative psychosocial health and weight loss.

Experiences of weight bias (i.e., experiences of weight-based stigmatization, discrimination, or prejudice; EWB) constitute a psychosocial risk factor that has documented myriad associations with poor psycho-behavioral health in bariatric surgery patients (Lent et al., 2014; Raves, Brewis, Trainer, Han, & Wutich, 2016). Yet theory (Puhl & Brownell, 2006) and preliminary evidence suggests that EWB is not always affiliated with poor health outcomes (e.g., Pearl, Puhl, & Dovidio, 2014), generating conjecture that the presence of other risk or protective factors among individuals in a given sample may better explain EWB’s effects. EWB can be internalized as negative and harsh
weight-related self-appraisals (i.e., internalized weight bias; IWB), implicated in turn to contribute to body shame and poor mental and behavioral health. Tylka and colleagues (2014) recently proposed a theoretical model positing serial linkages between EWB, IWB, body shame, and decreased psychological and physical well-being (Figure 1), reflecting an overall increase in models seeking to explain the mechanisms through which EWB affects health (Hunger, Major, Blodorn, & Miller, 2015; Ratcliffe & Ellison, 2015; Sikorski, Luppa, Luck, & Riedel-Heller, 2015; Tomiyama, 2014; Webb & Hardin, 2015). Such theories follow on the earlier observations of Puhl and Brownell (2001) and others that stigmatizing experiences may engender factors related to IWB and body shame, with the interaction between these variables likely to engender myriad poor health outcomes (e.g., Annis, Cash, & Hrabosky, 2004; Conradt et al., 2008; Friedman et al., 2005; Womble et al., 2001).

Other evidence suggests that weight or body-related shame stemming from EWB may generalize to internalized (i.e., more generalized, global, dispositional) shame, a sense of the whole self as defective or devalued. Demonstratively, Lewis and colleague’s (2011) qualitative study with bariatric surgery patients suggested that self-blame is a common response to EWB, which extrapolates in turn to IWB, body shame, and then internalized shame, negative affect, and action (i.e., behavior) in a serial sequence: “When someone says something negative towards you about what you look like, then for the whole day and into the next that is exactly how you portray yourself. You get down. That is how you feel and that is how you act” (p. 1354). Australian adults with overweight/obesity have also reported believing themselves deserving of weight-related prejudice, inferring the presence of both body and internalized shame (Lewis et al., 2011).

Internalized shame has been associated with poor psychological and physical health (Kemeny et al., 2004) and been studied in relation to a broader array of concerning outcomes than body shame, including self-harm, substance use, and suicidality (Gilbert et al., 2010; Kölves, Ide, & De Leo, 2011; Vanderhei, Rojahn, Stuewig, & McKnight, 2014). Studies have documented associations between internalized shame and poor behavioral coping strategies of post-operative concern in
bariatric surgery patients, including eating pathology (Woodward, McIlwain, & Mond, 2017), substance use (Cook, 1988), and self-harm (Mahtani, Melvin, & Hasking, 2018). As such, internalized shame may represent a powerful mechanism for the deleterious effects of weight bias on psycho-behavioral health. Although comparatively little research has examined internalized shame in the context of weight bias or behavioral medicine, there is inferential support for its role as a risk mechanism. Research has implicated shame as the most common emotion persons with obesity experience in response to social ostracism (Westermann, Rief, Euteneuer, & Kohlmann, 2015), and there are conceptual parallels between certain weight bias coping strategies (e.g., crying/isolation, negative self-talk) and internalized shame.

These data provide inferential support for the theory that internalized shame may more strongly and proximally mediate the effects of EWB on psycho-behavioral health through IWB than body shame in bariatric surgery patients. While some research has examined affiliations between internalized shame and body shame in relation to eating pathology, little has tested both constructs in relation to mental health, and none whether internalized shame may be a stronger or more proximal mediator than might body shame of the effects of EWB and IWB. Further, no empirical evidence has assessed whether EWB-related body shame is associated with more global attributions of shame.

Theory and preliminary evidence suggest that these sequelae may be partially mitigated by protective factors such as self-compassion, an adaptive coping and emotion regulatory strategy (Tylka et al., 2014). Self-compassion and related factors have been implicated as disrupting the mediational chain through which EWB, IWB, body shame, and related factors may operate (Braun, Park, & Gorin, 2016; Hilbert et al., 2015; Tylka et al., 2014). To date, however, very little research has tested self-compassion as protective against EWB-related risk pathways, and variable findings on presently-studied protective factors of these linkages underscore a critical need for continued investigation to inform prevention and treatment efforts. Finally, little has examined whether the effects of EWB remain after accounting for adverse childhood experiences (i.e., childhood trauma,
victimization) similarly linked to obesity, shame, and poor psychological and behavioral health. Given shared etiologies, better understanding the unique variance accounted for by EWB, after controlling for ACE, will afford more specificity in related models and future research.

At present, little research has examined models of weight bias in bariatric surgery patients, or the intrapersonal factors that may mechanistically facilitate or ameliorate affiliations between EWB and poor psycho-behavioral health in this population. This knowledge is important to inform screening, detection, and treatment targets and enhance post-operative endpoints. Here we present a theoretical and empirical review that extends extant models of weight bias to include internalized shame and the protective factor of self-compassion in the bariatric surgery population. We then report findings of a cross-sectional study in a sample of weight loss surgery candidates that serves as an exploratory test of this theoretical model.

Review of the Literature

Mental Health in Bariatric Surgery Patients

Prevalence of psychopathology. Prevalence rates of lifetime and current psychiatric disorders are elevated among bariatric surgery patients when compared to the U.S. general population and population of treatment-seeking persons with obesity (Malik, Mitchell, Engel, Crosby, & Wonderlich, 2014). In studies using diagnostic interviews, estimated lifetime prevalence rates of DSM-IV (American Psychiatric Association, 1994) Axis I disorders in U.S. samples have ranged from 50.5% (Jones-Corneille et al., 2012) to 66.6% (Kalarchian et al., 2007). A recent review of psychopathology in this population observed affective disorders to be the most common category of lifetime disorders among bariatric surgery patients, and major depressive disorder as the most frequent lifetime diagnosis (Malik et al., 2014). Anxiety disorders were the most common current psychiatric disorder across most studies. Illustratively, Kalarchian and colleagues (2007) found mood disorders to be the most common category of lifetime disorder (45.5%, predominantly Major Depressive Disorder) and anxiety disorders the most common pre-operatively (24%).
A recent meta-analysis documented a 1-2% prevalence of Post-Traumatic Stress Disorder (PTSD) in the bariatric surgery population (Dawes et al., 2016), consistent with rates in the general population. Yet some studies have observed elevated lifetime rates of PTSD (11.5% for U.S. samples, and 8.9% for German; Malik et al., 2014) compared to the general population and treatment seeking people with obesity, with a pre-surgical prevalence of 2.8% observed in one U.S. sample (Kalarchian et al., 2007). Lower rates in the meta-analysis may be attributable to the inclusion of data collected at the psychological evaluation for surgery, when patients have been shown to under-report symptoms (Ambwani et al., 2013; Malik et al., 2014; Rosik, 2005). Research comparing unstructured diagnostic interviews in the psychological evaluation for bariatric surgery to structured diagnostic interviews performed independent of the surgical program in the same pre-bariatric sample observed current PTSD twice as likely, and lifetime PTSD four times as likely, when assessed by independent raters (Mitchell et al., 2010). It is also possible that the lower current rates of PTSD observed in some samples may be attributable to poor health behaviors that self-medicate and mask PTSD symptoms, such as binge eating or alcohol misuse, as suggested by the self-medication hypothesis (e.g., Brewerton, 2011; Turner, Mota, Bolton, & Sareen, 2018). Studies observing elevated lifetime rates of PTSD generally align with findings that childhood psychological trauma is prevalent in the bariatric surgery population.

Last, eating to soothe difficult affect, of which emotional and binge eating are a class, is common in bariatric surgery candidates, among whom an average of approximately 25% report binge eating (with rates ranging from 14% to 55.9%; Meany, Conceição, & Mitchell, 2014;), rates of any eating disorder are observed elevated (Kalarchian et al., 2007), and up to 40% report emotional eating (Guerdjikova et al., 2007; Mitchell, Crosby, De Zwaan, Engel, & Roerig, 2013; Walfish, 2004). In addition, other maladaptive eating behaviors have been noted, including night eating syndrome, grazing, eating without hunger, and addictive eating behavior (Herpertz, Kessler, & Jongen, 2017).
**Effects of bariatric surgery on psychopathology.** Earlier research observed psychopathology to improve following bariatric surgery (e.g., Dixon, Dixon, & O’Brien, 2001; Hafner, Rogers, & Watts, 1990; Kodama et al., 1998; Larsen, 1990), inferring that an emphasis on pre-operative mental health may have limited utility. Yet recent reviews have found that improvements in psychological health and eating pathology observed in the early months following bariatric surgery appear to attenuate over a longer follow-up period (Meany, Conceição, & Mitchell, 2014; Switzer, Debru, Church, Mitchell, & Gill, 2016). This indicates pre-operative psychopathology remains an important topic of research, particularly given its strong associations with a host of concerning post-operative outcomes.

**Pre-operative psychopathology as predictive of post-operative outcomes.** Compelling research suggests an association between pre- and post-operative psychopathology (e.g., Kalarchian et al., 2008; Mitchell et al., 2014). Recent reviews have concluded pre-operative psychopathology is a risk factor for post-operative substance use (Kanji et al., 2019), non-suicidal self-harm, and suicidality (Castaneda et al., 2019), and population-based studies offer strong support for these conclusions. A recent analysis found pre-operative psychopathology accounted for nearly all instances of post-operative self-harm emergencies in a population-based, self-matched, longitudinal study of Canadian bariatric surgery patients (Bhatti et al., 2015). In a second population-based prospective trial in Sweden, a sub-group analysis found that patients with pre-operative depression had a higher incidence of post-operative suicide events relative to those without such a history (Neovius et al., 2018). Regarding weight loss and energy balance behaviors, some patients with pre-operative eating pathology have been shown to develop problematic eating behaviors post-operatively (de Zwaan et al., 2010; Meany et al., 2014). Such observations are corroborated by prospective research that has found pre-operative psychopathology associated with attenuated post-operative weight loss (de Zwaan et al., 2011; Hemmingsson, Johansson, & Reynisdottir, 2014; Kalarchian et al., 2008; Lodhia et al., 2015).
However, not all evidence links pre-operative psychiatric status to post-operative mental health or weight loss. In recent, population-based studies, even after accounting for baseline psychiatric status, bariatric surgery patients evidenced an increased post-operative risk of psychopathology, psychiatric service utilization, emergency room visits, substance use, and non-suicidal self-harm. These include a retrospective trial that employed case control and self-matched analyses in Denmark (Kovacs et al., 2016) and the cited Swedish study which followed two cohorts, comparing bariatric surgery patients to usual care patients in cohort 1, and gastric bypass patients to those treated with intensive lifestyle modification in cohort 2 (Neovius et al., 2018). A recent meta-analysis concluded there is currently inconsistent evidence to determine whether a relationship exists between pre-operative mental health conditions and post-operative psychopathology or weight loss (Dawes et al., 2016).

**Anxiety and depressive symptoms.** Dawes et al. (2016) concluded moderate improvements in depression, but not anxiety, are observed following bariatric surgery. However, most studies in this meta-analysis followed patients no longer than three years post-operatively. Of three studies with a longer follow-up period of nine or ten years, two suggested a different pattern. Despite shorter-term improvements in rates of anxiety and depression following bariatric surgery, by nine years post-operatively, a return to or exceeding of baseline symptoms was observed (Herpertz et al. 2015; Canetti et al. 2016). In bariatric surgery candidates, depression and anxiety have been associated with pre-operative eating pathology (Malik et al., 2014), while depression has been associated with suicidality and non-suicidal self-harm (Adamowicz, Salwen, Hymowitz, & Vivian, 2016; Lagerros, Brandt, Hedberg, Sundbom, & Bodén, 2017).

While heterogeneous results characterize the literature on whether pre-operative anxiety and/or depression predict post-operative psycho-behavioral health and weight loss (Herpertz, Kessler, & Jongen, 2017), depression has been implicated as particularly key in the emergence of post-operative psychopathology and risk behaviors. A recent, population-based Swedish study of all
patients who underwent bariatric surgery found pre-operative depression to predict substantially greater post-operative depression and self-harm behavior, including suicide (Lagerros et al., 2017). This is consistent with the cited findings of Neovius et al. (2018) that Swedish bariatric surgery patients with pre-operative depression were more likely to commit suicide than were those without such a history, and with Mitchell et al.’s (2014) finding that U.S. patients in a national study with pre-operative depression experienced higher rates of post-operative adverse events. Despite generally mixed findings, these data suggest pre-operative anxiety, depression, and related mechanisms may plausibly contribute to adverse post-operative sequelae. It is possible that inconsistent findings are partially related to the lack of measurement of underlying mechanisms. Elucidating risk and protective paths that contribute to pre-operative anxiety and depressive symptoms in bariatric surgery patients thus remains an important focus of research.

**Post-traumatic stress symptoms.** To our knowledge, no research has yet examined the impact of bariatric surgery on PTSD or post-traumatic stress symptoms. A recent review concluded that traumatic event exposure, severity of traumatization, and PTSD are non-predictive of post-operative weight loss or mental health, at least in the shorter-term follow-ups it has been studied to date, although some evidence suggests increased vulnerability to post-operative decrements in mental health among traumatized patients (Herpertz et al., 2017). Contributing factors to the inconsistency of associations include relatively short-term follow-up periods of one to two years, greatly limiting inference, and over-reliance on data collected at the psychological evaluation for surgery (Mitchell et al., 2010). Trauma history in this population, particularly childhood maltreatment, has been associated with obesity, suicidality, increased incidence of psychiatric disorders prior to and following surgery, and post-operative psychiatric hospitalizations (Mitchell, Crosby, et al., 2013; Wildes, Kalarchian, Marcus, Levine, & Courcoulas, 2008). Recent research suggests patients with a greater history of child abuse and a lifetime diagnosis of PTSD evidence greater overall impairment in psychiatric disorders, health behaviors, eating pathology, and other factors (Walsh, Rosenstein,
Dalrymple, Chelminski, & Zimmerman, 2017). To our knowledge, no research to date has examined the mechanisms underlying symptoms of post-traumatic stress in this population, an important step with treatment implications. Further, much remains to be understood regarding the etiology of pre-operative post-traumatic stress symptoms and their underlying mechanisms in bariatric surgery patients.

**Emotional eating.** Bariatric surgery is linked to improvements in poor eating behaviors, of which emotional eating is a class, although emerging evidence suggests a subset of patients with pre-operative eating pathology are at increased risk of maladaptive eating behaviors when followed longer-term (Meany et al., 2014; White,Kalarchian, Masheb, Marcus, & Grilo, 2010; Wimmelmann, Dela, & Mortensen, 2014). While findings are mixed regarding whether self-reported pre-operative emotional eating predicts post-operative weight loss (e.g., Busetto et al., 2002; Wedin et al., 2014), emotional eating has been implicated in problematic post-operative eating behaviors, including graze eating (Colles, Dixon, & O’Brien, 2008; Poole et al., 2005; Saunders, 2004), uncontrolled overeating (Larsen et al., 2006, 2004; Mathus-Vliegen, 2007; Rusch & Andris, 2007), and snack eating (Dziurowicz-Kozlowska, Wierzbicki, Lisik, Wasiak, & Kosieradzki, 2006; Rusch & Andris, 2007). One possible reason for inconsistent findings on emotional eating, aside from the known limitations of self-reported eating behaviors (Bongers & Jansen, 2016; Parker, O’Brien, & Brennan, 2014), is the inconsistent measurement of underlying mechanisms, an important topic of investigation.

**Review of mental health in bariatric surgery patients.** The reviewed evidence suggests that baseline psychological status may predict the emergence of post-operative psychiatric symptoms and disorders including substance use, self-harm, and suicidality, as well as eating pathology and variability in weight loss and medical complications. These findings have recently been complemented by larger-scale studies that suggest that additional factors are likely to play a role, as baseline psychiatric status does not fully account for post-operative variances in psychopathology or weight loss. Hence, calls in the field have increased to examine other, unmeasured factors – for
example, pre-operative psychosocial characteristics – that may catalyze adverse post-operative sequelae, and thus represent targets for prevention, screening, detection, and treatment (Dixon, 2016; Homer, Tod, Thompson, Allmark, & Goyder, 2016; Lindekiilde et al., 2015; Spittal & Frühbeck, 2018).

Psychosocial Risk and Protective Factors

Weight bias.

*Experienced Weight Bias (EWB).* Weight bias – commonly termed weight stigma, and referring to experiences of weight-based discrimination, teasing, or unfair treatment – is a psychosocial factor strongly associated with poor mental health among bariatric surgery candidates (Rosenberger, Henderson, Bell, & Grilo, 2007). Weight bias is experienced disproportionately among persons with obesity (Hatzenbuehler, Keyes, & Hasin, 2009). Up to 100% of U.S. bariatric surgery patients have reported a recent (Friedman, Ashmore, & Applegate, 2008) and more than 50% a childhood history of weight-based victimization (Rosenberger et al., 2007), with other samples reporting a frequency of (Sarwer, Fabricatore, Eisenberg, Sywulak, & Wadden, 2008). By comparison, in a recent meta-analysis, prevalence rates of reported weight bias in non-bariatric samples with extreme obesity are 41.8%, and 19.2% in class I obesity (Spahlholz, Baer, König, Riedel-Heller, & Luck-Sikorski, 2016). Rates of weight bias in nationally representative and large U.S. samples are also substantially lower than the 100% observed in Friedman et al.’s (2008) study (Hatzenbuehler et al., 2009; Himmelstein, Puhl, & Quinn, 2017).

In U.S. bariatric surgery samples, EWB has been associated with multiple indices of poor psychosocial health in primarily cross-sectional studies. These include psychological distress, depression, body dissatisfaction, lower self-esteem, weight and shape concerns, shame, poorer health-related quality of life, maladaptive coping responses, poor post-surgical dietary adherence, and greater obesity (Fettich & Chen, 2012; Myers & Rosen, 1999; Raves et al., 2016; Rosenberger et al., 2007; Sarwer et al., 2008). Research has suggested that the relationship between EWB and
depressed mood may persist in this population even after accounting for BMI, binge eating, and weight-related physical disability (Chen et al., 2007). Notably, not all research has observed EWB predictive of hypothesized outcomes in the bariatric population. Rosenberger and colleagues (2007) did not observe associations between frequency of weight-based childhood teasing frequency and frequency of lifetime psychiatric disorders or binge eating in a small sample of bariatric surgery candidates, and one large retrospective study did not observe EWB predictive of post-operative weight loss, although this trial had some methodological limitations (Raves et al., 2016).

Variability in outcomes related to EWB. While these findings indicate that EWB is generally associated with poor psychological and behavioral health among bariatric surgery patients, some mixed findings suggest sample-related and individual variability that may be accounted for by the presence of more proximal, unmeasured risk or protective factors. Puhl and Brownell (2006) postulated that the ways in which individuals respond to and cope with stigmatizing situations, rather than the situations themselves, are more likely to predict subsequent psycho-behavioral health. Some persons may thus be more vulnerable to internalizing the messages of EWB and experience subsequent IWB, shame, and psychological distress, which in turn may drive maladaptive efforts to cope through poor health behaviors such as eating. For instance, Himmelstein et al. (2018) found that coping response to weight bias predicted psycho-behavioral health in a large national sample. This cyclical sequence has been hypothesized to engender physiological reactivity and weight gain (Tomiyama, 2014; Tylka et al., 2014).

Conversely, others may have protective characteristics related to adaptive emotion regulation and coping strategies (e.g., secure attachment, self-esteem, social support, self-acceptance, self-compassion) and be (a) less likely to experience internalization of weight bias and subsequent effects, and/or (b) be buffered from the cyclical nature of these sequelae on health even in the presence of internalization and shame (Tylka & Kroon Van Dienst, 2015). As suggested by Himmelstein et al.’s (2018) study, variance in the prevalence of protective factors in a given sample may account for cited
results that appear contrary to hypothesis. Identifying the risk and protective mechanisms of EWB’s effects is critical to inform theory-based research and weight bias mitigation efforts in preventive, public health, and medical settings. Such research will also inform development of interventions to enhance post-operative outcomes in bariatric surgery patients.

**Internalized weight bias.** Experiences of weight bias are internalized among some people who implicitly identify, or cognitively fuse, with interpersonally and/or socioculturally-construed stereotypic attributions regarding their weight status, resulting in self-blame. Internalized weight bias has been defined as (a) awareness of negative prejudices about one’s weight status; (b) belief in the validity of weight-related prejudices; (c) application of weight-related prejudices towards oneself; and (d) self-devaluation related to one’s weight status (Pearl & Puhl, 2018). Internalized Weight Bias (IWB) is more prevalent among people of higher BMI when compared to a broad range of body weights (Pearl & Puhl, 2018), with several studies indicating that EWB predicts IWB in U.S. samples (O’Brien et al., 2016; Schafer & Ferraro, 2011; Schvey, Barmine, et al., 2017; Schvey, Sbrocco, et al., 2017). Paralleling characteristics observed in the bariatric surgery population (e.g., Neovius et al., 2018), those with the highest levels of internalization across three U.S. samples, including a national sample, reported more prior experiences of weight bias, higher BMI, lower income and education, and were currently trying to lose weight (Puhl, Himmelstein, & Quinn, 2018).

Mirroring the broader literature, research in bariatric surgery patients generally associates IWB with poor psychosocial health. In samples of German pre-bariatric surgery candidates, IWB has been associated with emotion dysregulation, emotional eating, food addiction, and lower weight-specific quality of life (Baldoński et al., 2015; Claudia Hübner et al., 2016). Prospective studies suggest IWB or related constructs predict post-operative outcomes. Among U.S. women who lost more, but not less, weight post-operatively, fear of negative evaluation by others (a construct inferring the presence of IWB as well as the related construct of anticipated weight bias; Brenchley & Quinn, 2012) was associated with greater depression and poorer quality of life four years post-
operatively (Adams, Myers, Barbera, & Brantley, 2011). Pre-operative IWB was associated with pre-operative depression symptoms and less weight loss at 12-months post-surgery in a U.S. sample, suggesting the presence of poor energy balance behaviors and/or coping mechanisms (Lent et al., 2014). Supporting this conceptualization, in a U.S. sample of individuals who underwent bariatric surgery within the last five years, exercise avoidance motivation mediated the association between both EWB and IWB, and physical activity (Han, Agostini, Brewis, & Wutich, 2018). Other studies have observed null findings. In the previously-cited retrospective trial with adults, IWB, like EWB, was unrelated to post-surgery weight loss (Raves et al., 2016).

**IWB as a facilitator of the effects of EWB.** To date, no research has examined whether IWB facilitates the effects of EWB on psycho-behavioral health in bariatric surgery patients. Studies that sample persons with overweight/obesity provide inference for this relationship, including a U.S. analysis that found IWB a stronger predictor of psychological distress and poor behavioral health than EWB (Papadopoulos & Brennan, 2015). In other studies from the U.S., IWB has been associated with lower weight loss maintenance after controlling for EWB in a separate analysis of the previously reported national sample (Puhl, Quinn, et al., 2017), and observed a stronger predictor of higher BMI and poorer physical health-related quality of life when compared to EWB in a small sample of women with obesity (Latner, Barile, Durso, & Brien, 2014). The strongest such evidence stems from an online experimental trial conducted with adults with overweight/obesity, in which IWB induced greater negative affect, less positive affect, and lower self-esteem than did EWB alone (Pearl & Puhl, 2016).

In cross-sectional studies, generally consistent with theorized models, IWB has been found to mediate the effects of EWB on binge and emotional eating (Durso, Latner, & Hayashi, 2012; O’Brien et al., 2016) and exercise behaviors (Pearl et al., 2014). Despite a positive direct association of EWB with exercise behavior in the latter study among women with overweight/obesity, IWB partially mediated *lower* exercise behavior, suggesting it accounts for greater variance in maladaptive
health behavioral outcomes when compared to EWB alone (Pearl et al., 2014). Taken together, these findings generally indicate that while EWB and IWB are both affiliated with poor psychosocial health, IWB may mediate the effects of EWB thereupon. Where inconsistent findings occur, the variable prevalence of unmeasured risk factors in a given sample may contribute. Shame, for instance, may be one such factor. Contextualized in the broader stigma and shame literature, IWB can be understood as a multifaceted construct that blends elements of stigma consciousness (i.e., awareness of being seen as embodying stigmatized traits; Pinel, 1999) with body shame (i.e., perceptions that one’s body is undesirable, unwanted, or unattractive; Gilbert, 2007) and internalized shame (i.e., viewing oneself as bad, inadequate, or disgusting; Cook, 1988). The extent to which individuals in a given sample experience different valences of these constructs has implications for psycho-behavioral health and treatment.

**Shame.**

Central to the experience of shame are cognitions and/or feelings of the self as defective, inadequate, disgusting and flawed, in relation to one’s social group and/or to oneself (Gilbert, 2009). Both a personal experience (i.e., to feel ashamed) and an interpersonal process (i.e., construed via acts of stigmatizing and shaming) comprising “a complex set of feelings, cognitions, and actions … whose exact complexion can vary from person to person,” the primary behavioral manifestation of shame is one of avoidance and withdrawal (Gilbert, 2007b, pp. 3, 6; Tangney & Dearing, 2002). Paralleling recent weight bias models that stipulate shame as a key risk mechanism of the adverse effects of experienced and internalized stigma (Tomiyama, 2014; Tylka et al., 2014), a major theoretical paradigm with substantial empirical support, Compassion-Focused Therapy, views shame as a core maintenance process in disordered eating and other psychopathologies (Gilbert, 2009; Gilbert, 2014; Goss & Allan, 2011). Robust debate and diversity of orientations characterizes the literature on shame (Gilbert, 1998). Here, we review literature with greatest relevance to theoretical
models of weight bias, with attention to how specific dimensions of shame related to EWB and IWB may more proximally indicate risk for poor psychosocial health.

**General etiology and conceptualization of shame.** Experienced in a particular moment and context, the emotion of shame (i.e., “state” shame) is elicited under conditions that evoke a sense of thwarted belonging – through experiences of social identity threat, discrimination, trauma, and/or failing to match external standards, as is commonly experienced in critical caregiver relationships (Dickerson, Gruenewald, & Kemeny, 2004; Gilbert, Allan, & Goss, 1996; Taylor, 2015). When repeated over time, these experiences can be internalized and engender the disposition to feel shame (i.e., “trait” shame, or shame-proneness; Tangney, Wagner, & Gramzow, 1989). In U.S. and international samples, both state and trait shame have been implicated as key affective mechanisms of adverse psychological and behavioral sequelae in populations that experience social exclusion (e.g., Bennett, Traub, Mace, Juarascio, & O’Hayer, 2016; Mason & Lewis, 2016), including persons with obesity (Conradt et al., 2008; Homer et al., 2016; Lewis et al., 2011). Notably, while studies have implicated IWB and/or shame as mediating the linkages between factors related to EWB and health, we are unaware of any studies that have examined whether such effects are better attributable to IWB or the related, more proximal variable of shame, an important focus of investigation.

**Differentiating forms of shame in current weight bias models.** Shame is indicated as a risk mechanism in recent weight bias models. In Tylka et al.’s (2014) model (Figure 1), body shame is posited as a key link between IWB and psychosocial health. This shares parallels with Tomiyama’s (2014) Cyclic Obesity/Weight-Based Stigma (COBWEBS) model, which postulates that shame stemming from weight bias maintains the positive feedback loop whereby weight bias facilitates weight gain via enhanced cortisol secretion. While Tomiyama’s (2014) conception of shame appears broader than body shame, the COBWEBS model predominantly infers weight- or body-specific shame as most salient, with shame referenced as increasing in response to sociocultural beauty norms and overeating. COBWEBS, like Tylka’s model, renders no clear/conceptual distinction or temporal
ordering between weight/body specific shame and other forms, such as internalized or dispositional shame, that may better explain a broader range of poor outcomes following EWB and IWB.

Given the well-documented, far-reaching, and deleterious effects of this affect, and suggested treatment implications for the different affects around which shame may constellate (Gilbert, 2007), differentiating its variance from EWB/IWB in weight bias models may better specify the pathways through which EWB and IWB affect psychosocial health, and related treatment targets. Some research has examined whether different forms of shame, for example, situational or context-specific shame (e.g., body shame) compared to shame in a more global sense (e.g., internalized shame), differentially predict eating pathology and depression. Body shame has been found a stronger predictor of disordered eating compared to internalized shame in some studies (Burney & Irwin, 2000; Troop & Redshaw, 2012), although others have found body shame to account for similar variance (Doran & Lewis, 2012). Body vs. internalized shame may predict varied psychosocial health outcomes following EWB and IWB, with parallel considerations for treatment and intervention development in bariatric surgery patients.

**Body Shame.** Body shame, most commonly conceived and studied as a risk factor for eating pathology and depression, is theorized to stem from internalization of sociocultural appearance norms and/or experiences of trauma or victimization (e.g., thin ideal; Fredrickson & Roberts, 1997; Noll & Fredrickson, 1998; Stice & Shaw, 1994).

*Body shame as a facilitator of the effects of IWB.* Like IWB, body shame is broadly linked with poor psychosocial health, including depressive, anxiety, and stress symptoms, and disordered eating across diverse body weight statuses (Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015; Duarte & Pinto-Gouveia, 2016, 2017; Duarte, Pinto-Gouveia, & Ferreira, 2014; Gilbert, 2007; Moradi & Huang, 2008). Evidence confirms body shame to stem from internalization of an outsider’s judgments or evaluations of one’s body (Fredrickson & Roberts, 1997; Gilbert, 2007; McKinley & Hyde, 1996; Moradi & Huang, 2008). As such, body shame shares substantive theoretical parallels...
with IWB. The most cited measure of weight bias – the Weight Bias Internalization Scale (WBIS) – includes items that strongly relate to body shame (e.g., “I hate myself for being overweight”; “My weight is a major way that I judge my value as a person”; Durso & Latner, 2008). IWB and body shame have been associated in a German sample of treatment-seeking persons with obesity (Hain et al., 2015), while body shame has been associated with distress related to recollection of a situation in which a second sample of German persons with obesity were made aware of their weight, with the most common recollection comprising negative evaluations from others and oneself (Conradt et al., 2008). Despite this congruence, some evidence supports conceptualizing IWB and body shame as distinct constructs as posited in Tylka’s (2014) model.

To date, three U.S. studies have tested the hypothesis that body shame mediates the link between IWB and health-related endpoints (Figure 1) in non-bariatric surgery samples. In the first, body shame did not mediate the link between IWB and intuitive eating in female undergraduates after accounting for other mediators, although the variables were affiliated on the bivariate level (Webb & Hardin, 2015). A second study in female undergraduates found body shame to mediate the link between IWB and engaging in interpersonal “fat talk” (Webb, Fiery, & Jafari, 2016), and a third observed IWB and body shame to serially mediate the links between BMI and both healthcare stress and avoidance in women sampled from a health-panel database (Mensinger, Tylka, & Calamari, 2018).

**Internalized shame.** Internalized shame was first described by Kaufman (1989) as comprising a ‘shame-bound’ personality or ‘shame-based identity,’ a conceptualization drawn from Tomkins’ (1963) affect theory. Theorized to occur as a result of repeated shaming experiences, particularly from childhood, internalized shame was understood to develop based on “internal representations of the expression of affects, interpersonal needs, drives and competencies [that] become linked with representations of shame” (Leeming & Boyle, 2004, p. 3). Consequent of shaming experiences, Kaufman (1989) theorized the child to cognitively fuse their affects,
interpersonal needs, drives, and competencies with shame, engendering global attributions of unworthiness and inferiority carried into adulthood. Kaufman’s (1989) conceptualization shares some parallels with that of schema therapy, which views the core schema of defectiveness/shame as stemming from adverse childhood experiences (Beck & Freeman, 1990; Platt & Freyd, 2012).

Other theorists have conceptualized internalized shame and related core schemas to develop more globally consequent of adverse interpersonal experiences that induce the emotion with regular frequency (Cook, 1988; Leeming & Boyle, 2004). This broader conceptualization of the etiology of shame generally agrees with extant weight bias models. We further postulate that internalized shame, rather than body shame as posited in such models, is more likely to be a broader and more proximal predictor of poor psychosocial health following repeated experiences of IWB and weight/body shaming. Internalized shame has most commonly been studied as a risk factor in the etiology of eating and non-eating psychopathology and risk behaviors such as self-harm, binge eating, drug use, and alcoholism in diverse samples (Dearing, Stuewig, & Tangney, 2005; Gilbert et al., 2010; Harrington, Crowther, & Shipherd, 2010; Hequembourg & Dearing, 2014; Stuewig et al., 2014). Given the elevated psychiatric prevalence rates and alarming post-operative emergence of risk behaviors in the bariatric surgery population, internalized shame may well prove a better specifier of the effects of EWB and/or IWB on pre-operative mental and behavioral health than body shame in this population, given the latter’s narrower connotations and specificity (Mitchell, Selzer, et al., 2013; Spittal & Frühbeck, 2018).

Some evidence offers inferential support for our theory that repeated experiences of EWB may lead to IWB and weight/body shaming that in turn foster internalized shame and poor psycho-behavioral health. Among bariatric surgery patients, levels of internalized shame have been observed greater in U.S. patients with a history of childhood weight-based teasing than in those without such a history (Rosenberger et al., 2007); in U.S. patients with depression compared to those without; (Ivezaj, Barnes, & Grilo, 2016); and in Norwegian patients with comorbid psychiatric disorders
compared to those without (Lier et al., 2011). Internalized shame was also associated with self-evaluation based on body shape and weight, a risk factor for eating pathology, in the latter study. Prospective research has found pre-surgical internalized shame to predict substantially increased odds of developing post-operative psychopathology (Lier, Biringer, Stubhaug, & Tangen, 2012) and less physical activity one-year after surgery (Lier et al., 2011).

*Internalized shame as a facilitator of the effects of IWB, and/or body shame.* While these data offer preliminary support for our hypothesis that internalized shame may feasibly be a stronger and more proximal facilitator of the linkages between EWB, IWB, and psycho-behavioral health than body shame, little research has examined whether internalized shame mediates the effects of EWB or IWB on health. Further, relative to body shame, no research has directly assessed whether internalized shame accounts for greater variance in psychosocial health, or is a more proximal mediator of EWB-related affiliations, similarly comprising gaps in the literature. In lieu of such data, we consider evidence that associates shame with maladaptive coping strategies. We argue that the presence of such strategies infers the presence of internalized shame between EWB, IWB, and poor psychological and behavioral health (i.e., EWB → IWB → internalized shame → poor health).

*Maladaptive coping infers the presence of internalized shame.* Concordant with weight bias models, shame has been observed the characteristic emotional response to experiences of social ostracism among individuals with obesity (Gilbert et al., 2014; Westermann, Rief, Euteneuer, & Kohlmann, 2015), and may also be the emotion most commonly needed to cope with or defend against following EWB and/or IWB. This may be particularly true once shame has been internalized (i.e., rendered dispositional) consequent of repeated shame-inducing experiences, at which point such experiences more readily activate painful core schemas comprising damaging self-perceptions (Beck & Freeman, 1990; Platt & Freyd, 2012). Paralleling weight bias models that view shame as a key link in the association between EWB/IWB and maladaptive coping behaviors, recent theorists have conceptualized shame as a mechanism in the affiliation between concealable stigmatized identities
(i.e., stigmatized characteristics that are non-visible) and substance misuse (Talley & Littlefield, 2014). Such formulations view shame as an antecedent of maladaptive coping. The presence of maladaptive coping strategies may thus be theorized to infer the presence of shame and antecedent IWB/EWB, supported by research documenting a greater prevalence of maladaptive coping strategies among those reporting higher levels of EWB/IWB (Himmelstein et al., 2017; Myers & Rosen, 1999).

Shame is broadly theorized and well-documented to engender maladaptive efforts to cope (e.g., Choma, Shove, Busseri, Sadava, & Hosker, 2009; Elison, Pulos, & Lennon, 2006; Reid, Harper, & Anderson, 2009). Cook (1988) posited that internalized shame stemming from adverse interpersonal experiences sometimes causes a magnitude of emotional intensity so painful that psychological defenses are activated which occasionally take the form of addictive behaviors that function to mask the pain of shame. Such behaviors are theorized to maintain the cycle of addiction and psychopathology through reification of shame. Evidence in diverse samples supports Cook’s (1988) and others’ assertions that poor and risky health behaviors may function as coping and/or defense mechanisms that regulate painful emotions while engendering repetition of this cycle (e.g., Reid, Harper, & Anderson, 2009).

**EWB/IWB and maladaptive coping in bariatric surgery samples.** Coping strategies in response to IWB of *negative self-talk* and *cry/isolate myself* – both strategies that suggest the presence of internalized shame – were most related to psychological distress in a study that sampled treatment- and non-treatment seeking persons with obesity, and patients of gastric bypass surgery from the U.S. (Myers & Rosen, 1999). Negative coping strategies associated with EWB were similarly linked to depressed mood in both U.S.-based Black (*crying*) and White (*less self-love, fewer positive self-statements*) candidates of bariatric surgery with severe obesity (Fettich & Chen, 2012). These findings support our conjecture that internalized shame may be a latent variable that undergirds maladaptive coping responses to EWB among some groups. For instance, the only study
to examine mediation of the effects of IWB in the bariatric surgery population found emotion dysregulation to mediate associations between IWB and food addiction, emotional eating, and eating in the absence of hunger (Baldofski et al., 2015). Poor emotion regulation skills have been found to mediate the effects of shame on disordered eating in a non-bariatric sample, supporting the conceptualization that shame stemming from EWB, IWB, or other factors may play a central role in risk paths implicating affect dysregulation and poor psycho-behavioral health (Gupta, Rosenthal, Mancini, Cheavens, & Lynch, 2008).

Self-compassion as protective against the effects of painful interpersonal experiences and shame. The described negative affect coping strategies hypothesized to stem from and thus to infer the presence of internalized shame – negative self-talk, cry/isolate myself, less self-love, fewer positive self-statements, and emotion dysregulation – also strongly suggest low levels of self-compassion. Self-compassion is an adaptive affect regulation strategy extensively theorized as an antidote to painful interpersonal experiences, of which weight bias is a class; shame; and related psychopathological sequelae (Gilbert & Procter, 2006), including eating pathology (Braun, Park, & Gorin, 2016). Tylka et al. (2014) proposed that we extend models of weight bias to incorporate protective factors, citing self-compassion as one such factor.

Self-compassion as a protective factor. Self-compassion, taking a kind, nonjudgmental approach to oneself in times of failure or difficulty, represents a novel protective factor with substantial empirical support. Broadly conceptualized as an adaptive emotion regulatory and coping strategy (Allen & Leary, 2010; Ehret, Joormann, & Berking, 2018; Neff, 2003), a burgeoning literature finds self-compassion associated with and predictive of psychological, behavioral, and physical health (Biber & Ellis, 2017; Braun et al., 2016; MacBeth & Gumley, 2012; Zessin, Dickh, & Garbade, 2015). Self-compassion is a trainable (Neff & Germer, 2012) and perhaps more importantly interpersonally transmissible (Hermanto & Zuroff, 2016) psychosocial resource that has been
hypothesized to combat the adverse effects of EWB, IWB, and related sequelae on health (Tylka et al., 2014).

A number of the studies cited in this review implicate low core evaluation or poor self-esteem as outcomes or risk factors for the adverse sequelae related to EWB, IWB, and shame. Self-compassion conceptually differs from self-esteem in a number of key ways (Neff & Vonk, 2009). In brief, it is considered a more stable, resilient self-conception that is non-contingent upon external referents, in marked contrast to the limits observed of self-esteem (Baumeister, 2005), which can be negatively affected by external threats including discrimination. This conception is borne out in extensive research documenting that self-compassion accounts for substantially more variance in psychological well-being than does self-esteem (Neff & Vonk, 2009). Self-compassion likewise differs from self-indulgence, given its strong affiliations with conscientiousness in U.S. undergraduates (Neff, Rude, & Kirkpatrick, 2007).

Neff (2003) defines self-compassion as acknowledging that suffering, failure, and inadequacy are part of the human condition, and that all people—oneself included—are worthy of compassion. Self-compassion is conceptualized as comprising six interrelated dimensions: self-kindness (i.e., offering oneself soothing and comfort during painful experiences) vs. self-judgment (i.e., self-criticism), common humanity (i.e., reminding oneself that painful experiences are shared by others, and part of being human) vs. isolation (i.e., feeling separate from others and alone in one’s experience; withdrawal or avoidance), and mindfulness (i.e., equanimous awareness of negative thoughts and feelings) vs. over-identification (i.e., over-identifying with aversive thoughts and emotions; Neff, 2003; Neff & Dahm, 2013). Mindfulness in the context of self-compassion, which refers to attending to one’s experiences of pain or suffering, has a narrower scope than more general operationalizations of mindfulness, which refer to attending to “any experience—positive, neutral, negative—with equanimity” (Neff & Dahm, 2013, p. 20).
**Self-compassion as protective against weight bias and its sequelae.** Research has observed self-compassion to buffer the links between psychosocial factors related to weight bias (e.g., drive for thinness, internalization of sociocultural appearance norms, sociocultural appearance comparisons) and eating pathology in U.S. and international samples (Braun et al., 2016). Suggesting it may be affiliated with less IWB, self-compassion has been shown negatively predictive of weight stigmatizing attitudes in a general sample (Stapleton & Yamaoka, 2015). Self-compassion has also been tested as a mediator of the effects of IWB, consistent with Tylka et al.’s (2014) formulation. In studies with U.S. undergraduates, body image flexibility and self-compassion (marginally) partially mediated the link between IWB and intuitive eating (Webb & Hardin, 2015), and the indirect effect of anti-fat attitudes on fat talk via body shame declined with increasing levels of self-compassion (Webb et al., 2016).

The strongest evidence that self-compassion may buffer the effects of IWB emerges from a separate analysis of the previously-described nationally representative survey of German adults with overweight and obesity, which found self-compassion to lower the effects of IWB on depression, somatic symptoms, and health status/quality of life by approximately one-third (Hilbert et al., 2015). Self-compassion also partially mediated the link between IWB and each outcome. Last, some evidence infers that self-compassion may protect against linkages between peer victimization, body shame, and poor behavioral health. A construct closely related to self-compassion, self-assurance (i.e., entailing a “positive, compassionate, and warm disposition to the self, with a sense of concern, acceptance, understanding and encouragement when the self faces difficulties, setbacks, of failures”), has been found to protect against the association between bullying experiences and both body image shame and eating psychopathology among adolescent girls from Portugal (Duarte & Pinto-Gouveia, 2016, p. 2).

**Self-compassion as protective against shame and its sequelae.** Compassion-Focused Therapy provides a compelling theoretical and empirical rationale for the role of self-compassion in
mitigating shame and its psycho-behavioral sequelae (Gilbert, 2009; Goss & Allan, 2011). In a qualitative study of treatment-seeking individuals with obesity from the UK, levels of reported EWB, IWB, shame, and low self-compassion were prevalent (Gilbert et al., 2014). Origins commonly reported were early adverse family and peer experiences that were reinforced in present-day contexts. The study proposed ‘compassion-focused coping strategies’ to assist individuals in coping with the effects of stigma and shame, for example, being kind to themselves and drawing on the transmissible method of cultivating self-compassion by turning to others for support, although such strategies may prove difficult in the acute post-stigma phase.

Other evidence implicates self-compassion as protective against the effects of shame on psychological health. An article reporting on two studies sampling Canadian undergraduates suggests that self-compassion may predict psychological health through facilitating lower levels of shame and related factors (Johnson & O’Brien, 2013). The first of these studies found lower dispositional shame to partially mediate the affiliation between self-compassion and lower depressive symptoms. In the second study, shame-prone students assigned to write about a shame-inducing event reported greater state shame and negative affect than did shame-prone students assigned to a self-compassionate writing condition. Students in the self-compassion condition reported further reductions in depression and shame-proneness at two-week follow-up.

A growing literature also suggests self-compassion may protect against the effects of shame on poor behavioral health. In the recent review of research examining self-compassion as a protective factor for body image and eating pathology, self-compassion was negatively associated with body shame and beneficially predictive of a range of indices, emerging as a key protective factor of the effects of body shame (Braun et al., 2016). A seminal experimental study conveys the potential of self-compassion to interrupt the effects of state shame on poor eating behaviors. Experimentally inducing self-compassion enhanced self-forgiveness of dietary ‘transgressions’ following ‘forbidden’ food consumption, an observation linked to reduced food intake among those high in restrictive
eating (Adams & Leary, 2007). Thus, even when individuals lapse and engage in maladaptive health behaviors, accessing a sense of kindness and self-forgiveness, rather than guilt or shame, may ensure the episode is relatively isolated rather than maintained, interrupting the pathways that otherwise facilitate chronicity of poor health behaviors and mental health. Corroborating these findings, a recent RCT examining the effects of a self-compassion intervention on body image among multigenerational women with body image concerns found self-compassion participants, compared to wait-list controls, reported improved self-compassion and eating-pathology risk factors, including reduced body shame (Albertson, Neff, & Dill-Shackleford, 2014). These findings were maintained at 3-month follow-up and, like most research on self-compassion, after accounting for self-esteem. These results support our hypothesis that self-compassion may prove helpful among bariatric surgery patients at risk for EWB and intervening risk paths that implicate shame.

**Dimensions of self-compassion protective against risk.** Specific dimensions of the self-compassion construct are reviewed here to elucidate the pathways through which this construct may mitigate risk related to EWB/IWB, shame, and negative affect.

**Self-judgment vs. self-kindness.** Self-judgment shares considerable conceptual overlap with IWB as well as shame. Self-kindness, by contrast, is a factor suggested in the reviewed evidence to protect against these linkages by encouraging individuals to be kind and comforting towards themselves during times of difficulty. This approach mitigates negative affect and eliminates the need to engage in experiential avoidance or poor coping behaviors, both factors implicated in maintaining adverse stigma-related processes (Ratcliffe & Ellison, 2015). While theoretically concordant with self-love, the actual practice of self-kindness differs from popular conceptions of self-love that parallel self-esteem. Self-kindness refers to actively turning towards one’s experiences of pain and suffering with compassion, rather than engaging in positive self-talk or affirmations while engaging in other forms of experiential avoidance. Still, challenging negative self-evaluations can be part of a self-compassionate response.
Several of the reviewed studies cite risk factors related to self-judgment. Notable among these are findings that 2/3 of persons with overweight/obesity engage negative self-talk as coping (Puhl & Brownell, 2006) and that the most common distress-engendering weight-related situation is judgment by others as well as oneself (Conradt et al., 2008). In studies assessing factors that mediated the effects of IWB, self-criticism and low self-reassurance partially accounted for the link with binge eating among women (Palmeira, Pinto-gouveia, Cunha, & Carvalho, 2017); negative self-talk with psychological distress among weight loss surgery patients (Myers & Rosen, 1999); and low self-love with depressed mood in White but not Black bariatric surgery patients (Fettich & Chen, 2012). Self-acceptance/self-love coping is a commonly-deployed strategy among persons with overweight/obesity that experience weight bias (86%; Puhl & Brownell, 2006), and greater self-love was associated with self-esteem in one of the bariatric surgery samples (Myers & Rosen, 1999).

Isolation vs. common humanity. Isolation is a common instinctual response to experiences of social ostracism, as is shame, fundamentally characterized by the instinct to withdraw, isolate, and to perceive that one is fundamentally separate from others. Common humanity invites individuals to see their painful experience as shared by others, rather than isolating, which engenders greater shame. As such, individuals higher in common humanity remind themselves that they are not alone in their suffering, and more readily seek help and social support in times of need. Corroborating that isolation is a common response to EWB, Puhl and Brownell (2006) reported that 74% of their sample responded via crying/isolation, while a recent review of the literature concluded that isolation was one of the most common coping strategies employed by individuals experiencing weight bias (Sikorski et al., 2015). In one sample of bariatric surgery patients, crying/isolating was associated with greater psychological distress (Myers & Rosen, 1999).

Some healthier coping mechanisms deployed in response to EWB are related to dimensions of common humanity, suggesting it may combat the effects of isolation. Following EWB, 89% percent of respondents with overweight/obesity reported seeking social support from non-overweight
persons, 84% from other overweight people, 84% refused to hide and were visible, and 27% sought therapy (Puhl & Brownell, 2006). In addition, cognitive coping strategies related to reappraisal, whereby individuals may remind themselves that their painful experiences connect them to the shared experience of others share conceptual overlap with common humanity. Emblematic of the role common humanity may play in fostering well-being are the results of an experimental study that primed an inclusive ideology (i.e., unity, belonging), vs. the Protestant ethic (PE) ideology (i.e., self-blame, controllability) among women. Among women with overweight, the study observed inclusiveness to foster increased psychological well-being, while the PE condition resulted in decreased psychological well-being (Quinn & Crocker, 1999).

*Over-identification vs. mindfulness.* In the context of weight bias, over-identification may occur when individuals implicitly self-identify (i.e., cognitively fuse, in the Acceptance and Commitment Therapy [ACT] framework) with EWB, IWB, shame, and related cognitions, affects, and/or behaviors. This process parallels the social psychological concepts of identity centrality (i.e., the extent to which one’s stigmatized group’s attributes are aspect(s) of one’s identity, which may be harmful if such attributes are negative and there is no positive group identity) and identity salience (i.e., the frequency to which one experiences thoughts related to this internalization, viewed as constituting the magnitude of the extent to which the identity accounts for greater proportion of self-construal; Quinn & Earnshaw, 2011).

Theory from ACT and other paradigms posits cognitive fusion to engender experiential avoidance (i.e., efforts to avoid one’s experience) and other maladaptive processes. Notably, both experiential avoidance and its frequent antecedent, shame, have been implicated as mechanisms of psychopathology generally (Carvalho, Dinis, Pinto-Gouveia, & Estanqueiro, 2015; Costa & Pinto-gouveia, 2011) and both eating pathology and self-harm (Chapman, Gratz, & Brown, 2006; Cristiano Duarte, Pinto-Gouveia, & Ferreira, 2017), in the broader literature. Indeed, cognitive fusion and experiential avoidance, proxies of over-identification, have been extensively theorized in the ACT
model as core maintenance mechanisms in psychopathology, although the ACT model differs in several key ways from self-compassion and related interventions (Neff & Tirch, 2013).

A mindful alternative to over-identification is to hold awareness of these processes in balanced awareness, irrespective of where one might be experiencing aversive stimuli in the feedback loop (e.g., in response to EWB, IWB, shame, or other factors). Characteristic of this process is turning towards one’s suffering, a form of experiential acceptance that contrasts with avoidance. Maladaptive weight-bias coping strategies that may be conceived to stem from or relate to over-identification include ignoring situation/making no response (83%), crying/isolation (74%), physical violence (25%), responding negatively/insulting back (22%), and health behavioral coping strategies that include eating (79%) and diet refusal (75%; Puhl & Brownell, 2006). In previously-described samples, the over-identification-related strategy of disengagement coping was predicted by EWB via IWB (Hayward et al., 2018), and by weight-related shame, with higher disengagement coping in turn predicting less weight loss (Conradt et al., 2008).

Adaptive coping strategies related to mindfulness include seeing the situation as the other person’s problem (82%) and educating self or others about weight stigma (51%; Puhl & Brownell, 2006). Evidence suggests that reappraisal coping is a mechanism of the link between mindfulness and well-being (Garland, Gaylord, & Park, 2009; Garland et al., 2010). The previously-described study that found lower reappraisal coping to mediate the link of EWB via IWB with distress (Hayward et al., 2018) provides support for the hypothesis that the mindfulness component of self-compassion, in conjunction with other positive components of common humanity and self-kindness, may encompass variance related to reappraisal coping and/or that reappraisal coping may represent a mechanism of self-compassion’s protective effect. Similarly, positive self-statements stemming from one’s efforts to challenge maladaptive self-appraisals may be conceptualized to mitigate over-identification, consistent with evidence that such statements as a coping response to EWB negatively predicted psychological distress (Fettich & Chen, 2012).
**Self-compassion and psychological and behavioral health.** Meta-analyses have observed large effect sizes for the relationship between self-compassion and psychopathology (MacBeth & Gumley, 2012), and found that self-compassion significantly predicts psychological well-being (Zessin et al., 2015). Few studies have assessed self-compassion in relation to psychological health in samples of persons with obesity or bariatric surgery patients. In the previously described nationally representative survey of German adults with overweight and obesity, self-compassion was negatively associated with depression and somatic symptoms (Hilbert et al., 2015).

Consistent with its conceptualization as an adaptive affect regulation and coping strategy, self-compassion when experiencing psychological distress has been associated in observational and experimental research with attenuation of negative affect and health-promoting behaviors, including less binge eating (Sirois, Kitner, & Hirsch, 2015; Sirois, 2015; Terry, Leary, Mehta, & Henderson, 2013; Terry & Leary, 2011; Webb & Forman, 2013). Biber and Ellis’ (2017) review on self-compassion interventions for health behavior change concluded that such interventions were as effective as other health behavioral interventions at improving self-regulation of health behaviors. Other theorists have offered compelling theoretical and empirical rationale for the role of self-compassion in weight regulation via mitigation of maladaptive health behavioral coping strategies (Mantzios & Wilson, 2014; Mantzios & Egan, 2017). A recent review of self-compassion interventions observed that, despite methodological flaws characterizing study designs, such interventions are beneficial for nutrition behaviors, eating behaviors, body image, and weight loss (Rahimi-Ardabili, Reynolds, & Vartanian, 2018).

**Self-compassion in the context of EWB, IWB, and shame.** The primary pathway through which self-compassion has been theorized to beneficially impact health behaviors is its mitigation of negative affect such as shame—characterized by elements of self-judgment, isolation, and over-identification—through awareness of one’s suffering (mindfulness), recollection of one’s inclusion/belonging (common humanity), and generation of warmth towards oneself (self-kindness).
Among bariatric surgery patients, mitigation of shame or other negative affect experienced as a result of EWB through IWB may ameliorate downstream psychological distress and/or maladaptive health behaviors.

**Adverse Childhood Experiences**

We conclude our review with brief discussion of a factor that represents potential to be a significant confound in the study of weight bias, particularly in the bariatric surgery population – history of childhood trauma. History of child maltreatment has been strongly affiliated with later psychiatric morbidity and increased risk of obesity (Grilo et al., 2005; Gustafson & Sarwer, 2004; Williamson, Thompson, Anda, Dietz, & Felitti, 2002), with these factors often linked in the literature. For instance, a population-based study of women in the U.S. observed childhood abuse and rates of current and lifetime PTSD to be significantly elevated among those with BMI ≥40 (Brewerton, Neil, Dansky, & Kilpatrick, 2015). In this study, women with morbid obesity were also more likely to meet DSM-IV (1994) criteria for major depressive disorders and eating pathologies, aligning with the theory that trauma, like EWB, may increase the risk of poor psychological health, maladaptive coping behaviors, and obesity.

Similar patterns are observed in bariatric surgery samples. Bariatric surgery patients are more likely to have an ACE (Adverse Childhood Experiences) score greater than population norms (≥4; Lodhia et al., 2015), and between 61% (Salwen, Hymowitz, Vivian, & O’Leary, 2014) and 69% (Grilo et al., 2005) report a history of childhood abuse, rates comparable to those in psychiatric populations (Salwen et al., 2014). Childhood maltreatment has been associated with lower self-esteem, depression, and risk factors for eating pathology (Grilo et al., 2005), and a greater number of Axis I diagnoses (Wildes et al., 2008), in the bariatric surgery population. Inferring a similar linkage between trauma and maladaptive health behavioral coping strategies that may partially explain body weight status in some patients, two samples of bariatric surgery patients have evidenced concurrently
elevated rates of post-traumatic stress disorder and eating pathology (Kalarchian et al., 2007; Mitchell, Selzer, et al., 2013)

In sum, while rarely accounted for in weight bias research, ACE have been shown predictive of endpoints similar to those predicted by EWB. Similar to theorists in the field of weight bias, trauma researchers have hypothesized that shame and maladaptive coping behaviors following ACE – binge eating, diet refusal, exercise avoidance, or other unhealthy mechanisms – may foster excess weight gain (Midei & Matthews, 2011). Given the parallel psychological, behavioral, and weight-related sequelae stemming from ACE and EWB, distinguishing the unique and interrelated contributions of each factor to poor pre-operative psychological and behavioral health among bariatric surgery patients is an important focus of research with treatment implications. For instance, those without a history of ACE but who commonly experience EWB may benefit from a less-intensive or different type of intervention than might those with a history of ACE coupled with EWB. A first step towards this differentiation is better understanding the unique contributions of EWB to psychological and behavioral health after controlling for the role of ACE. Such knowledge will allow us to attain more specificity in our theoretical models and better develop screening, detection, and treatment targets.

Comparatively little research has accounted for the potential confounding etiological role of ACE in models that conceptualize EWB and IWB as predictors of outcome, excepting the recent study which did not consider ACE as a covariate but an exogenous predictor of later adult interpersonal victimization (Salwen et al., 2014). While the literature would benefit from an exploration of the serial ordering and interactions between ACE and EWB, the present study sought a narrower focus: To better understand the unique contributions of EWB and intervening sequelae, independent of ACE, to psychological health and emotional eating. The present study thus controlled for ACE. As an exploratory question, we also compared risk and protective pathways with and
without these factors accounted for, to better understand the conditions under which, and potentially for whom, the studied models and pathways may apply.

The Present Study

The present cross-sectional study in pre-bariatric surgery candidates sought to partially replicate and extend Tylka et al.’s (2014) model (Figure 1) by examining a theoretical model in which the cited factors – EWB (experienced weight bias), IWB (internalized weight bias), body shame, and internalized shame – are temporally posited. While each of these constructs has been shown to independently predict poor psychosocial and behavioral health in obese and bariatric surgery samples, they have not yet been modeled and tested in a unified theoretical framework, or one that controls for the antecedent contributions of ACE (Adverse Childhood Experiences). We also test whether self-compassion mitigates the proposed risk pathways. We hypothesized the following:

1. EWB will account for variance in psychosocial health (anxiety, depressive, and post-traumatic stress symptoms, and emotional eating) beyond that accounted for by ACE.

2. Internalized shame will account for greater variance in psychosocial health than body shame after accounting for the role of covariates, EWB, and IWB.

3. In serial mediation analyses modeling risk pathways, internalized shame will mediate the effects of EWB, IWB, and body shame on psychosocial health (\(\text{EWB } \rightarrow \text{IWB } \rightarrow \text{body shame } \rightarrow \text{internalized shame } \rightarrow \text{poorer psychosocial health}\))

4. In serial mediation analyses modeling protective pathways, self-compassion will protect against risk pathways implicating body and/or internalized shame in the sequelae between EWB and psychosocial health. Specifically:

   a. Self-compassion will protect against the association of EWB with poor psychosocial health (Hypothesis 4a)

      i. \(\text{EWB } \rightarrow \text{self-compassion } \rightarrow \text{better psychosocial health}\)
b. After weight bias is internalized, self-compassion will protect against the effects of EWB through IWB and shame on psychosocial health through pathways implicating internalized shame as the most proximal variable (Hypothesis 4b)

i. \( EWB \rightarrow IWB \rightarrow \text{body and/or internalized shame} \rightarrow \text{self-compassion} \rightarrow \) better psychosocial health

Methods

Participants and Procedure

The present cross-sectional study comprised a sub-analysis of a larger prospective trial initiated by the first author. Bariatric surgery candidates (i.e., pre-operative; \( n = 170 \)) were recruited from an Association for the Society of Metabolic and Bariatric Surgeons (ASMBS) Center of Excellence in Eastern CT from June 2015 to February 2017 at their pre-surgical medical or psychological evaluations, where they were administered informed consent. Patients provided assent for research personnel to access their medical records, including psychological measures administered as part of standard clinical care for the psychological evaluation prior to clearance for bariatric surgery. Patients also filled out study-specific questionnaires pre-surgery.

Candidates presenting for all types of surgery were eligible to participate. Exclusion criteria included those presenting for revisional operations (i.e., operations to revise an earlier surgical weight loss procedure), non-English reading/speaking individuals, and those under age 18. Revisional procedures were excluded because many such patients had already undergone considerable weight loss and/or regain, and their inclusion would confound the parent study objective to assess post-operative outcomes among first-time surgical candidates. Non-English reading/speaking individuals were excluded given the lack of study resources to translate study measures for this population, while those under age 18 were excluded as their inclusion may introduce confounding related to familial and other variables affecting bariatric surgery outcomes in adolescents relative to adults, the study target population.
Patients were informed that study participation would not influence their coordination of care, with all study-specific data confidential from the clinical/medical team and managed by research personnel. As compensation, participants were provided $10 Amazon gift cards for study participation. The study protocol was approved by the Hartford Hospital and University of Connecticut’s Human Subjects Institutional Review Boards. All participants completed informed consent with study staff. Base rates for a history of suicidality or substance use (both n=13, 2.6%), self-harm (n=6, 1.2%), and current Binge Eating Disorder diagnosis (n=11, 6.4%) in this sample were too low for the tested models, with these outcomes thus excluded from analysis.

**Measures**

**Covariates (patient charts).** Demographic indices, Body Mass Index (BMI=kg/m²), and total scores of surveys administered as part of the standard of care psychological evaluation (Beck Depression Inventory II, Beck Anxiety Inventory, Overeating Questionnaire) were extracted from the patient medical record pre-operatively. BMI was extracted at the date closest to the date surveys were completed (date range from 14 to 60 days). Surveys administered as part of standard of clinical care vary in available n, given a change in the measures utilized to assess candidates for surgery part-way through the study.

**Covariates (online survey).**

**Adverse Childhood Experiences (ACE).** ACE were assessed with the ACE checklist, a widely used 10-item scale (Dong et al., 2004). The items assess ten categories of childhood maltreatment: Emotional, physical, or sexual abuse; emotional or physical neglect; domestic violence; household substance abuse; mental illness in household; parental separation or divorce; or having a criminal household member. Responses are yes/no, with each “yes” indicating one point. Higher ACE scores indicate a greater incidence of childhood traumatic stressors. The ACE has indicated good internal consistency, reliability, and predictive validity (Dube, Cook, & Edwards,
2010; Dube et al., 2003; Felitti et al., 1998), and has been used in bariatric surgery samples (e.g., Lodhia et al., 2015). In the present study, Cronbach’s alpha was .73.

Predictors (online survey).

Experienced weight bias (EWB). Lifetime frequency of experienced weight bias in varied scenarios was assessed with the Stigmatizing Situations Inventory-Brief (SSI-B; Vartanian, 2015), a brief, 10-item revision of the original 50-item SSI (Myers & Rosen, 1999). The original SSI-B ranked items on a 10-point Likert scale. Like Sattler, Deane, Tapsell, and Kelly (2018), we reduced this to an 8-point scale (eliminating frequencies of ‘several times per month’ and ‘daily’) to avoid the comparatively low mean values and SDs found in previous research using the SSI (Myers & Rosen, 1999). Items were ranked from 1 (never) to 3 (about once a year) to 7 (several times per week).

Sources of stigma measured by the SSI-B include physical barriers, relational difficulties (i.e., being treated poorly by romantic partners), comments on one’s weight status by doctors and children, physical barriers, and assumptions by others that one binges or has emotional issues because one is overweight. The SSI-B has been shown a reliable and valid measure of EWB (Vartanian, 2015), and has been used in prior studies with bariatric surgery patients (Raves et al., 2016). In the present study, Cronbach’s alpha was .92.

Internalized weight bias (IWB). Internalization of harmful weight-related stereotypes was assessed with the Weight Bias Internalization Scale-Modified (WBIS-M; Pearl & Puhl, 2014), a revision of the original 11-item WBIS (Durso & Latner, 2008) developed to assess IWB across different body weight statuses. The current analysis used a 9-item version based on recent research indicating improved reliability of the WBIS with two items dropped (eliminating ‘Because of my weight, I feel that I am just as competent as anyone’ and ‘I hate myself for my weight’; Durso, Latner, & Ciao, 2016; Lee & Dedrick, 2016). The remaining items were ranked on an 8-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Item content includes weight-related self-appraisals and judgments (e.g., ‘My weight is a major way that I judge my value as a person;’ ‘I
am less attractive than most other people because of my weight’). The WBIS-M has been shown a reliable and valid measure of IWB that strongly corresponds with the original WBIS (Pearl & Puhl, 2014), which has been used in studies with bariatric/overweight samples (e.g., Baldofski et al., 2015; Lent et al., 2014). In the present study, Cronbach’s alpha was .81.

**Body shame.** The extent to which shame regarding one’s body is experienced was assessed with a subset of three items from the 8-item Body Shame subscale of the Objectified Body Consciousness Scale (McKinley & Hyde, 1996): ‘When I can’t control my weight, I feel like something must be wrong with me’; ‘I would be ashamed for people to know what I really weigh’; ‘When I’m not the size I think I should be, I feel ashamed.’ Items are ranked on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). The body shame subscale of the OBCS has been widely used and shown to be both reliable and valid in clinical and non-clinical samples (Dakanalis, Timko, Clerici, Riva, & Carrà, 2017), although it has not been used in samples of bariatric surgery patients. In the present study, Cronbach’s alpha was .88.

**Internalized shame.** The extent to which the negative affect of shame is magnified and internalized, resulting in self-criticism and self-devaluation (i.e., internalized shame), was assessed with the 30-item Internalized Shame Scale (ISS; Cook, 1988). The total ISS includes six items that assess self-esteem; due to a clerical error, this subscale was not administered. Reported outcomes are thus for the 24-item internalized shame scale. Items are ranked on a 5-point Likert scale from 1 (never) to 4 (almost always). Critical self-appraisals assessed by the ISS include interpersonal (e.g., ‘When I compare myself to others, I am just not as important’; ‘I think others are able to see my defects’) and intrapersonal characterizations (e.g., ‘I see myself as being very small and insignificant; ‘I feel as if I am somehow defective as a person, like there is something basically wrong with me’). The ISS has been shown a reliable and valid measure of shame (del Rosario & White, 2006), and has been used in several studies sampling bariatric surgery patients (Lier et al., 2011; Lier, Biringer, Stubhaug, & Tangen, 2012). In the present study, Cronbach’s alpha was .98.
**Self-compassion.** The ability to be compassionate towards oneself was assessed with the 12-item Self-Compassion Scale-Short-Form (SCS-SF; Raes, Pommier, Neff, & Van Gucht, 2011), a brief form of the original 26-item Self-Compassion Scale (Neff, 2003). Items are ranked on a 5-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*), with higher scores indicating greater self-compassion. The SCS-SF construct is comprised of six components, three positive and three negative (reverse scored), summed to create a global score. Components include mindfulness (‘When something painful happens I try to take a balanced view of the situation’) vs. over-identification (‘When I fail at something important to me I become consumed by feelings of inadequacy’), common humanity (‘I try to see my failings as part of the human condition’) vs. isolation (‘When I’m feeling down, I tend to feel like most other people are probably happier than I am’), and self-kindness (‘When I’m going through a very hard time, I give myself the caring and tenderness I need’) vs. self-judgment (‘I’m disapproving and judgmental about my own flaws and inadequacies’). The SCS-SF has been shown a reliable and valid measure of self-compassion that strongly corresponds with the original SCS, which has been used with overweight/obese samples (Braun, Park, & Conboy, 2012; Braun et al., 2016). In the present study, Cronbach’s alpha was .85.

**Psychosocial health indices (patient chart).** Cronbach’s alphas are unavailable for the following measures, as the score composites, rather than raw scores, were available from patient charts.

**Anxiety.** The 7-item Generalized Anxiety Disorder-7 (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) was used to assess symptoms of anxiety over the past two weeks. Items are ranked on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*) and summed into a total score, with higher scores indicative of greater anxiety. Cut-offs are specified for symptom severity that range from minimal (0-4), to mild (5-9), moderate (10-14) and severe (15-21). The GAD-7 was shown in the initial validation study to have good reliability and validity (Spitzer et al., 2006), and has been used in samples of bariatric surgery patients (e.g., Cassin et al., 2016).
**Depression.** The 21-item Beck Depression Inventory-II (BDI-II; Beck, Steer, Ball, & Ranieri, 1996) was used to query cognitive, affective, and somatic symptoms of depression experienced within the past two weeks. Items are ranked on a 4-point Likert scale from 0 (e.g., ‘I do not feel like a failure’) to 3 (e.g., ‘I feel I am a total failure as a person’) and summed into a total score, with higher scores indicative of higher levels of depression. Cut-offs are specified for symptom severity that range from minimal (0-9) to mild (10-18), moderate (19-29), and severe (30-63). The BDI-II has been shown to have good reliability, validity, and internal consistency (Beck et al., 1996), and has been used in samples of bariatric surgery patients (e.g., Lent et al., 2014).

**Psychosocial health indices (online survey).**

**Post-traumatic stress symptoms.** Symptoms of post-traumatic stress were assessed with the Posttraumatic Stress Checklist, Civilian version, (PCL-C-4), a widely-used revision of the PCL screener used in military populations (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Symptoms assessed correspond with DSM-IV (1994) diagnostic criteria (no civilian version exists for DSM-V; Freedy et al., 2010; Ruggiero, Ben, Scotti, & Rabalais, 2003; Walker, Newman, Dobie, Ciechanowski, & Katon, 2002). The PCL-C-4 anchors items (i.e., symptoms experienced within the past month, for example ‘repeated, disturbing dreams of a stressful experience from the past’) in relation to lifetime “stressful experiences” rather than a specific traumatic event.

Items are ranked on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). The scoring algorithm generates screening status of PTSD likelihood (suggested cut-off point of 30 for civilian primary care or populations known to under-report symptoms) or a continuous score of symptom severity, the latter used in this study (VA National Center for PTSD, 2012). The present study did not administer the Life Events Checklist (LEC). A recent review of the literature observed the PCL-C-4 to indicate good reliability, internal consistency, and validity (Wilkins, Lang, & Normal, 2011). We were unable to locate any prior studies that have utilized the PCL-C-4 in an overweight/obese or bariatrics sample. In the present study, Cronbach’s alpha was .94.
Emotional eating. Tendency to eat in response to painful emotions (anxious, “blue,” lonely) over the past week was measured with the 3-item subscale of the 18-item Three-Factor Eating Questionnaire-Revised (TFEQ-R; Anglé et al., 2009), a revision of the original 51-item TFEQ (Stunkard & Messick, 1985). Items are ranked on a 4-point Likert scale ranging from 1 (definitely false) to 4 (definitely true), with higher scores indicating greater emotional eating. This measure has been shown to have good reliability, validity, and internal consistency (Anglé et al., 2009), and has been used in a bariatrics sample (Pratt et al., 2016) and in many studies with overweight persons (e.g., Chacko, Chiodi, & Wee, 2015). In the present study, Cronbach’s alpha was .93.

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS 23.0). Descriptive statistics and Pearson’s correlations were generated, and one-way ANOVA and independent t-tests used to test differences by demographics and study outcome variables. Multiple regression analyses were used to test our hypothesis #1 that EWB will account for variance in psychosocial health above and beyond that accounted for by adverse childhood experiences (ACE) and hypothesis #2 that internalized shame will account for greater variance in psychological health and emotional eating than body shame after accounting for EWB, IWB, and covariates. In each model, we entered demographic covariates in step one (age, BMI, ethnicity, gender, insurance status, race) and ACE in step two, to assess the proportion of variance accounted for after controlling for demographics. EWB was entered in step three, IWB in step four, and body shame and internalized shame in step five. To quantify the differential proportions of variance accounted for by internalized vs. body shame, we then ran two additional multiple regression models, with the first four steps identical to the first multiple regression. The first such model entered body shame into step five, and internalized shame in step six. The second such model reversed the entry order.

To test our hypotheses #3 that internalized shame will be a more proximal mediator of the effects of weight bias on psychological health and emotional eating than body shame, and #4 that
self-compassion will protect against risk pathways implicating body and/or internalized shame in the sequelae between EWB and psychological health and emotional eating, we used the SPSS PROCESS macro, model six (serial mediation model; Hayes, 2013). This approach to testing has been shown to improve upon some limitations of earlier mediation tests, including the Sobel significance test (Sobel, 1982) and the causal steps test (Baron & Kenny, 1986). The Preacher and Hayes (2008) approach employs non-parametric bootstrap resampling procedures to generate estimates of indirect effects interpretable via their significance and magnitude, a function not available via Baron and Kenny’s (1986) strategy. Bootstrapping does not require the sampling distribution to be normally distributed (Preacher & Hayes, 2008). Because data is frequently skewed, results generated from the Sobel test, which requires normal distribution (1986), may prove less reliable.

Serial mediation presumes that a relationship between mediator variables exists after controlling for the predictor (i.e., EWB; Hayes, 2013). Analyses assessing relationships between IWB, body shame, internalized shame, and self-compassion after controlling for covariates and EWB revealed their linkages to remain significant ($p<.05$), indicating shared cause other than EWB, that one mediator affects another, or that “the remaining association is epiphenomenal” (Hayes, 2013, p. 144). For each of the models analyzed, 10,000 bootstrap samples were generated to create 95% bias-corrected and accelerated confidence intervals (CIs) to test the significance of indirect effects. Such effects are considered significant at $p<.05$ if the 95% CI excludes zero.

Given strong theoretical rationale for the contributions of age, BMI, sex, ethnicity, race, and insurance status (i.e., Medicaid vs. Private as a proxy of SES) to the outcomes studied, these variables were included as covariates across all models. In all multiple regression models, we additionally controlled for ACE. For serial mediation models, to better understand how the pathways through which EWB may differ after controlling for ACE, we present two sets of models for each outcome; the first excluding ACE, and the second controlling for this factor.
Results

Preliminary Analyses

First, data were examined for missing values and outliers. Missing data from the online survey for all cases was low (<3.6%), with all available cases thus retained for analysis (n=164 – 170). Data obtained from patient charts were more variable (BDI-2, n=159; GAD-7, n=160), with analyses on these outcomes analyzing all available cases. Outliers (i.e., defined by the SPSS boxplot standard ± 1.5 IQR, interquartile range) were evident across the studied outcomes, with some individuals reporting high symptom levels of anxiety (five), post-traumatic stress (two), and depression (one) relative to the rest of the sample. Review of other responses did not indicate a suspicious pattern. EWB and obesity have both been positively associated with a greater prevalence of psychiatric symptoms (e.g., Hatzenbuehler et al., 2009; Simon et al., 2006); therefore, it was not surprising to see this phenomenon in our data. These outliers were retained because their exclusion would potentially weaken our ability to accurately model and assess relations between the measured outcomes. Skewness and kurtosis were within recommended parameters for regression analysis (i.e., skewness < 2.1 and kurtosis < 7.1; West, Finch, & Curran, 1995).

Demographic Characteristics

Sociodemographic sample characteristics are reported in Table 1. Participants were predominantly female, non-Hispanic/Latino/a (n=140, 81.4%), and White (n=108, 62.8%) with a mean BMI of 49.16 kg/m² (S.D. 9.35). Ninety-seven percent of participants (n=164) reported experiencing weight bias at least once in their lifetime. Those enrolled in the study (N=170) did not differ significantly from those who declined study participation (N=414) on sex, age, ethnicity, race or SES. Study participants had significantly greater BMI (M. 49.16 kg/m², S.D. 9.35) than did non (M. 45.52 kg/m², S.D. 7.72), p<.05. There were no differences in the measured outcomes by sex, race, or enrollment by a psychologist vs. research assistant (p>.10). Hispanic/Latino/a participants endorsed lower internalized weight bias (mean difference .52, t(168)=−1.28, p=.033) and emotional
eating (mean difference 14.67, \( t(162) = -2.28, p=.024 \)) than did those of non-Hispanic/Latino/a descent. Those with Medicaid reported lower emotional eating than did those with private insurance (mean difference 16.32, \( t(162)=3.31, p=.001 \)).

**Descriptive Statistics of Study Variables**

*Adverse Childhood Experiences.* The mean ACE score in our sample was 2.20 (S.D. 9.00), similar to levels reported in a large sample of U.S. pre-operative bariatric surgery patients (\( M. 2.16, S.D. \) not reported; Holgerson et al., 2018) and lower than the average score in U.S. samples of pre-operative bariatric surgery patients (\( M. 2.9, S.D. \) not reported; Lodhia et al., 2015) and post-operative inpatient psychiatric patients (\( M. 5.4, S.D. 3.3; \) Fink & Ross, 2017). Zero-order correlations revealed ACE were associated with EWB (\( r=.187, p=.015 \)), IWB (\( r=.247, p=.001 \)), body shame (\( r=.202, p=.008 \)), internalized shame (\( r=.229, p=.003 \)), anxiety (\( r=.183, p=.021 \)), post-traumatic stress symptoms (\( r=.362, p<.001 \)), and depressive symptoms (\( r=.210, p=.008 \)). BMI was positively associated with frequency of EWB (\( r=.404, p<.001 \)) and symptoms of anxiety (\( r=.240, p=.002 \)) and depression (\( r=.169, p=.034 \)), and negatively associated with age (\( r=-.188, p=.014 \)).

*Main study variables.* Descriptive statistics and Pearson’s correlations between main study variables are reported in Table 2. The primary predictor, EWB, was significantly correlated in hypothesized directions with all theorized mediators (IWB, shame, self-compassion) and outcomes (symptoms of anxiety, post-traumatic stress, depression, and emotional eating). Mediators and outcomes were similarly and significantly intercorrelated in theorized directions. Given the high intercorrelation (\( r=.713 \)) between IWB and shame, Variance Inflation Factors (VIFs) were computed in linear regression models that regressed each outcome on EWB and all mediator variables. Low multicollinearity (VIF<2.3) was indicated for all predictive variables in each model (Kock & Lynn, 2012).

Mean reported rates of EWB in our sample corresponded to a frequency of ‘several times in your life’ (\( M. 1.86; S.D. 1.52 \)). This is greater than the mean frequency of ‘once in your life’ reported
in the one other published study to administer the SSI-B with the same modified anchor points in a U.S. sample with obesity (M. 0.94; S.D. 0.93; Sattler et al., 2018), and similar to the mean frequency of several times in your life reported for the most commonly experienced stigmatizing situations in a sample of U.S. bariatric surgery patients (i.e., Comments from Children; Negative Assumptions by Others, and Physical Barriers; mean not comparable, as a different Likert scale was used for the full SSI; Sarwer et al., 2008). Mean levels of IWB in our sample (M. 3.85, S.D. 1.35) were lower than those reported in other samples of German and U.S. pre-bariatric surgery candidates (M. 5.56, S.D. 1.02, Hübner et al., 2016; M. 4.54, S.D. 1.3, Lent et al., 2014), and similar to those reported in a sample of U.S. post-op patients (M. 3.79, S.D. 0.89, Raves et al., 2016).

Mean levels of body shame in our sample (M. 4.67, S.D. 1.84) are not comparable to other samples, given that we used a subset of items. However, because we used the mean, rather than sum score, these levels can still be construed as higher than mean levels of body shame in a recent validation study clinical sample (M. 4.38, S.D. 4.12). Our sample reported levels of internalized shame (M. 29.79, S.D. 24.66) well below the threshold indicating painful, possibly problematic levels (>50; Cook, 1993), although there was significant variability in responses. This level is higher than levels reported in samples of U.S. female (M. 23.00, S.D. 19.4; Rosenberger, Henderson, & Grilo, 2006) and Norwegian bariatric surgery patients (M. 26.8, S.D. 23.7; Lier et al., 2012), and falls between mean rates of shame reported in a prior Norwegian bariatric sample for those with comorbid Axis I psychiatric disorders (M. 41.1, S.D. not reported) and those without (M. 16.5, S.D. not reported; Lier et al., 2011). Mean levels of self-compassion were similar (M. 38.25, S.D. 9.72) to those reported in a dissertation study of U.S. bariatric surgery patients (M. 39.81, S.D. 8.83; Kearney, 2012) and slightly higher than the mean reported in the U.S. undergraduate SCS-SF validation sample (M. 36.00, S.D. 7.33; Raes et al., 2011) and in an undergraduate sample with anxiety and depression from Norway (M. 34.5, S.D. 7.4; Haukaas, Gjerde, Varting, Hallan, & Solem, 2018).
Anxiety levels (M. 3.70, S.D. 4.46) were classified in the minimal range by GAD-7 severity guidelines (Spitzer et al., 2006), similar to levels reported in a Canadian sample of bariatric patients (M. 3.9, S.D. 3.7; Cassin et al., 2016) yet lower than reported in a large Canadian sample of bariatric surgery candidates (M. 6.53, S.D. 5.69; Taube-Schiff et al., 2015) and in one German pre-bariatric sample (e.g., M. 7.96, S.D. 4.91; Hübner et al., 2016). Reported symptoms of depression (M. 8.04, S.D. 7.28) were similarly classified within the minimal range, lower than reported in other U.S. samples of pre-bariatric patients (M. 15.18, S.D. 9.97 and M. 10.18, S.D. 8.50 in Ambwani et al., 2013; M. 9.7, S.D. 8.3 in Sarwer, Fabricatore, Eisenberg, Sywulak, & Wadden, 2008).

Post-traumatic stress symptoms (M. 32.60, S.D. 14.33) exceeded the screening cut-off point for likelihood of PTSD in populations known to commonly underreport symptoms (i.e., 30; VA National Center for PTSD, 2012). We were unable to locate other studies that have used the PCL-C-4 for any DSM version in bariatric or obese samples, so we lack a point of comparison. Levels of reported emotional eating in our sample (M. 38.28, S.D. 32.31) were lower than the threshold suggesting high levels (>50; Anglé et al., 2009), although our sample was characterized by wide variability. Mean emotional eating in our sample was substantially lower than that of another sample of bariatric surgery candidates (M. 63.70, S.D. 25.96; Pratt et al., 2016).

Multiple Regression Models

**Anxiety.** The overall model accounted for 30% of variance in anxiety, $F(11,146)=5.70$, $p<.001$. In step one, anxiety was significantly predicted by BMI ($\beta=.249, S.E.=.04, p=.003$), $R^2=.080$, $F(6,151)=2.20, p=.046$. In step two, BMI remained a significant predictor ($\beta=.253, S.E.=.04, p=.002$), with ACE significantly ($\beta=.183, S.E.=.16, p=.021$) accounting for an added 3.2%, $F(1,150)=5.48, p=.021$. In step three, EWB was the only significant predictor ($\beta=.264, S.E.=.26, p=.004$), accounting for 4.8% of added variance, $F(1,149)=8.45, p=.004$. EWB became non-significant in step four after the inclusion of IWB ($\beta=.308, S.E.=.27, p<.001$), which accounted for an added 6.9% of variance, $F(1,148)=12.71, p=.001$. In step five, with the addition of body shame and
internalized shame, internalized shame emerged the only significant predictor of greater anxiety symptoms ($\beta=.320$, $S.E.=.02$, $p=.003$); both constructs accounted for an added 7.1% in variance, $F(2,146)=7.67$, $p<.001$.

Quantifying the additional variance accounted for in anxiety by body shame relative to internalized shame, in the second multiple regression analysis, body shame accounted for an additional 2.9% of variance in step five. Internalized shame in the final step accounted for an additional 4.2% of the variance in anxiety symptoms. In the third and final analysis, when internalized shame was tested in step five it accounted for 6.1% of the variance, while body shame in the final step accounted for a negligible 1% of variance in anxiety.

**Depressive symptoms.** The overall model accounted for 28% of the variance in depression symptoms, $F(11,145)=5.13$, $p<.001$. In step one, BMI predicted depressive symptoms ($\beta=.170$, $S.E.=.06$, $p=.040$), $R^2=.067$, $F(6,150)=1.78$, $p>.05$. In step two, ACE accounted for 4.6% of additional variance ($\beta=.217$, $S.E.=.26$, $p=.006$), $F(1,149)=7.64$, $p=.006$. In step three, ACE remained significant ($\beta=.160$, $S.E.=.26$, $p=.042$) with EWB a significant predictor ($\beta=.287$, $S.E.=.42$, $p=.002$), accounting for an added 5.8% of variance, $F(1,148)=10.37$, $p=.002$. In step four, IWB emerged the only significant predictor ($\beta=.376$, $S.E.=.44$, $p<.001$), accounting for an added 10.3% of variance, $F(1,147)=20.40$, $p<.001$. In step five, IWB remained the only predictor ($\beta=.284$, $S.E.=.66$, $p=.024$), with body shame and internalized shame rendering no added contributions to depressive symptoms, $\Delta R^2=.007$, $F(2,145)=.71$, $p>.05$. Given the non-significant prediction by either form of shame, we did not test which was a stronger predictor.

**Post-Traumatic Stress symptoms (PTSS).** The overall model accounted for 58.2% of the variance in PTSS, $F(11,155)=19.61$, $p<.001$. In step one, no covariates were significant ($R^2=.037$, $F(6,160)=1.03$, $p>.05$). In step two, the addition of ACE ($\beta=.371$, $S.E.=.48$, $p<.001$) accounted for an added 13.5% of variance in PTS, $F(1,159)=26.02$, $p<.001$. In step three, ACE ($\beta=.276$, $S.E.=.46$, $p<.001$) remained significant, with EWB ($\beta=.429$, $S.E.=.75$, $p<.001$) accounting for an additional
13.1% of variance, $F(1,158)=29.84, p<.001$. In step four, ACE ($\beta=.202, S.E.=.43, p=.002$) and EWB ($\beta=.259, S.E.=.75, p=.001$) remained significant, with IWB accounting for 12.4% additional variance ($\beta=.414, S.E.=.74, p<.001$), $F(1,157)=31.16, p<.001$. In step five, ACE ($\beta=.177, S.E.=.37, p=.002$) and EWB ($\beta=.173, S.E.=.65, p=.011$) remained significant, with internalized shame accounting for 0% in step four. In the final step, insurance status ($\beta=.190, S.E.=.39, p=.001$) remained significant, with IWB accounting for 1% of variance ($\beta=.429, S.E.=.53, p<.001$), $F(1,154)=29.18, p<.001$. In step five, insurance status ($\beta=.397, S.E.=.62, p=.014$) remained significant, with internalized shame newly significant ($\beta=.290, S.E.=.13, p=.005$) and the overall step accounting for 3.9% of variance, $F(2,152)=4.44, p=.013$.

In the second analysis modeling internalized shame to follow body shame, body shame accounted for .9% of variance in step five (non-significant), while internalized shame accounted for 14.5% of variance in PTS symptoms in the final step. In the third and final analysis, internalized shame accounted for 15.4% of the variance in step five, with body shame accounting for 0% in the final step.

**Emotional eating.** The overall model accounted for 32.4% of the variance in emotional eating, $F(11,152)=6.64, p<.001$. In step one, insurance status (SES) was the only significant predictor ($\beta=-.266, S.E.=.52, p=.001$), $R^2=.102, F(6,157)=2.99, p=.009$. In step two, SES remained significant ($\beta=-.274, S.E.=.54, p=.001$), with the inclusion of ACE accounting for an added 2.4% of variance ($\beta=.157, S.E.=1.14, p=.040$), $F(1,156)=4.28, p=.040$. In step three, insurance status ($\beta=-.264, S.E.=.536, p=.001$) remained significant, with EWB ($\beta=.202, S.E.=1.89, p=.023$) accounting for an added 2.9% of variance, $F(1,155)=5.31, p=.023$. In step four, insurance status remained significant ($\beta=-.184, S.E.=.50, p=.015$), with IWB accounting for 13.5% in added variance ($\beta=.429, S.E.=1.9, p<.001$), $F(1,154)=29.18, p<.001$. In step five, insurance status ($\beta=-.185, S.E.=.49, p=.014$) remained significant, with internalized shame newly significant ($\beta=.290, S.E.=.13, p=.005$) and the overall step accounting for an added 3.9% of variance, $F(2,152)=4.44, p=.013$.

In the second analysis modeling internalized shame to follow body shame, body shame accounted for .3% of the variance in step five (non-significant), while internalized shame accounted for 3.6% of added variance in step six. In the final analysis, internalized shame accounted for 3.9% of variance in step three, and body shame 0% in step four.
Serial Mediation Models

Risk pathway models. Each model tested the serial pathway EWB → IWB → body shame → internalized shame → poorer psychosocial health. Total and individual indirect effects of EWB on each outcome and model statistics, before and after controlling for ACE, are presented in Tables 3 through 6. Diagrams for each model are presented with unstandardized betas for direct paths Figures 2a – 5b, with a figures depicting models that did not control for ACE, and b figures depicting models that did control for this factor. Significant findings for covariates are stated when evident.

Suppression effects. Suppressor variables “correlate with other IVs and account for or suppress some outcome-irrelevant variation or errors in one or more other predictors, [improving] the overall predictive power of the model” (Pandey & Elliott, 2010, p. 28). Because of this function, it has been argued that such variables may be better conceptualized as “enhancers” (Mcfatter, 1979). Several effects likely to be attributable to suppression are noteworthy given directionality that contrasts with hypothesis and zero-order correlations, although these effects are non-significant and we thus do not probe them in detail. After accounting for the inclusion of other model variables, in risk models for post-traumatic stress symptoms, IWB became negatively associated with symptoms. A similar pattern was evident for the link between body shame and emotional eating in the model, which was negative. This suggests that one or more of the assessed mediators is suppressing irrelevant variance in EWB or IWB, and clarifying the affiliation of their residual variance with respective outcomes.

Direct paths across models. In both sets of models, most hypothesized direct paths were significant (p<.05; Figures 2a-5b). Across the modeled outcomes, people reporting greater EWB tended to report greater IWB. Individuals that internalized weight bias were more likely to experience both body and internalized shame, with those experiencing greater internalized shame in turn more likely to report symptoms of anxiety and post-traumatic stress, and emotional eating (but not depression).
**Anxiety.** When not controlling for ACE, the effect of EWB on anxiety was fully attenuated with mediators added to the model, suggesting full mediation per Baron and Kenny’s (1986) criteria (Figure 2a). BMI significantly predicted anxiety ($B=.43, S.E.=.29, p=.030$). There were three risk pathways from EWB to greater anxiety via IWB through internalized shame, via IWB through body shame and then internalized shame, and via body shame through internalized shame. The overall model accounted for 29.8% of the variance in anxiety symptoms. These findings persisted after controlling for ACE, with the overall model accounted for 30% of the variance in anxiety (Figure 2b; Table 3 for tests of each path).

**Depressive symptoms.** When not controlling for ACE, the effect of EWB on depression was fully attenuated with mediators added to the model (Figure 3a). This attenuation was accounted for by IWB; one significant risk path was evident from EWB to greater depression through IWB. The overall model accounted for 27.2% of the variance in depressive symptoms. Results remained largely unchanged after controlling for ACE, with .6% added variance accounted for ($R^2=.280$; Figure 3b; Table 4 for tests of each path).

**Post-traumatic stress symptoms (PTSS).** When not controlling for ACE, the effect of EWB on PTSS was partially attenuated with mediators added to the model (Figure 4a). There were two risk pathways from EWB to greater PTSS via IWB through internalized shame, and via IWB through body shame and then internalized shame. The overall model accounted for 55.5% of variance in PTSS. These results remained largely the same after controlling for ACE, which predicted PTSS ($B=1.18, S.E.=.37, p=.002$). The overall model accounted for 58.2% of the variance in PTSS (Figure 4b; Table 5 for tests of each path).

**Emotional eating (EE).** When not controlling for ACE, the total effect of EWB on EE was fully attenuated with mediators added to the model, suggesting full mediation (Figure 5a). Insurance status significantly predicted EE ($B=-12.50, S.E.=5.01, p=.01$). Significant indirect effects revealed five risk pathways from EWB to greater emotional eating through IWB, IWB through internalized
shame, IWB through body shame and then internalized shame, body shame through internalized
shame, and through internalized shame alone. The overall model accounted for 32.9% of the variance
in emotional eating. After controlling for ACE, two key differences emerged. Risk paths from EWB
to greater emotional eating via body shame through internalized shame, and through internalized
shame alone, were no longer significant. ACE accounted for no added variance in EE (32.9%; Figure
5b; Table 6 for tests of each path).

**Protective pathway models.** Each model tested the serial pathway EWB $\rightarrow$ IWB $\rightarrow$ body
shame $\rightarrow$ internalized shame $\rightarrow$ self-compassion $\rightarrow$ *better* psychosocial health. Total and individual
indirect effects of EWB on each outcome and model statistics before and after controlling for ACE
are presented in Tables 6 through 10. Diagrams for each model with unstandardized betas for direct
paths are presented in Figures 6a – 9b, with a figures depicting models that did not control for ACE,
and b figures depicting models that did. Significant findings for covariates are stated when evident.

Notably, shame evidenced no direct affiliation with depression in the multiple regression or
risk path models. We elected to retain depression in the initially hypothesized protective path models,
because shame resulting from EWB or IWB may indirectly be related to lower depression via higher
self-compassion, and this model may better elucidate individual differences with respect to the
conditions under which self-compassion may be protective. That is, it may be that individuals in our
sample experience the sequelae of EWB $\rightarrow$ IWB $\rightarrow$ shame, but they *may not* evidence any affiliation
between shame and depressive symptoms if they are also higher in self-compassion. Such findings
could feasibly explicate why shame was unrelated to depression in multivariate regression or serial
mediation models.

**Significant suppression effects.**

*EWB and self-compassion.* Models in both sets of analyses (i.e., with and without controlling
ACE) evidenced a significant positive direct effect of EWB with self-compassion (see Figures 6a –
9b). This finding contrasts with the directionality of our hypothesis and the zero-order negative
correlation, suggesting a statistical suppression effect. Statistical suppression was confirmed by performing a stepwise linear regression analysis that predicted self-compassion from sociodemographic covariates (step 1), EWB (step 2), and each mediator variable in subsequent steps (VIFs<2.3). EWB was an initial negative predictor of self-compassion ($\beta=-.18, p=.042$), although its sign flipped and affiliation with self-compassion incrementally strengthened upon inclusion of IWB ($\beta=.09, p=.289$), body shame ($\beta=.103, p=.237$), and shame ($\beta=.18, p=.020$) in the model.

This pattern was confirmed in partial correlations. After controlling for these mediators, the link of EWB with self-compassion was positive and significant ($r=.186, p=.020$). In a separate linear regression predicting EWB from IWB and shame, after accounting for controls, these negative affect factors accounted for 15.4% of the variance in EWB. IWB, body shame, and shame thus appear to suppress negative affective variance from the EWB construct and elucidate positive variance that positively affiliates with self-compassion.

**Non-significant patterns of suppression.** These effects are non-significant and thus not probed/interpreted further. They are summarized here for clarity.

**Body shame and self-compassion.** Each model evidenced a non-significant, positive affiliation between body shame and self-compassion, contrasting with hypothesis and zero-order correlations. Similar to EWB, this pattern suggests that after accounting for other negative affect variables in the model, the experience of body shame may actually positively associate with the adaptive response of self-compassion among some persons in our sample.

**Model-specific suppression patterns.** In models for anxiety, IWB was non-significantly negatively linked with the outcome. The same pattern was evident in the depression models between internalized shame and depressive symptoms. These observations suggest other variables are clarifying variance in IWB and internalized shame that weakens each respective association. Last, in the models for PTSS, the positive association between body shame and PTSS changed directions
after accounting for ACE. That is, the association between body shame and PTSS was clarified as negative, although non-significant, after partialing out shared variance related to ACE.

**Direct paths across models.** As hypothesized, in both sets of models, people reporting greater EWB were also more likely to report higher IWB, with this in turn associated with higher body shame and then internalized shame (Figures 6a – 9b). Internalized shame was negatively associated with self-compassion, which in turn negatively predicted each outcome. Notable is the observed suppression effect, whereby the negative affective variables in the model (IWB, shame) clarified positive variance in EWB that freed it to positively associate with self-compassion.

**Anxiety symptoms.** When not controlling for ACE, the direct effect of EWB on anxiety was fully attenuated with mediators added to the model (Figure 6a). BMI significantly predicted anxiety ($B=.09$, $S.E.=.04$, $p=.029$). One significant protective pathway comprised an indirect effect of EWB on lower anxiety among self-compassionate individuals who internalized weight bias that was then associated with body shame and then internalized shame. A second protective pathway implicated lower anxiety following EWB among those reporting greater self-compassion who endorsed internalized weight bias that was then associated with internalized shame. The tested model accounted for 33.1% of variance in anxiety.

After controlling for ACE, a newly significant suppression risk path emerged, indicating an indirect effect of EWB on anxiety through internalized weight bias and then body shame. This is likely attributable to a complex statistical suppression effect. Because this risk path was not evident in any prior analyses, it suggests that the mutual inclusion of ACE and self-compassion clarified variance in body and internalized shame that freed them to indirectly account for the affiliation between EWB and anxiety. The model controlling for ACE accounted for a negligible added .1% of variance in anxiety (33.2% model total; Figure 6b;Table 7 for tests of each path).

**Depressive symptoms.** In the model that did not control for ACE, the total effect of EWB on depression symptoms was fully attenuated with mediators added to the model (Figure 7a), and the
indirect effect of EWB through IWB on greater depression was significant. Self-compassion offered no protection for this specific pathway. However, four protective pathways were associated with lower depressive symptoms via higher self-compassion. Self-compassion interrupted the direct serial path of EWB, and the indirect effects of EWB on depression via the paths of IWB through internalized shame; IWB through body shame and then internalized shame; and body shame through internalized shame, associating with lower symptoms. The overall model accounted for 30.2% of the variance in depressive symptoms.

One key change emerged in the model controlling for ACE. Two protective pathways to lower depressive symptoms among self-compassionate individuals, from EWB through body shame and then internalized shame, and from EWB through self-compassion, were no longer significant. The model controlling for ACE accounted for a negligible added .5% of the variance in depressive symptoms (30.7% total; Figure 7b; Table 8 for tests of each path).

**Post-traumatic stress symptoms (PTSS).** Results were substantively similar in analyses with and without controlling for ACE (Figures 8a, 8b), except the significant prediction of PTSS by ACE in the model adjusting for ACE ($B=1.23$, S.E.=.37, $p=.001$). In both sets of models, the direct association of EWB with PTSS was partially attenuated with mediators added to the model. Significant indirect effects indicated two risk pathways from EWB to greater PTSS via the indirect effects of IWB through internalized shame and IWB that lead to body shame and then internalized shame. Four protective pathways linked EWB to fewer PTSS via self-compassion. Self-compassion interrupted each of the two significant risk pathways, as well as serial paths involving the direct effect of EWB and the indirect of EWB through IWB on PTSD symptoms. The overall model that did not control for ACE accounted for 57.5% of the variance in PTS symptoms, while the model that controlled for ACE accounted for an additional 3% of variance (60.4% model total; Table 9 for tests of each path).
**Emotional eating (EE).** In the model not controlling for ACE, the total effect of EWB on EE was fully attenuated with mediators added to the model (Figure 9a). Indirect effects revealed five protective pathways between EWB and lower EE through self-compassion. Self-compassion interrupted serial paths involving the direct effect of EWB and the indirect effects of IWB, IWB through internalized shame, IWB through body shame and then internalized shame, and body shame through internalized shame, on EE. The overall model accounted for 37.2% of the variance in emotional eating.

After accounting for ACE, the protective pathway implicating lower EE among those for whom EWB was associated with body shame that was linked with internalized shame and in turn, self-compassion, became non-significant. In parallel with the depression model, this finding suggests that body shame directly experienced following EWB may better be accounted for by antecedent factors. The model controlling for ACE accounted for a negligible .1% of the variance in EE (37.3% total; Figure 9b; Table 10 for tests of each path).

**Discussion**

Variable post-operative trajectories in psycho-behavioral health and weight loss in bariatric surgery patients have underscored an urgent need to identify pre-surgical psychosocial risk and protective factors to inform prevention, screening, detection, and treatment targets. The current study sought to better understand the paths through which the psychosocial risk factors of experienced and internalized weight bias (EWB, IWB) may associate with poor psychosocial health in bariatric surgery candidates. This is the first known study to examine the affiliations between EWB, IWB, and both PTSS and anxiety in this population, as well as the intervening mechanisms of body and internalized shame. Our overall findings implicate IWB and internalized shame as risk mechanisms of the effects of EWB on poor psychosocial health in bariatric surgery candidates, and suggest that people higher in self-compassion experience some protection from these risk sequelae. Results are hoped to inform future prospective and treatment research in this population.
Study Findings

Sample characteristics. In aggregate, our sample reported less EWB and IWB, fewer symptoms of anxiety and depression, and less emotional eating than have other samples of bariatric surgery patients. Levels of self-compassion were elevated when compared to non-clinical samples of undergraduates. While inferring our sample is psychologically healthy, measures of anxiety and depression were filled out at the psychological screening assessment for bariatric surgery, and may thus under-represent symptoms, given the well-documented under-reporting of symptoms by candidates for bariatric surgery presenting for psychological screening (Ambwani et al., 2013; Mitchell et al., 2010; Rosik, 2005). Of additional consideration, participants of Hispanic/Latino/a descent, comprising 18.6% of our sample, endorsed lower IWB and emotional eating than did those of non-Hispanic/Latino/a descent, which may have partially contributed to this observation. Nonetheless, the pattern of lower EWB, IWB, anxiety and depressive symptoms, and greater self-compassion is consistent with our hypothesis that the latter would protect against the former.

The lower levels of IWB and emotional eating in Hispanic/Latino/a participants observed in our study are partially consistent with Himmelstein et al.’s (2017) finding that Hispanic/Latina women endorsed lower IWB than did White women. In her study, Hispanic/Latina women were also more likely to cope with the effects of stigma via disordered eating. Himmelstein et al. (2017) theorized that Hispanic women may be at particular risk of “double jeopardy” – referring to cumulative disadvantages that outweigh the disadvantage of a single social category that is stigmatized (Purdie-Vaughns & Eibach, 2008) – given similarities between racial and weight-related biases (e.g., lazy, unintelligent) and the lack of protective factors found in other racial/ethnic groups. Our study had a small $n$ of individuals of Hispanic/Latino/a descent, precluding further examination of differences by sex, although better understanding the unique ways this group internalizes, responds to, and copes with weight bias remains an important focus of future study. This is particularly salient given the prevalence of overweight/obesity (Ogden, Carroll, Fryar, & Flegal,
PTS symptoms were elevated in our sample relative to population norms, which may be attributable to our using the lower cut-off score recommended for populations known to under-report symptoms. Given that the PCL-C-4 was administered online, rather than at the psychological evaluation for surgical candidacy, it is possible that people did not under-report their symptoms and our selected cut-off was too low. While elevated symptoms are generally consistent with previously-cited studies that have observed higher rates of PTSD or childhood/adult interpersonal abuse in bariatric surgery samples relative to population norms (e.g., Grilo et al., 2005; Lodhia et al., 2015; Salwen et al., 2014), the present study did not assess full DSM-IV (1994) PTSD criteria, including a Criterion A1 event (i.e., a traumatic event involving “actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others”; p. 527). Interestingly, some evidence suggests PTSS are higher in LGBTQ persons who do not report a strict DSM-IV Criterion A1 event compared to those who do (Alessi, Meyer, & Martin, 2013). These findings suggest that strict DSM-IV criteria lead many with PTSD-like diagnoses to be overlooked, particularly among those with concealable stigmatized identities. It is thus equally plausible that elevated rates of PTSS in our sample, independent of Criterion A stressors, reflect valid clinically significant elevations related to EWB and IWB, an important question for future study. Notably, ACE in our sample were comparable to other samples of bariatric surgery patients, despite wide variability.

The greater self-compassion levels reported in our sample of bariatric surgery candidates aligns with the high reported prevalence of self-acceptance/self-love coping among persons with overweight/obesity (86%; Puhl & Brownell, 2006). Given that the bariatric surgery population is predominantly characterized by extreme obesity, such findings raise questions about whether self-compassion serves a protective function against associations between EWB and energy balance behaviors (e.g., exercise avoidance, dieting, binge eating) in this population, as it has in obese,
community, student, and clinical samples (e.g., Braun et al., 2016). Our overall findings suggest that self-compassion offers protection against associations between EWB and psychological health under some conditions, which may partially explain why our sample appears comparatively healthier psychologically than some others. Nonetheless, we can’t preclude other possibilities, including that self-compassion may not protect against the associations between EWB, energy balance behaviors, and/or obesity in this population, or among certain groups of persons. It is also possible that the construct of self-compassion (i.e., SCS) may lack validity or require modification in this group. Focus groups and qualitative interviews may better elucidate these processes and the construct validity of the SCS in this population.

**EWB accounted for variance in poor psychosocial health beyond that accounted for by ACE alone (hypothesis #1).** ACE are a known contributor to poor population health and more commonly reported among people with overweight/obesity (Brewerton et al., 2015; Williamson et al., 2002), although no weight bias research has controlled for the role of this factor to date. As hypothesized, after accounting for ACE, EWB accounted for added variance in symptoms of anxiety, depression, post-traumatic stress, and emotional eating. Further, in aggregate, EWB and IWB accounted for substantially greater variance in anxiety, depressive symptoms, PTSS, and emotional eating than did ACE alone. It is striking that EWB/IWB accounted for over one fifth of variance in PTSS, while ACE accounted for less than one seventh. Pending future research, these findings suggest that EWB and its sequelae, independent of ACE, may be potentially critical treatment targets for improvement of PTSS in bariatric surgery patients. Additionally, while some prior research has suggested that EWB and ACE interact to predict greater likelihood of depressive symptoms in bariatric surgery patients (Salwen et al., 2014), weight bias internalization and shame have not yet been examined in relation to both, an important topic of future prospective research given implications for treatment.
Internalized shame accounts for greater variance in psychosocial health than body shame following EWB and IWB (hypothesis #2), and mediates the effects of these variables on psychosocial health (hypothesis #3). In multiple regression models, hypothesis #2 was supported for all outcomes save depression. Internalized shame, but not body shame, accounted for significant variance in anxiety, PTSS, and emotional eating following EWB and IWB. Modeled following body shame, internalized shame accounted for substantial variance in each outcome, most notably over one-seventh of variance in PTSS. When reversing the entry of these factors, body shame accounted for negligible added variance. These findings add to the weight bias literature by implicating internalized shame as an important risk mechanism of the negative effects of EWB/IWB on anxiety, PTSS, and emotional eating, extending beyond the commonly theorized mechanisms of IWB and body shame.

Risk path models testing the indirect effects of EWB on psychosocial health mirrored multiple regressions, supporting hypothesis #3 for all constructs save depression. Before and after accounting for the effects of ACE, bariatric surgery candidates in our sample who endorsed experiencing weight bias, internalized weight bias, and internalized shame, with or without body shame, reported more anxiety, PTSS, and emotional eating behavior. IWB and internalized shame were factors common to most risk pathways, implicating both as important targets of future investigation given the adverse associations of these factors with poor behavioral health (e.g., Baldoñski et al., 2015; Hübner et al., 2016; Lent et al., 2014) and post-operative outcomes (e.g., Lent et al., 2014; Lier et al., 2011; Lier et al., 2012). Notably, most risk paths that implicated body and/or internalized shame as a direct response to EWB, independent of IWB, were non-significant after accounting for ACE. This supports extant theory that the adverse effects of EWB on psychosocial health primarily act through IWB and intervening sequelae (e.g., Pearl & Puhl, 2018; Tylka et al., 2014).
Only one previously cited study to our knowledge has examined mediators of IWB’s effects on psychosocial health in bariatric surgery patients. Baldowksi et al. (2015) found emotion dysregulation to mediate the association of IWB with poor eating behaviors in a German pre-bariatric sample. Ours is the first study to investigate body and internalized shame in relation to EWB and IWB in bariatric surgery candidates, and to find internalized shame represents a plausible mechanism of IWB’s adverse effects on a broader range of psychosocial health outcomes than previously studied in this population. The central role of internalized shame in these models is noteworthy given the reviewed broader range of adverse effects attributed to internalized shame relative to IWB or other forms of shame, including self-harm, suicidality, and substance use (Dearing et al., 2005; Lester, 1997; Mahtani et al., 2018), all outcomes of concern in subsets of post-operative bariatric surgery patients (e.g., Spittal & Frühbeck, 2018).

It is also possible that the strength of the internalized shame variable in our models reflects latent variance of confounding constructs unmeasured in our study, for example, other forms of trauma or interpersonal violence associated with internalized shame (e.g., Gaudet, Sowers, Nugent, & Boriskin, 2015; Saraiya & Lopez-Castro, 2016). Future research would benefit from accounting for comprehensive traumatic event exposure in the study of weight bias and shame to better understand etiology and temporal sequencing, with important treatment implications. For instance, should internalized shame develop following EWB, IWB, and intervening sequelae in those with no prior trauma exposure, it may profitably be targeted across weight bias interventions. However, should internalized shame be found primarily derivative of other traumatic or interpersonal stressors unaccounted for in the present study, interventions may target specific behavioral phenotypes. For example, those with a history of trauma who report EWB and IWB may in such case benefit from reduction of internalized shame, while those who report EWB and IWB without such a history may benefit from intervention that excludes such a focus.
Self-compassion protects against the association of EWB with poor psychosocial health (hypothesis #4a), and protects against the effects of EWB through IWB and shame on poor psychosocial health through pathways implicating internalized shame as the most proximal variable (hypothesis #4b). In protective path models for all psychosocial health outcomes, our hypotheses were generally supported, and self-compassion accounted for added variance in each construct. Before and after accounting for ACE, those reporting greater self-compassion evidenced fewer psychological symptoms, and lower emotional eating, despite endorsing weight bias, weight bias internalization, and shame. Our hypothesis that people higher in self-compassion would be protected from the direct effects of EWB on psychosocial health was supported for PTSS and emotional eating, but not for anxiety or depression (hypothesis #4a). The observed suppression effect was intuitive; as suggested in prior research, individual responses to EWB vary widely (Himmelstein et al., 2018). Whereas some people may directly respond to EWB with shame or internalize EWB and report experiencing subsequent shame and negative affect, others still may respond immediately to such experiences with self-compassion and experience mitigated distress, as appears in our sample. This finding supports our theory that self-compassion may be an important factor to protect against the direct effect of weight bias on PTSS and emotional eating in bariatric surgery patients.

Our hypothesis that self-compassion would protect against risk paths implicating internalized shame (hypothesis #4b) in worse symptom severity and emotional eating was supported under most conditions after controlling for ACE. Self-compassionate people who reported experiencing weight bias accompanied by IWB, internalized shame, and for some, body shame, reported improved psychological health and emotional eating, in contrast to risk models and paths that did not include this protective factor. As hypothesized, people higher in self-compassion experienced some protection against the effects of EWB through the intervening sequelae on each outcome. While self-compassion did not protect against all risk paths for all people in our sample, these findings clearly suggest future research would benefit from investigating the causes and conditions under which it is
protective, and its feasibility as an intervention target to mitigate risk of anxiety, depression, PTSS, and emotional eating related to EWB, IWB, and internalized shame in bariatric surgery candidates.

Finally, although we conceptualized self-compassion as protective if, or when, other negative contextual or self-processes such as EWB, IWB, or shame are activated, other studies have conceptualized low self-compassion as a risk factor (e.g., Pinto-Gouveia, Ferreira, & Duarte, 2014). Our results may be interpreted similarly. For instance, we can conceptualize low self-compassion as a facilitating risk mechanism in the associations between EWB and poor psychosocial health. While the conceptualization differs, the processes are statistically identical and have similar implications for prevention and treatment. We now turn to discussion of construct-specific findings, and consider future directions and treatment implications for each.

**Anxiety and depressive symptoms.** Anxiety is the most common current psychiatric disorder in pre-bariatric candidates (Malik et al., 2014), while major depressive disorders are the most common lifetime psychiatric disorder (Kalarchian et al., 2007; Malik et al., 2014). Despite lower overall rates of anxiety and depression in our sample compared to other samples of bariatric surgery patients, our findings strongly suggest differential mechanisms related to EWB underlying each disorder. Our findings mark an important initial inquiry into the factors that may be targeted in future screening and detection of varied psycho-behavioral phenotypes reporting anxiety and depressive symptoms, and underscore the need for continued research to better understand how these factors interact across time.

**Risk path models of anxiety.** The modeled constructs accounted for about one-third of the variance in anxiety symptoms, and EWB’s effects on anxiety were fully accounted for by the modeled mediators (i.e., full mediation). In addition, internalized shame was implicated in all risk paths to greater anxiety following the indirect effects of EWB through IWB, suggesting this factor may be a particularly salient treatment target for bariatric surgery candidates reporting anxiety, EWB, and IWB. One unique risk path emerged from EWB to greater anxiety through body and then
internalized shame. This was the only risk path across all risk models/outcomes to implicate body shame directly following EWB on worse symptom severity after controlling for ACE, excluding IWB as an intervening variable. It is possible that those who experience body shame in direct response to EWB have been primed to experience body shame independent of IWB due to other factors (e.g., eating pathology) or prior adverse interpersonal experiences unmeasured in this study (traumatic stressors; harsh/critical caregivers; other forms of discrimination). Another possibility is that this effect operates indirectly via other mechanisms, such as anticipated weight bias (i.e., weight-based rejection sensitivity, anxiety regarding the expectation of experiencing weight bias; Brenchley & Quinn, 2012).

**Risk path models of depressive symptoms.** While the overall model accounted for slightly less than a third of variance in depressive symptoms, in contrast to other risk path models, IWB alone fully accounted for the indirect effect between EWB and depression (i.e., full mediation). Our hypothesis #3 that internalized shame would mediate the effects of EWB/IWB was unsupported. This hypothesis was based on theory and research that has implicated internalized shame in the etiology of depression in bariatric surgery patients (Ivezaj, Barnes, & Grilo, 2016; Lier et al., 2011; Lier, Biringer, Stubhaug, & Tangen, 2012) and other populations (e.g., Skerrett, Kõlves K., & De Leo, 2015; Stuewig & McCloskey, 2005). However, a meta-analysis of available evidence in non-bariatric surgery samples revealed that external shame, involving negative self-construal as seen through the eyes of others (Goss, Gilbert, & Allan, 1994), appears a stronger predictor of depression than internalized shame (Kim, Thibodeau, & Jorgensen, 2011). External shame shares close parallels with the construct of stigma consciousness (i.e., the extent to which individuals expect to be stereotyped by others; Pinel, 1999) and may also relate to anticipated weight bias (Brenchley & Quinn, 2012).

IWB, most commonly assessed with the WBIS measure, is a complex construct that includes items related to body shame and internalized shame (“I hate myself for being overweight”; “My weight is a major way that I judge my value as a person”), as well as external shame (“I feel anxious
about being overweight *because of what people might think of me*; “Because of my weight, *I don't understand how anyone attractive would want to date me*”; emphases added; Durso & Latner, 2008). As a construct, IWB thus captures a great deal of variance that overlaps with other measures in our study. One way of conceptualizing our findings is that these analyses effectively partialed body and internalized shame out of the IWB construct, with the remaining IWB variance predicting depression reflecting the presence of external shame or other factors.

Several explanations have been offered for why external shame may be a stronger predictor of depression than internalized shame. Kim and colleagues (2011) theorize external shame may be more strongly associated with depression due to the acute awareness of lost favor of valued others in social settings. This social devaluation mirrors “evolutionarily primitive anxieties related to the dangerous possibility of abandonment or rejection” (Kim et al., 2011, p. 74). A further possibility for why the social threat of external shame may engender greater depression than internalized shame is the presence of self-persecution in internalized shame. While deeply painful, harsh self-criticism has been theorized to serve the key function of defending against external shame (Gilbert, 1998). Thus, the harsh and critical self-blaming attitudes of internalized shame may keep the self safe via the adoption of subordinate submissive strategies hoped to undermine further attacks from the shamer, and improve one’s image in the latter’s eyes (Gilbert, 1998). Hence in the absence of internalized shame as a defensive response, external shame may predict greater depression. This theory has yet to be empirically demonstrated. However, the presence of external shame encompassed by IWB offers a plausible explanation for why variance remaining in IWB after accounting for body and internalized shame predicted depression in our sample. A final possibility is that our sample may have lacked sufficient variance to detect an affiliation between internalized shame and depression among those for whom such a linkage exists.

**Shared findings in protective path models of anxiety and depression.** Two shared findings emerged in protective paths of anxiety and depressive symptoms. First, self-compassion did not
protect against the direct effects of EWB on anxiety and depressive symptoms. It may be that the lower base rate of reported depressive/anxiety symptoms in our sample offers limited variance to detect a conditional effect should one exist, and does not preclude the possibility that self-compassion may protect against EWB in a different sample. It is also possible that self-compassion is ineffective at mitigating anxiety and depressive symptoms experienced in direct response to EWB, suggesting other risk or protective factors may be important to mobilize or target. Such factors may include, as noted, the related constructs of external shame or stigma consciousness and anticipated weight bias, particularly given conceptual linkages between anticipated weight bias and anxiety, and between external shame and depression. Self-compassion may be more protective against the effects of these underlying constructs than depressive/anxiety symptoms themselves, an interesting hypothesis for future research.

Second, although depression had no association with body and internalized shame after accounting for IWB in regression/risk path models, protective path models of depression revealed two protective paths shared with anxiety. Self-compassionate people reported fewer anxiety and depressive symptoms if they endorsed experiencing weight bias that was associated with IWB, internalized shame, and for some, body shame. Thus, self-compassion appears to offer some protection against anxiety and depressive symptoms for people who report this pattern of associations. Future research would benefit from understanding whether self-compassion is more globally protective against the sequelae that foster depression in bariatric surgery patients over time.

*Protective path findings unique to anxiety.* One unique finding was evident. After controlling for ACE, the emergence of a new risk path implicating EWB in greater anxiety symptoms suggests a complex suppression effect. This risk path was only evident in the model that included both self-compassion and ACE. We conjecture that the relationship between ACE and self-compassion may be reciprocally or mutually suppressing variance in other variables, with the inclusion of self-compassion in this model clarifying variance in EWB after accounting for ACE.
Thus, holding a history of ACE and self-compassion constant, EWB is associated with greater anxiety through IWB and then body shame. This is the sole path across outcomes/analyses to implicate body shame as the most proximal predictor of symptomatology, aligning with Tylka et al.’s (2014) weight bias model. Better understanding whether increased risk of anxiety following EWB through IWB and body shame is replicable, and the roles of ACE and self-compassion in moderating these links, would yield insights for intervention.

*Protective path findings unique to depressive symptoms.* Two protective paths to lower depression became non-significant after accounting for ACE. In the first, ACE better accounted for the protective path whereby people higher in self-compassion who reported EWB, body shame, and internalized shame indicated fewer depressive symptoms. In the second, the suppression path from EWB to lower symptoms through self-compassion was accounted for by ACE. IWB was implicated across the remaining two protective paths, aligning with findings from other models. These findings underscore the strong role of IWB in fostering depressive symptomatology following EWB, and lend some support to the hypothesis that body shame reported in immediate response to EWB may better be attributable to antecedent stressors. While beyond the parameters of the present study, the disappearance of these paths after controlling for ACE suggests that self-compassion may protect against the effects of ACE on shame and depressive symptoms in bariatric surgery patients. This hypothesis is consistent with recent studies implicating self-compassion as a protective factor in amelioration of distress among those exposed to trauma (Barlow, Goldsmith Turow, & Gerhart, 2017; Scoglio et al., 2015; Valdez & Lilly, 2016). Future investigation of this hypothesis is warranted, given its implications for screening and treatment.

Last, there was no indication in our sample that self-compassion protected against the strong risk path of EWB with depression through IWB alone. That is, only those self-compassionate people who reported shame following EWB and IWB reported fewer depressive symptoms. This suggests limits of self-compassion in addressing the etiology of depression in bariatric surgery patients when
related to IWB and/or the theorized related factor of external shame, although this explanation contrasts with extensive theory and prior evidence showing self-compassion buffers against the effects of external shame on eating pathology (Ferreira, Pinto-Gouveia, & Duarte, 2013; Marta-Simoes, Ferreira, & Mendes, 2016). It is also plausible is that there is limited variance or power in our sample to detect a true relationship, with too few people simultaneously experiencing EWB, IWB, high self-compassion, and lower depressive symptoms independent of body and/or internalized shame to detect the presence of an indirect effect.

**Future directions and treatment implications of anxiety/depression models.** Our finding that internalized shame was the strongest contributor to anxiety symptoms and IWB the strongest contributor to depressive symptoms after accounting for other constructs underscores a need for continued investigation into the differential mechanisms underlying anxiety relative to depression in bariatric surgery patients. How these factors and related mechanisms interact across time in the prediction of post-operative outcomes has implications for screening and intervention. This is particularly salient given meta-analytic evidence that suggests bariatric surgery is associated with improvements in depressive, but not anxiety, symptoms (Dawes et al., 2016). Differential mechanisms underlying each may explain post-operative resolution vs. maintenance, and warrant a tailored approach. Such research is particularly important given the cited associations between both anxiety and depression with psychopathology and risk behaviors.

Some research stimulates conjecture as to the mechanisms through which EWB and related factors may interact to affect adverse post-operative psycho-behavioral health. In a nationally representative study of U.S. adults, EWB mediated the link between formerly overweight status (i.e., those who were overweight and subsequently lost weight, with parallels to post-operative weight loss in bariatric surgery patients) and anxiety, depression, and suicide attempts (Levy & Pilver, 2012). The researchers posited that prolonged saliency of EWB among those formerly overweight may facilitate a susceptibility to anticipating EWB that is not necessarily warranted by the reality of
everyday life experience, and hypothesized that this in turn would explicate the observed psychopathology. Levy and Pilver’s (2012) conceptualization incorporates aspects of IWB bias and internalized shame (i.e., ‘susceptibility’ infers bias has been internalized and become a trait, rather than state), as well as constructs not included in the present study, anticipated weight bias (i.e., anticipating prejudice or unfair/unkind treatment from others based on one’s weight status, independent of EWB; Brenchley & Quinn, 2012) and external shame (i.e., viewing oneself as undesirable based on one’s weight status through the eyes of the other; Goss et al., 1994).

The diverse mechanisms of anticipated weight bias and external shame share in common ways that EWB has shaped a stigmatized self and identity, whether through anticipation of weight bias from others, internalization of weight bias, and/or generalization of these predispositions to global negative self-construal and internalized shame. The affiliation of EWB with anxiety, depression, and suicidality in this formerly overweight sample may be theorized to reflect a greater or lesser proportion of underlying external shame, internalized shame, anticipated weight bias, and other risk mechanisms shaped by stigma, trauma, and adverse interpersonal experiences, as well as factors related to heritability and neurophysiology. The variable prevalence and interaction of such mechanisms may plausibly explicate inconsistent results on associations of pre- and post-operative psychosocial health across studies, given differential implications of each for post-operative resolution and treatment.

While generalizability of Levy and Pilver’s (2012) findings to the bariatric surgery population is limited, they offer preliminary support for the hypothesis that psychosocial risk sequelae related to EWB are unlikely to resolve through weight loss alone for those vulnerable, and may even prove exacerbated post-operatively, requiring psychological or other intervention. This hypothesis offers one possible explanation for the finding among bariatric surgery patients that shorter-term post-operative improvements in psychopathology mitigate longer-term (e.g., Dawes et al., 2016; Herpertz et al., 2017; Switzer et al., 2016). Previously-cited research offers additional
support for this hypothesis, including prospective findings that a construct related to IWB, fear of negative evaluation, predicted post-operative psychopathology among those who lost more, but not less, weight (Adams et al., 2011). Further, as indicated, IWB has been found to predict both pre-operative depression and less weight loss at 12 months (Lent et al., 2014).

Our findings also suggest the possibility that specific risk mechanisms following EWB – IWB for depression, and IWB and internalized shame for anxiety – may contribute to variable trajectories in post-operative psychopathology and suicidality among those vulnerable. It is also possible, as we have hypothesized, that the association of EWB with depression through IWB is better explained by more proximal mediating variables (e.g., external shame, anticipated weight bias, stigma consciousness). Levy and Pilver’s (2012) findings and conceptualization parallel our explanation that the strong affiliation of IWB and depression after accounting for body and internalized shame in our study of bariatric surgery patients may reflect latent variance related to external shame and/or anticipated weight bias, implicating these as particularly key constructs to assess in future research. This is particularly important given differential implications of internalized shame, external shame, and anticipated weight bias for post-operative psycho-behavioral health and treatment.

*Differential treatment implications of external shame, internalized shame, and anticipated weight bias.* External shame affects have been argued as amenable to clinical intervention, with the legitimacy of the interpersonal or sociocultural ‘judger or rejecter’ theorized more readily dismantled via psychoeducation, literacy, and reparative interpersonal experience (Gilbert, 2007). Notably, the bariatric surgery intervention results in profound alteration or elimination of the primary stigmatized attribute (i.e., obesity). Post-operative weight loss may mitigate obesity-related external shame, particularly in the two-year “honeymoon” period after surgery. Yet it is also possible that external shame develops secondary of other post-operative sequelae (e.g., excess skin) in some individuals,
which in turn contributes to maintenance or re-emergence of psycho-pathological sequelae, including maladaptive eating behaviors and subsequent weight regain.

By contrast, Gilbert (2007) posited, internalized shame is considerably more difficult to treat, given its strong association with self-hatred, negative self-schemas (e.g., ‘I am bad at the core of me’; ‘if you knew the real me, you would not like me’; Gilbert, 2007, p. 21), and internal feelings of self-persecution. Those with high internalized shame, per Gilbert (2007), may find it difficult to trust a therapist or other providers, and be more likely to dismiss therapeutic efforts to disconfirm negative core schemas. Treatments for internalized shame or internalized shame with co-occurring external and/or body shame may thus be more likely to require more intensive and interpersonal intervention that enhances insight into the function of internalized shame than might treatments for presentations with a primary external shame component. Internalized shame may be hypothesized as much less likely to resolve following bariatric surgery independent of clinical intervention, as it is not specific to a visible stigmatized attribute but rather the whole self, and may shift its focus of hated aspects of the self over time. Indeed, it is possible that EWB and IWB related to extreme obesity may not only lead to, but over time justify, internalized shame (i.e., self-hatred and self-loathing, towards one’s whole self as well as one’s obesity) and that, following weight loss in those susceptible, internalized shame could locate another diffuse aspect of the self to hate. The complex interaction of related factors may play a role in the uptake of post-operative risk behaviors, including substance use, self-harm, and suicidality.

The construct of anticipated weight bias, or weight-based rejection sensitivity, relates to aspects of both external and internalized shame and may serve as a bridge between these factors (Brenchley & Quinn, 2012). The internalization of the predisposition to anticipate stigmatizing experiences may be less amenable to post-operative resolution than might the ‘cleaner’ construct of external shame, which is theorized to resolve following challenging and/or mitigation of the stigmatized attribute. As such, anticipated weight bias may play a greater role in the maintenance of
internalized stigmatized identity following weight loss, and feasibly contribute, alongside internalized shame, to post-operative psychopathology. It may also, like internalized shame, require more intensive interpersonal intervention to resolve, although it is equally plausible that weight-based rejection sensitivity that occurs independent of internalized shame could mitigate following weight loss, an interesting hypothesis for future research.

Future directions for study of EWB-related anxiety/depressive symptoms in bariatric surgery patients. As indicated previously, bariatric surgery has generally been associated with shorter-term improvement of post-operative depression, but not anxiety, although there are notable exceptions (Dawes et al., 2016). It has been suggested that psychopathology secondary to obesity is more likely to resolve with surgery, whereas psychopathology primary to obesity is much less likely to do so (Wimmelmann et al., 2014). Our finding that IWB is most strongly associated with depressive symptoms, and internalized shame most strongly with anxiety, following EWB, add nuance to this conceptualization. As noted, IWB’s strong prediction of depression after accounting for internalized and body shame suggests residual variance related to external shame and/or anticipated weight bias. Since external shame is theorized to resolve more readily than internalized shame, it may be that the short-term post-operative improvements in depression reflect mitigation of external shame related to the stigma of obesity (EWB).

Conversely, the post-operative maintenance of anxiety may be hypothesized to reflect the theorized greater treatment recalcitrance of underlying internalized shame and/or anticipated weight bias. Hence, it is possible that the strongest predictor of post-operative psychopathology is not whether such psychopathology is primary or secondary to obesity, but rather the strength of the underlying differential risk mechanisms (e.g., external shame, internalized shame, or anticipated weight bias) and the interaction of adverse interpersonal experiences that facilitate them. Better understanding the associations between such factors prospectively, particularly in relation to
neurophysiology, is an important focus of research, with an eye towards developing metrics to detect and intervene for those vulnerable to these sequelae.

**Post-Traumatic Stress Symptoms (PTSS).** Elevated PTSS scores in our sample exceed the probable cut-point for PTSD (Blanchard et al., 1996; VA National Center for PTSD, 2012), consistent with elevations in PTSD observed in other bariatric surgery samples (Kalarchian et al., 2007). To our knowledge, this study marks the first preliminary investigation of the etiology of PTSS and related mechanisms in bariatric surgery patients, and the first to conceptualize PTSS as related to EWB after adjusting for ACE. While qualified by our lack of assessment of the Criterion A traumatic stressor required for a provisional DSM-IV (1994) PTSD diagnosis, our overall findings – including that EWB/IWB accounted for over one fifth and internalized shame for over one seventh of variance in PTSS, with ACE by comparison accounting for less than one seventh – mark an important first step towards better understanding how etiologies of PTSS and related risk factors may interact to affect psychosocial health and, pending future research, post-operative trajectories in bariatric surgery patients. Our results strengthen the inference that EWB alone, independent of ACE, may contribute to PTSS and prove a vastly understudied contributor to poor post-operative psycho-behavioral health and weight loss trajectories in this population.

**Risk path models of PTSS.** The modeled variables accounted for over one half of the variance in PTSS, increasing to nearly sixty percent after controlling for ACE. Our finding that the effect of EWB on PTSS in bariatric surgery patients was partially accounted for by indirect effects (i.e., partial mediation) extends the prior link found between EWB and PTSD in a national sample (Hatzenbuehler et al., 2009) by examining the theorized risk paths through which EWB-related PTSS may develop, and documenting maintenance of these paths after accounting for ACE. These findings offer preliminary support for viewing EWB as a cumulative traumatic stressor, a hypothesis consistent with research in racial/ethnic and sexual minority populations, which has conceptualized and found discrimination, particularly when sustained over time, to function as a traumatic stressor
Future studies that account for other traumatic event exposures and employ rigorous psychodiagnostic assessments, such as the Clinician-Administered PTSD Scale (CAPS; Blakes et al., 1995), are warranted to examine this possibility.

Internalized shame emerged the strongest predictor of PTSS in our models and was present in all risk paths, aligning with considerable evidence implicating shame as a risk mechanism in the etiology of PTSS following trauma (Gaudet et al., 2015; Saraiya & Lopez-Castro, 2016). This finding is noteworthy, as it is the first to associate EWB with internalized shame and PTSS in the literature, and suggests internalized shame may serve a plausible risk mechanism through which weight bias may impact PTSS and, potentially, concerning post-operative risk behaviors. Nonetheless, the partial mediation indicates that other factors unaccounted for in our models predict PTSS following EWB in our sample, such as other traumatic or minority stressors, demographic factors, and/or the interaction between these factors.

**Protective path models of PTSS.** Self-compassion accounted for added variance in PTSS and, consistent with other protective path models, self-compassionate people were protected from the associations between EWB and PTSS via IWB and internalized shame and, for some, body shame. Unique to the model of PTSS, people reporting greater self-compassion reported lower PTSS following EWB and IWB. While no corresponding risk path for this affiliation was present in risk path models, possibly due to lack of variance in our sample, this finding suggests that self-compassion is protective against associations of EWB and IWB with PTSS in the absence of shame. It is also possible that self-compassion may protect against the effects of EWB and IWB on PTSS through other factors, such as coping responses (Himmelstein et al., 2018).

While self-compassion mitigated most risk paths from EWB to PTSS, two paths remained from IWB through internalized shame and from IWB through body and then internalized shame. These risk paths were uniquely significant for PTSS in protective path models. Although those higher
in self-compassion were protected from these associations, the continued significance of these risk paths in the protective models indicates there are less self-compassionate individuals in our sample who may be more susceptible to the adverse effects of these sequelae on PTSS. It is unknown whether self-compassion training might mitigate these risk paths for those vulnerable or if other strategies may be more beneficial, a subject for future investigation. It is also likely that a given protective factors may not be universally and culturally applicable, and that sociodemographic factors may account for or moderate this observation. For instance, consider the study that found self-love coping to protect against depressed mood following EWB in White, but not Black, bariatric surgery candidates (Fettich & Chen, 2012). Continued investigation of a broader array of protective factors in different groups is an important direction for future research.

**Discrimination as a traumatic stressor.** As noted, some researchers have compellingly argued that repeated discrimination can comprise a traumatic stressor (Alessi & Martin, 2017; Carter, 2007; Sanchez-Hucles, 1999). A robust debate has characterized whether so-termed “non-traumatic” events such as emotional abuse, or minority stress qualify as antecedents for diagnosis of PTSD, and, as noted, some evidence suggests elevations in PTSS following non-traumatic events, including sexual minority stress, are similar to or even elevated when compared those characterized by Criterion A events (Alessie et al., 2013; Gold, Marx, Soler-Baillo, & Sloan, 2005; Long et al., 2008; Roberts et al., 2012). Nonetheless, the DSM-IV (1994) is clear in requiring a Criterion A event for a provisional PTSD diagnosis. Per such criteria EWB would qualify as a non-traumatic stressor, although the marked elevations in our sample exceed the cut-off for likelihood of PTSD. Future research would benefit from a more thorough assessment of EWB in relation to traumatic and minority stress, as well as other sociodemographic factors, to better understand its unique contributions to PTSD vs. PTSS in the prediction of psycho-behavioral health, and identify treatment targets. Such an approach would align with Himmelstein, Puhl, and Quinn’s (2017) work illustrating the importance of utilizing an intersectional lens. Intersectionality refers to the study of
interconnections between multiple, interrelated social categories and/or identities, based on the principle that advantages and disadvantages interact in complex and not simply additive ways to shape health at both individual and structural levels (Bowleg, 2012; Crenshaw, 1991).

**Treatment considerations for EWB-related PTSS in bariatric surgery patients.** While protective path models suggest self-compassion may be an important part of a preventive, multi-pronged approach to mitigate development of PTSS following EWB, IWB, and shame, self-compassion alone may be unlikely to treat the adverse effects of PTSS. Studies in other populations that experience discrimination offer some clues for the assessment and treatment of PTSS in bariatric surgery patients. For instance, the association between prejudice and symptoms of post-traumatic stress among racial/ethnic minorities (e.g., Williams & Mohammed, 2009) has led to tailoring of Evidence-Based Practices for PTSD, such as a recent Prolonged Exposure treatment modified for use with African Americans that addresses racism-related trauma (Williams et al., 2014). Some evidence also suggests Acceptance and Commitment Therapy approaches may be particularly helpful for mitigation of distress related to weight bias and minority stress (e.g., Levin, Potts, Haeger, & Lillis, 2018; Skinta, 2014; Skinta, Lezama, Wells, & Dilley, 2014). Future research may wish to assess whether bariatric surgery patients who report EWB and PTSS benefit from tailored trauma treatment that addresses the effects of weight bias alongside other traumatic and minority stressors, and whether such treatment may enhance post-operative psycho-behavioral health.

**Emotional eating.** While rates of emotional eating are generally heightened in bariatric surgery samples, our sample reported considerably lower levels than have other samples. As noted, possible reasons for this include lower levels of anxiety and depression, and greater self-compassion, given the latter’s strong associations with healthier eating behaviors (Braun et al., 2016). As discussed in the reviewed literature, the inconsistent prediction of pre- to post-operative emotional eating and weight loss may be attributable to inconsistent measurement of underlying mechanisms. This study is the first to associate emotional eating with EWB and IWB in bariatric surgery.
candidates, and to examine body and internalized shame as mediators of these effects. Our overall finding that EWB and related mechanisms, including self-compassion, accounted for nearly two-fifths of the variance in emotional eating, with ACE making no added contribution, offer a novel addition to the literature on emotional eating in bariatric surgery patients. These findings lend preliminary support to the hypothesis that EWB and related mechanisms may be more salient targets of prevention and treatment of emotional eating than ACE for some bariatric surgery patients. Nonetheless, the causes and conditions through which, and for whom, this occurs, remain an important focus of future investigation with implications for post-operative psycho-behavioral health.

**Higher SES predicted greater emotional eating.** Those on Medicaid reported less emotional eating than did those with private insurance, and the latter accounted for substantial variance in emotional eating after accounting for other factors across analyses. While most prior research documents a link between lower SES, obesity, and emotional or binge eating (e.g., Baum & Ruhm, 2009; Olson, Bove, & Miller, 2007; Reagan & Hersch, 2005), some studies have observed an association between higher SES and emotional (Spinosa, Christiansen, Dickson, Lorenzetti, & Hardman, 2019) and stress eating (Laitinen, Ek, & Sovio, 2002). Our observation does not preclude the presence of poor eating behaviors in our heterogenous sample of people of lower SES, who may under some conditions be less likely to report emotional eating yet engage in other unhealthy eating behaviors. For example, in some cultural groups, greater portion sizes or comfort eating may prove more culturally or familially normative than it may be for other groups (e.g., Alleyne & LaPoint, 2004; Clark & Winterowd, 2012; Pine, 1985).

Additionally, some people of higher SES may feasibly experience different subjective mechanisms for overeating than might those of lower SES and/or other sociodemographic characteristics. For example, consider a higher SES bariatric surgery patient who identifies with other concealable and/or visible stigmatized identities, has a history of trauma, and experiences few buffering/protective factors. A greater or lesser proportion of such persons in any given sample may
contribute to mixed findings, as has been argued by proponents of using an intersectional approach in the study of marginalization and weight bias (Collins, 1998; Himmelstein et al., 2017, 2018). Future research may benefit from assessing whether this finding is replicable, and elucidate the risk mechanisms through which greater SES is associated with increased self-reported emotional eating in bariatric surgery patients, including EWB, IWB, and other factors (e.g., race/ethnicity, sex, and sexual/gender identity).

**Risk path models of emotional eating.** The modeled variables accounted for over one-third of variance in emotional eating, and the association between EWB and emotional eating was fully accounted for by IWB, body shame, and internalized shame (i.e., full mediation). The risk path associating EWB with greater emotional eating through IWB in our sample replicates research in non-bariatric samples that have found IWB to mediate the link between EWB and poor eating behaviors (Durso et al., 2012; O’Brien et al., 2016). There are several possible explanations for why IWB associated with emotional eating independent of internalized or body shame, including that IWB itself or other, more proximal factors such as external shame, anticipated weight bias, negative affect, distress, stress, emotion dysregulation, poor coping strategies, and/or other factors may predict emotional eating following EWB. Some evidence supports this hypothesis, including the study that found EWB associated with greater depressive symptoms via coping through negative affect, and with dieting through coping via maladaptive eating (Himmelstein et al., 2017), and the study in bariatric surgery patients that found emotion dysregulation to mediate the link between IWB and emotional eating (Baldofski et al., 2015). Elucidation of a more extensive array of mechanisms of the effects of IWB on emotional eating would assist in the development of improved specification of psycho-behavioral phenotypes, with implications for treatment.

The two risk paths implicating internalized shame as the most proximal predictor of emotional eating following EWB and IWB adds to our understanding of these processes, implicating this factor as more closely related to emotional eating than IWB for some people. Notably, all three
risk paths from EWB to greater emotional eating, after accounting for ACE, included IWB, while two paths shared with anxiety, depression, and post-traumatic stress symptoms included IWB and internalized shame. Pending further research, both constructs appear promising intervention targets for mitigation of emotional eating behaviors and psychiatric symptoms that may contribute in some people who experience weight bias.

After controlling for ACE, two risk paths from EWB to greater emotional eating were no longer significant. EWB no longer predicted emotional eating through the indirect effects of body shame through internalized shame, or through internalized shame alone. These findings suggest that when body or internalized shame is experienced proximal to EWB (i.e., independent of IWB) and is associated with greater subsequent emotional eating, the etiology of this sequence in our sample is attributable to ACE, rather than EWB, or the interaction between these factors. While conjectural, given the cross-sectional nature of our data, it makes some sense that shame experienced in immediate response to EWB – that is, shame that does not come about as a result of internalizing EWB first, as in IWB – may be experienced as a result of having internalized prior shaming experiences, in this case, ACE.

Dispositional shame is conceptualized to develop in response to repeated adverse interpersonal experiences that are then internalized. In our sample, ACE appears to plays an exogenous role in the sequelae leading to emotional eating among those reporting body and/or internalized shame in direct response to EWB. This sequence is implied by other evidence that has suggested internalized and/or body shame mediate the association between traumatic stressors and disordered eating behaviors (Andrews, 1995; Murray & Waller, 2002). Indeed, it is plausible that EWB may modify or amplify the affiliation between ACE and these factors as suggested by Salwen and colleagues (2014), an interesting topic for future study given the implications for screening and treatment. While our findings provide some evidence that ACE may account for some variance in eating-related outcomes that EWB has previously been shown to account for, and/or that there may
be interaction between these factors, cautions are warranted with this interpretation, our sample size is modest, and this observation may better be attributed to sample-specific variance for the cited risk paths.

**Protective path models of emotional eating.** The inclusion of self-compassion in models of emotional eating accounted for nearly an added tenth of variance and eliminated all prior risk paths. EWB was associated with lower emotional eating via greater self-compassion through four pathways. Paralleling results for anxiety, depression, and post-traumatic stress, two paths indicated lower emotional eating among self-compassionate people who experienced weight bias and reported IWB, internalized shame, and, for some, body shame. Two additional unique protective paths associated EWB with less emotional eating through the indirect effects of EWB, IWB, and greater self-compassion, and through self-compassion alone.

Notably, all four protective pathways for emotional eating are shared with PTSS, suggesting shared etiologic mechanisms between PTSS and emotional eating following EWB. The latter possibility suggests a parallel mechanism through which minority and/or traumatic stress and PTSD associate with weight gain over time (Dedert et al., 2010; Mason, 2016; Perkonigg, Owashi, Stein, Kirschbaum, & Wittchen, 2009), lending some support to the hypothesis that developments in PTSS and maladaptive eating following adverse interpersonal event exposure share some etiological risk paths. The potential interaction between EWB and internalized shame, PTSS, PTSD, and maladaptive eating behaviors, including emotional eating, in the prediction of post-operative psycho-behavioral health is an important focus of future research. Our results, which implicate self-compassion as protective against the shared sequelae between EWB and both PTSS and emotional eating, suggest multiple nodes at which it may interrupt the risk sequelae that foster both in bariatric surgery patients.

Last, when controlling for ACE, the protective path showing self-compassionate individuals who reported less emotional eating irrespective of preceding EWB, body shame, and internalized
shame no longer retained significance. This finding suggests that self-compassion offers some protection against the risk sequelae for emotional eating that stem from ACE. It is also possible there may be an interaction between EWB and ACE through these factors in the prediction of EE, or that self-compassion may offer protection for the direct effect of ACE on emotional eating through shame. Both are interesting topics of future inquiry.

_Treatment implications and future directions for studying EWB-related emotional eating in bariatric surgery patients._ A growing literature implicates self-compassion as protective against the risk sequelae implicated in eating pathology, indicating it is likely to interrupt the mediational sequence that results in emotional and binge eating in diverse samples (Braun et al., 2016). Our findings offer some support for this conceptualization in bariatric surgery patients. Anxiety, depression, and PTSS have all been implicated as contributors to dysregulated eating behaviors (e.g., Araujo, Silva Santos, & Nardi, 2010; Brewerton, 2007; Swinbourne & Touyz, 2007). The current study found self-compassion modeled following EWB (and ACE) as associated with less anxiety, depressive, and PTS symptoms, implicating it as buffering some of the mediational links through which emotional eating may develop. That two protective paths were shared across constructs – from EWB to reduced symptoms and lower emotional eating through the indirect effects of greater self-compassion associated with less IWB, internalized shame, and for some, body shame – is particularly supportive of this hypothesis. Future research would benefit from clarification of the pathways through which psychopathology may contribute to dietary disinhibition in bariatric surgery patients, and whether self-compassion or other factors offer some protection against these associations, irrespective of etiology.

**Strengths and Limitations**

This study is characterized by several notable limitations, including the self-report nature of instruments, the cross-sectional design which precludes causal inference of the modeled temporal sequelae, and the prior cited tendency for bariatric surgery candidates to under-report psychiatric
concerns (Ambwani et al., 2013; Malik et al., 2014; Rosik, 2005). Further, due to the nature of the study design and data collection process, data collected online was collected at a different timepoint than data in patient medical charts, introducing a confound into our findings. Interestingly, rates of anxiety and depression, assessed at the antecedent psychological evaluation for surgery, were lower than those of post-traumatic stress and emotional eating, collected at a later time-point via an online survey confidential from the bariatric surgery team. Further, our models accounted for generally greater variance in PTSS and emotional eating when compared to depression and anxiety. These observations may be related to divergent data collection timepoints or issues of under-reporting. Future research should rectify these issues by collecting all data at one timepoint, preferably independent from the psychological evaluation process for surgery to ensure increased accuracy.

With respect to body shame, it is possible that we did not observe better prediction by this measure because we used a subset of items from the original scale. This may also explain why IWB was a comparatively stronger predictor of outcome. Future research would benefit from using a more widely used and validated scale of body image shame that assesses multiple dimensions, such as the Body Image Shame Scale (Duarte et al., 2015).

There are also several limitations respecting the use of the PCL-C-4 (Wilkins et al., 2011). First, as noted our study did not assess for the presence of a Criterion A stressor, defined as exposure to “death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence”; the duration of PTSS symptoms (Criterion F); the functional significance of reported symptoms on distress or functional impairment (Criterion G); and whether the reported symptoms are better explained by medication, substance use, or other illness (Criterion H), criteria required for a formal PTSD diagnosis per the DSM-IV (1994). Thus, although we controlled for common traumatic childhood stressors (ACE), it is unknown whether the observed PTSS in our sample are attributable to EWB, the presence of other “non-traumatic” events, Criterion A events, and/or interactions between these factors, important inquiries for future research.
Second, because the PCL-C-4 correlates highly with measures of depression and anxiety (Wilkins et al., 2011), without the anchor to a specific trauma, it may detect negative emotionality rather than emotions specific to PTSD (DSM-IV, 1994). Our lack of measurement of a qualifying Criterion A stressor raises the possibility that the measure of PTSS may have been tapping general distress related to other forms of psychopathology. Future research would benefit from the use of structured diagnostic interviews to better differentiate symptom profiles. Despite these limitations, the substantially greater proportion of variance accounted for by the modeled variables in PTSS, when compared to more modest proportions for depression and anxiety, suggest this measure captured unique variance related to PTS. Finally, the PCL-C-4 has been observed to be above the reading level for some adults (Wilkins et al., 2011). We did not assess mean levels of education in our study, and can’t preclude the possibility that this was the case for our sample. Relatedly, as noted, we did not assess comprehensive traumatic event exposure, an important focus of future research to better ascertain the differential contributions of EWB and sequelae relative to traumatic stressors to PTSS in the bariatric surgery population.

The construct of emotional eating may also have limited predictive validity for the bariatric surgery population. Evidence on the predictive utility of emotional eating in relation to post-operative outcomes has proven mixed, which may reflect the known limitations of self-reported emotional eating (Bongers & Jansen, 2016). Two studies observed pre-surgical emotional eating behavior to predict improved post-surgical outcomes (Busetto et al., 2002; Wedin et al., 2014). Nonetheless, base rates of eating pathology in our sample were too low to examine, so we elected to report emotional eating instead. Our findings still generate interesting hypotheses about the sequelae related to EWB that foster other maladaptive eating behaviors, in bariatric surgery as well as non-bariatric samples. However, future research would benefit from the use of structured interviews and/or Ecological Momentary Assessment or similar technology to gain a more accurate read on emotional or binge eating behavior.
Relatedly, SES was assessed using Medicaid vs. private insurance as a proxy. This method may have under- or over-estimated actual SES, which may have important implications for our finding that greater SES predicted emotional eating after accounting for other modeled constructs. Future research should include more reliable indicators of SES to better understand its affiliation with emotional eating in bariatric surgery patients.

Finally, two caveats emerge with regard to self-compassion findings. First, self-esteem, a critical variable to control for in the study of self-compassion, was excluded from study surveys based on a clerical error. Robust theory and literature indicates self-compassion is non-susceptible to the pitfalls of self-esteem and widely predicts psychological and behavioral health independent of self-esteem, including among persons with obesity (e.g., Braun et al., 2016; Neff & Vonk, 2009; Zessin et al., 2015), and self-compassion has been found protective against the effects of low self-esteem (Marshall et al., 2015). Controlling for self-esteem is important to understand whether such findings are replicable in the bariatric surgery population. Further, given recent findings that low self-esteem mediated affiliations between BMI and depression/suicidality in bariatric surgery patients (Yusufov et al., 2017), future research is likely to benefit from examining the interaction between self-compassion and self-esteem in the prediction of post-operative psycho-behavioral health in this population. Second, while the study of protective factors is important, intrapersonal psychosocial variables, no matter how promising, are reflective of sociocultural conditions and resources, and are unlikely to completely erase the effects of stigma. Such factors can only be considered alongside broader efforts to shift public opinion and reduce weight-related prejudice.

This study also has notable strengths, having addressed several gaps in the literature. First, we demonstrated that EWB accounts for substantial variance in psychological health after accounting for the role of ACE. Second, we demonstrated that EWB indirectly affects the studied outcomes via a differential pattern of associations between IWB, internalized, and body shame, contributing to extant models of weight bias. Third, our study was the first we are aware of to assess mechanisms
that may explain the affiliation between EWB and symptoms of PTSS, and further, to control for the role of ACE in this affiliation. Fourth, our inclusion of self-compassion, a protective factor with substantial empirical support, contributes to the evidence base, given that it appeared to significantly interrupt most significant risk paths, despite the few noted exceptions. Fifth, assessing these affiliations in bariatric surgery patients has potential to inform longitudinal research and address a substantial need for more theory-driven research in this population to better elucidate the pathways through which EWB and other psychosocial risk factors may adversely affect psycho-behavioral health and post-operative outcomes.

**Future Directions**

Mitigated post-operative weight losses and the emergence of psychopathology, substance use, and suicidality in subsets of bariatric surgery patients highlight an urgent need to better understand psychosocial risk and protective factors, particularly those that can be detected pre-operatively. The current study was the first to examine a comprehensive theoretical model of weight bias in relation to psychiatric symptoms and emotional eating in bariatric surgery candidates. Our study extended current weight bias models and the growing research literature implicating experienced (EWB) and internalized weight bias (IWB) in poor psycho-behavioral health in the bariatric population by examining whether these constructs indirectly act through the risk mechanisms of internalized and body shame, and the protective mechanism of self-compassion.

After accounting for all other variables, internalized shame emerged the strongest predictor and most proximal mediator of risk between EWB and anxiety, post-traumatic stress, and emotional eating, with IWB the strongest predictor and only mediator of risk between EWB and depression. These findings warrant continued research to examine the pathways from EWB and related sequelae to poor psycho-behavioral health in the bariatric surgery and other populations. A revision to Tylka et al.’s (2014) model, in which body shame alone is posited as a mediator of the effects of EWB and
IWB on psychosocial health, may be also indicated, awaiting study in designs that better infer causality and replication in different samples.

Protective path models revealed that self-compassionate people reported fewer symptoms of anxiety, PTSS, depression, and emotional eating associated with EWB, IWB, and intervening sequelae. Our findings suggest the importance of continued investigation to better understand whether these factors interact to predict post-operative medical or psychiatric outcomes, including substance use, self-harm, and suicidality. Pending such research, this construct may prove a potential screening and treatment target for those vulnerable to EWB-related risk sequelae.

Important questions for future research remain. Assessing the observed affiliations in designs that would better infer causality, including case control studies, prospective research, and experimental/lab paradigms, is an important next step. This includes examining whether the studied baseline models predict post-operative weight losses, complications, and psychopathology, as well as lab studies testing whether priming EWB in those of different psychosocial phenotypes (e.g., high vs. low IWB; high vs. low self-compassion) predicts body or internalized shame, and subsequent state distress, affect dysregulation, and/or poor behavioral health. Comparing the post-operative outcomes of bariatric surgery patients who undergo pre-operative self-compassion training to those who undergo a matched control may also reveal the extent to which this factor is protective against post-operative risk profiles related to EWB, IWB, and shame in this population.

Examining intersectionality between EWB and other social categories/stigmatized identities and traumatic stressors. Our results underscore the importance of using an intersectional approach in the study of weight bias that accounts for interactions between different advantaged vs. disadvantaged social categories (e.g., race/ethnicity, sex, gender identity, sexual identity, disability, SES; Himmelstein et al., 2017). In our study, those of greater SES reported more emotional eating independent of other sociodemographics, ACE, EWB, and related sequelae, while those of Hispanic/Latino/a descent reported lower levels of IWB and emotional eating, raising questions
about contributing and moderating factors. In addition to including more reliable measures of SES and maladaptive eating behavior, future research would benefit from seeking to understand moderators of these associations, including other sociodemographics, and indices of minority and traumatic stress.

Our finding that EWB predicted variance in psychiatric symptoms and emotional eating independent of ACE, with ACE in some cases accounting for no added variance, is interesting, and similarly warrants future investigation. Better understanding the intersectionality of EWB in relation to other forms of traumatic stress and social identities in the prediction of psycho-behavioral health is crucial to better understand the conditions under which, and for whom, risk and protective sequelae may occur. This is critical, as experiences of discrimination, ostracism, and interpersonal victimization may interact to engender more severe post-operative risk profiles via “double jeopardy” or other mechanisms (e.g., Himmelstein et al., 2017). For instance, an LGBTQ-identified bariatric surgery patient with a childhood trauma history who reports greater levels of EWB, IWB, and internalized homophobia may experience painfully pronounced shame relative to one who reports EWB and IWB alone, particularly in the absence of protective factors. Relatedly, some persons that belong to intersecting social categories may experience relative protection against the effects of stigma due to buffering factors (e.g., acculturation status, group pride in identity), indicating that the future study of protective factors in this population should seek to better understand unique variance in risk and protective sequelae between and within groups.

Research that uses an intersectional lens may sometimes lead to findings contrary to hypothesis, yet yield interesting insights. For example, research has suggested that EWB may be protective against adult interpersonal abuse for those with a history of child abuse (Salwen et al., 2014). Whether this finding would hold true for all social categories in this study is unknown, and points to a need for further research. We found that EWB in our predominantly female, White, non-Hispanic/Latino/a sample encompasses considerable variance related to how people respond to such
experiences, via IWB, shame, and self-compassion. It may be that the protection of EWB against adult interpersonal abuse observed in Salwen et al.’s (2014) study reflects latent, unstudied constructs, such as a greater proportion of protective vs. risk factors. Better understanding how these risk and protective mechanisms differ by social categories (e.g., race, gender), rather than controlling for them as is done in the current study and most other research, represents an important focus of future work (Himmelstein et al., 2017).

**Elucidating the differential risk mechanisms underlying EWB and IWB with anxiety and depression.** While internalized shame was a strong risk mechanism of the association of EWB/IWB with anxiety, PTSS, and emotional eating, only IWB significantly mediated EWB-related risk of depression in our sample, implicating IWB as a standalone risk factor for depression in bariatric surgery candidates. Future research is warranted to examine whether these findings are replicable in different samples across time, and/or whether other factors unmeasured in the current study better explain the association of IWB with depression. Such factors, as described prior, may include anticipated weight bias, external shame, affect dysregulation, disengagement coping (avoidance), etc.

Another important focus of future research is better understanding whether the differential risk mechanisms underlying the association of EWB and IWB with different forms of psychiatric symptoms predict variance in the development of post-operative psychopathology. For example, does greater baseline internalized shame related to EWB, when implicated in certain psychiatric profiles, predict increased likelihood of concerning post-operative outcomes when compared to IWB or external shame? And do fluctuations in these risk factors following bariatric surgery predict varied psycho-behavioral and risk trajectories? Last, as previously reviewed, internalized relative to external shame affects, as well as IWB and anticipated weight bias, have substantial implications for intervention (Gilbert, 2007; Kim et al., 2011). It is possible that varied psycho-behavioral phenotypes may benefit from tailored intervention approaches. Future research may benefit from seeking to
identify such phenotypes and relevant protective factors that can be targeted for intervention in bariatric surgery patients across the surgical care continuum.

**Examining the studied models in relation to post-operative substance use, self-harm, and suicidality.** As noted, elevated risk of suicidality and substance use disorders occur following bariatric surgery, and some data indicates this risk presents irrespective of weight losses (Backman, Stockeld, Rasmussen, Näslund, & Marsk, 2016; Dixon, 2016; Neovius et al., 2018; Spittal & Frühbeck, 2018). In our study, associations observed between EWB and dimensions associated with substance use and/or suicidality in non-bariatric samples – internalized stigma, shame, anxiety, depression, and post-traumatic stress (Carpiniello & Pinna, 2017; Chesney, Goodwind, & Fazel, 2014; McClatchey, Murray, Rowat, & Chouliara, 2017) – indicate an urgent need for future research to examine whether our tested models are predictive of these constructs.

As indicated, EWB has been observed to mediate the link between formerly overweight status (paralleling post-operative bariatric trajectories) and depression, anxiety, and suicidality in a national sample with obesity (Levy & Pilver, 2012), implicating such factors as key in the emergence of post-operative risk profiles that occur independent of weight loss in bariatric surgery patients. A promising future direction involves better understanding the salience of stigmatized identities and intervening risk mechanisms in predicting post-operative risk profiles. That is, weight bias internalization, internalized shame, and other factors related to a stigmatized identity may be recalcitrant to change after post-operative weight loss (i.e., ‘residual stigma’), with this affiliation possibly moderated by other social categories, psychiatric factors, and/or trauma history. For those vulnerable, these pathways may engender greater distress, and increased risk of substance use, non-suicidal self-harm, and suicidality, an important question for future research. Finally, given the known contribution of substance use to suicidal behavior, continued attention to determining contributing risk factors to both factors post-operatively remains critical (Darvishi, Farhadi, Haghtalab, & Poorolajal, 2015; Yuodelis-Flores & Ries, 2015).
**Implications of findings for self-compassion and other protective factors.** Our findings that self-compassion was protective against the risk sequelae stemming from EWB under some conditions encourages continued work to better understand the causes and conditions under which it may buffer risk. It is unknown whether dispositional self-compassion predicts improved outcome following bariatric surgery through the studied pathways, or whether self-compassion training might mitigate state distress or shame stemming from EWB/IWB and disrupt the development of postoperative psychopathology and behavioral health concerns found in some bariatric surgery patients. Both are important questions for future research. Additionally, self-compassion did not protect against all risk paths in our sample, with one risk path for depression and two for PTSS remaining evident. Future research would benefit from studying a broader array of protective factors. For instance, Himmelstein et al. (2017) found coping with weight bias through healthy lifestyle behaviors to interrupt the adverse effects of weight bias on psycho-behavioral health in a national sample, while studies in other samples have found mindfulness and psychological flexibility protective against the adverse effects of discrimination (Brown-Iannuzzi, Adair, Payne, Richman, & Fredrickson, 2015; Chan, Lee, & Mak, 2018; Graham, West, & Roemer, 2013).

Finally, as noted, using an intersectional lens in the study of protective factors is essential. Research suggests that self-love is a helpful coping response to EWB for White, but not Black, bariatric surgery patients (Fettich & Chen, 2012). Such findings raise important questions about differing risk and protective mechanisms for EWB’s effects in different groups. For example, research in Native Americans/American Indians has found strong cultural ties and participation in traditional tribal activities associated with fewer depressive symptoms related to discrimination (Clark & Winterowd, 2012). In Black/African American individuals, factors proposed protective against the effects of discrimination include religion, racial socialization, cultural/ethnic identity, and problem-focused coping, among others (Keyes, 2009), while familism, social connectedness, and spirituality are among the factors suggested protective against discrimination in Hispanic/Latino/a
individuals (e.g., Kim & Fredriksen-Goldsen, 2017; Ojeda & Piña-Watson, 2013; Smokowski, Chapman, & Bacallao, 2007). A better understanding of the unique factors that buffer against the effects of weight bias in different groups is needed, and an important topic of future research.

**Concluding Remarks**

The present study marks an important initial inquiry into the risk and protective mechanisms underlying the effects of experienced weight bias (EWB) and internalized weight bias (IWB) on psycho-behavioral health in bariatric surgery candidates. While a number of important questions remain, our findings strongly implicate differential mechanisms underlying the associations of EWB with anxiety, post-traumatic stress disorder, and emotional eating (i.e., IWB and internalized shame) compared to depression (i.e., IWB). Self-compassion appears protective against this risk in some bariatric surgery candidates, yielding insights for future intervention research. That findings persisted after accounting for Adverse Childhood Experiences (ACE) strongly suggests further research is needed to understand the effects of EWB on post-operative outcomes after accounting for this factor.

Continued exploration of these pathways in causal research designs has strong potential to result in the identification of psycho-behavioral phenotypes that more consistently predict variable post-operative outcomes, as well as enhanced screening and detection metrics. In aggregate, our findings have strong potential to inform future, theory-based research on the psychosocial predictors of outcome in bariatric surgery patients. Such research is critically needed to develop improved standard of care screening and detection metrics and psychological evaluation guidelines for bariatric surgery patients, as well as pre- and post-operative interventions to optimize post-operative psychosocial health for those screened higher risk.
References


discrimination and the prevalence of psychiatric disorders in the general population. *Obesity, 17*(11), 2033–2039. https://doi.org/10.1038/oby.2009.131


112


Table 1. Sociodemographic characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Valid n</th>
<th>$M \ (SD)$ or percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE score</td>
<td>172</td>
<td>2.2 (9.0)</td>
</tr>
<tr>
<td>Age</td>
<td>172</td>
<td>43.31 (11.30)</td>
</tr>
<tr>
<td>Body Mass Index (kg/m2)</td>
<td>172</td>
<td>49.16 (9.35)</td>
</tr>
<tr>
<td>Class I or II (BMI≥30)</td>
<td>22</td>
<td>12.8</td>
</tr>
<tr>
<td>Class III (BMI≥40)</td>
<td>150</td>
<td>87.2</td>
</tr>
<tr>
<td>Reports Experienced Weight Bias</td>
<td>164</td>
<td>96.5</td>
</tr>
<tr>
<td>Female</td>
<td>140</td>
<td>81.4</td>
</tr>
<tr>
<td>Non-Hispanic/Latino/a</td>
<td>140</td>
<td>81.4</td>
</tr>
<tr>
<td>Race</td>
<td>172</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>108</td>
<td>62.8</td>
</tr>
<tr>
<td>Black/African American</td>
<td>34</td>
<td>19.8</td>
</tr>
<tr>
<td>Other/undisclosed</td>
<td>15</td>
<td>8.7</td>
</tr>
<tr>
<td>Multiracial</td>
<td>11</td>
<td>6.4</td>
</tr>
<tr>
<td>Asian</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Native American/Alaska Native</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Medicaid insurance (SES proxy)</td>
<td>75</td>
<td>43.6</td>
</tr>
</tbody>
</table>

Note: ACE, age, and BMI are mean (standard deviation). All other data are n (%).
Table 2. Descriptive statistics and intercorrelations for main study variables

<table>
<thead>
<tr>
<th>Measure</th>
<th>EWB</th>
<th>IWB</th>
<th>B-Shame</th>
<th>I-Shame</th>
<th>SC</th>
<th>AS</th>
<th>PTSS</th>
<th>DS</th>
<th>EE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IWB</td>
<td>0.411**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-Shame</td>
<td>0.394**</td>
<td>0.762**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-Shame</td>
<td>0.386**</td>
<td>0.716**</td>
<td>0.670**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>-0.160*</td>
<td>-0.529**</td>
<td>-0.437**</td>
<td>-0.652**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>0.357**</td>
<td>0.389**</td>
<td>0.427**</td>
<td>0.466**</td>
<td>-0.392**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSS</td>
<td>0.424**</td>
<td>0.567**</td>
<td>0.519**</td>
<td>0.716*</td>
<td>-0.558**</td>
<td>0.551**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS</td>
<td>0.349**</td>
<td>0.456**</td>
<td>0.397**</td>
<td>0.410**</td>
<td>-0.379**</td>
<td>0.741**</td>
<td>0.506**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td>0.198*</td>
<td>0.485**</td>
<td>0.424**</td>
<td>0.487**</td>
<td>-0.486**</td>
<td>0.281**</td>
<td>0.406**</td>
<td>0.287**</td>
<td></td>
</tr>
</tbody>
</table>

| M         | 1.86  | 3.85  | 4.67    | 29.79   | 38.25  | 3.68  | 32.60  | 8.04  | 38.28  |
| SD        | 1.52  | 1.35  | 1.84    | 24.66   | 9.72   | 4.46  | 14.33  | 7.28  | 32.31  |
| N         | 170   | 170   | 170     | 170     | 166    | 160   | 167    | 159   | 164    |

*p < .05. **p < .01.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); B-Shame (Body Shame); I-Shame (Internalized Shame); SC (Self-Compassion); AS (Anxiety Symptoms); PTSS (Post-Traumatic Stress Symptoms); DS (Depressive Symptoms); EE (Emotional Eating). For all scales, higher scores indicate higher levels of the measured construct,
Table 3. Anxiety symptom PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates (age, BMI, ethnicity, race, insurance [SES], sex). Significant paths bolded.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect</th>
<th>$b$ (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R²</th>
<th>F ($df$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety Symptoms without controlling ACE</td>
<td>Total indirect effect</td>
<td>.64 (.17)</td>
<td>[.36, 1.04]</td>
<td>158</td>
<td>.298</td>
<td>6.23 (10,147)**</td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; AS</td>
<td>.02 (.16)</td>
<td></td>
<td>[-.35, .30]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; AS</td>
<td>.17 (.11)</td>
<td></td>
<td>[-.01, .44]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; AS</td>
<td>.20 (.09)</td>
<td></td>
<td>[.07, .43]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; AS</td>
<td>.10 (.05)</td>
<td></td>
<td>[.03, .25]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; body shame -&gt; AS</td>
<td>.05 (.05)</td>
<td></td>
<td>[-.003, .21]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; body shame -&gt; int. shame -&gt; AS</td>
<td>.03 (.02)</td>
<td></td>
<td>[.003, .12]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; int. shame -&gt; AS</td>
<td>.10 (.08)</td>
<td></td>
<td>[-.02, .31]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety Symptoms controlling ACE</td>
<td>Total indirect effect</td>
<td>.56 (.16)</td>
<td>[.29, .93]</td>
<td>158</td>
<td>.300</td>
<td>5.70 (11,146)**</td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; AS</td>
<td>-.03 (.15)</td>
<td></td>
<td>[-.32, .27]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; AS</td>
<td>.14 (.10)</td>
<td></td>
<td>[-.01, .39]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; AS</td>
<td>.18 (.08)</td>
<td></td>
<td>[.06, .39]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; AS</td>
<td>.09 (.04)</td>
<td></td>
<td>[.03, .21]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; body shame -&gt; AS</td>
<td>.05 (.05)</td>
<td></td>
<td>[-.01, .19]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; body shame -&gt; int. shame -&gt; AS</td>
<td>.03 (.02)</td>
<td></td>
<td>[.001, .11]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; int. shame -&gt; AS</td>
<td>.10 (.08)</td>
<td></td>
<td>[-.02, .31]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$p < .05$.  **$p < .01$.  ***$p < .001$.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); AS (anxiety symptoms)
Table 4. Depressive symptom PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates (age, BMI, ethnicity, race, insurance [SES], sex). Significant paths bolded.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R²</th>
<th>F (df)</th>
</tr>
</thead>
</table>
| Depressive Symptoms          | Total indirect effect                  | 1.01 (.27) | [.56, 1.65] | 157| 0.272    | 5.45 (10,146)***
| with out controlling ACE     | 1. EWB -> IWB -> DS                   | .68 (.29)  | [.17, 1.32] |
|                              | 2. EWB -> IWB -> body shame -> DS     | .05 (.17)  | [-.27, .41] |
|                              | 3. EWB -> IWB -> int. shame -> DS     | .12 (.13)  | [-.08, .42] |
|                              | 4. EWB -> IWB -> body shame -> int. shame -> DS | .06 (.06)  | [-.03, .21] |
|                              | 5. EWB -> body shame -> DS            | .02 (.06)  | [-.07, .17] |
|                              | 6. EWB -> body shame -> int. shame -> DS | .02 (.02)  | [-.006, .10] |
|                              | 7. EWB -> int. shame -> DS            | .06 (.08)  | [-.03, .33] |

| Depressive Symptoms          | Total indirect effect                  | .88 (.26)  | [.46, 1.46] | 157| 0.280    | 5.10 (11,145)***
| controlling ACE              | 1. EWB -> IWB -> DS                   | .60 (.28)  | [.12, 1.23] |
|                              | 2. EWB -> IWB -> body shame -> DS     | .03 (.15)  | [-.27, .34] |
|                              | 3. EWB -> IWB -> int. shame -> DS     | .11 (.12)  | [-.08, .39] |
|                              | 4. EWB -> IWB -> body shame -> int. shame -> DS | .05 (.05)  | [-.03, .18] |
|                              | 5. EWB -> body shame -> DS            | .01 (.05)  | [-.08, .15] |
|                              | 6. EWB -> body shame -> int. shame -> DS | .02 (.02)  | [-.01, .09] |
|                              | 7. EWB -> int. shame -> DS            | .06 (.09)  | [-.03, .34] |

*p < .05. **p < .01. ***p < .001.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); DS (Depressive Symptoms)
Table 5. Post-traumatic stress symptom PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates (age, BMI, ethnicity, race, insurance [SES], sex). Significant paths bolded.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect</th>
<th>$b$ (SE)</th>
<th>95% CI</th>
<th>$n$</th>
<th>Model R2</th>
<th>$F$ (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Traumatic Stress Symptoms without controlling ACE</strong></td>
<td><strong>Total indirect effect</strong></td>
<td>2.22 (.65)</td>
<td>[1.05, 3.67]</td>
<td>167</td>
<td>0.555</td>
<td>19.43 (10,156)**</td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; PTSS</td>
<td></td>
<td>.20 (.36)</td>
<td>[-.44, 1.03]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; PTSS</td>
<td></td>
<td>-.09 (.23)</td>
<td>[-.62, .31]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.95 (.35)</td>
<td>[.43, 1.87]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.42 (.19)</td>
<td>[.16, .94]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; body shame -&gt; PTSS</td>
<td></td>
<td>-.02 (.06)</td>
<td>[-.23, .06]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.07 (.10)</td>
<td>[-.08, .33]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.67 (.46)</td>
<td>[-.18, 1.67]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total indirect effect</strong></td>
<td></td>
<td>2.45 (.60)</td>
<td>[1.41, 3.75]</td>
<td>167</td>
<td>0.582</td>
<td>19.65 (11,155)**</td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; PTSS</td>
<td></td>
<td>.19 (.39)</td>
<td>[-.55, 1.0]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; PTSS</td>
<td></td>
<td>-.07 (.24)</td>
<td>[-.59, .38]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>1.06 (.35)</td>
<td>[.54, 1.98]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.48 (.19)</td>
<td>[.21, .99]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; body shame -&gt; PTSS</td>
<td></td>
<td>-.02 (.07)</td>
<td>[-.24, .09]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.13 (.11)</td>
<td>[-.03, .42]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; int. shame -&gt; PTSS</td>
<td></td>
<td>.68 (.44)</td>
<td>[-.14, 1.63]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001.

*Note:* EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); PTSS (Post-Traumatic Stress Symptoms)
Table 6. Emotional eating PROCESS risk path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates (age, BMI, ethnicity, race, insurance [SES], sex). Significant paths bolded. Paths no longer significant after controlling ACE highlighted grey.

<table>
<thead>
<tr>
<th>Outcome Emotional Eating</th>
<th>Effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R²</th>
<th>F (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>without controlling ACE</td>
<td>Total indirect effect</td>
<td>5.37 (1.27)</td>
<td>[3.18, 8.19]</td>
<td>164</td>
<td>0.329</td>
<td>7.49 (10,153)**</td>
</tr>
<tr>
<td></td>
<td>1. EWB -&gt; IWB -&gt; EE</td>
<td>2.46 (1.24)</td>
<td>[.28, 5.15]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; EE</td>
<td>-.009 (.79)</td>
<td>[-1.60, 1.60]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; EE</td>
<td>1.32 (.57)</td>
<td>[.46, 2.81]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.60 (.28)</td>
<td>[.21, 1.38]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. EWB -&gt; body shame -&gt; EE</td>
<td>-.003 (.27)</td>
<td>[-.59, .52]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. EWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.18 (.14)</td>
<td>[.009, .62]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. EWB -&gt; int. shame -&gt; EE</td>
<td>.82 (.58)</td>
<td>[.010, 2.38]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total indirect effect</td>
<td>4.79 (1.21)</td>
<td>[2.68, 7.41]</td>
<td>164</td>
<td>0.329</td>
<td>6.78 (11,152)**</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome Emotional Eating</th>
<th>Effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R²</th>
<th>F (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>controlling ACE</td>
<td>Total indirect effect</td>
<td>1.79 (1.21)</td>
<td>[2.68, 7.41]</td>
<td>164</td>
<td>0.329</td>
<td>6.78 (11,152)**</td>
</tr>
<tr>
<td></td>
<td>1. EWB -&gt; IWB -&gt; EE</td>
<td>2.18 (1.12)</td>
<td>[.31, 4.75]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; EE</td>
<td>-.02 (.70)</td>
<td>[-1.48, 1.31]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; EE</td>
<td>1.17 (.51)</td>
<td>[.41, 2.57]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.52 (.24)</td>
<td>[.18, 1.22]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. EWB -&gt; body shame -&gt; EE</td>
<td>-.01 (.25)</td>
<td>[-.61, .46]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. EWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.16 (.13)</td>
<td>[-.01, .59]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. EWB -&gt; int. shame -&gt; EE</td>
<td>.79 (.58)</td>
<td>[-.03, 2.32]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05. **p < .01. ***p < .001.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); EE (Emotional Eating)
Table 7. Anxiety symptom PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates (age, BMI, ethnicity, race, insurance [SES], sex). Significant paths bolded. The suppression path newly significant after controlling ACE is italicized.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R2</th>
<th>F (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anxiety Symptoms without controlling ACE</strong></td>
<td>Total indirect effect</td>
<td>.56 (.18)</td>
<td>[.24; .97]</td>
<td>154</td>
<td>0.331</td>
<td>6.39 (11,142)*****</td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; AS</td>
<td></td>
<td>-.08 (.18)</td>
<td>[-.42, .28]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; AS</td>
<td></td>
<td>.20 (.12)</td>
<td>[-.001, .48]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; AS</td>
<td></td>
<td>.13 (.10)</td>
<td>[-.04, .37]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>.06 (.06)</td>
<td>[.005, .23]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; AS</td>
<td></td>
<td>.07 (.05)</td>
<td>[.02, .21]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; IWB -&gt; body shame -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>-.01 (.03)</td>
<td>[-.10, .02]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; IWB -&gt; int. shame -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>.07 (.05)</td>
<td>[.001, .22]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>.04 (.03)</td>
<td>[.001, .12]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. EWB -&gt; body shame -&gt; AS</td>
<td></td>
<td>.06 (.05)</td>
<td>[-.001, .23]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. EWB -&gt; body shame -&gt; int. shame -&gt; AS</td>
<td></td>
<td>.02 (.02)</td>
<td>[-.003, .09]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. EWB -&gt; body shame -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>.003 (.01)</td>
<td>[-.05, .004]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. EWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>.01 (.01)</td>
<td>[-.0002, .005]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EWB -&gt; int. shame -&gt; AS</td>
<td></td>
<td>.06 (.06)</td>
<td>[.02, .29]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. EWB -&gt; int. shame -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>.04 (.04)</td>
<td>[.006, .17]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. EWB -&gt; self-compassion -&gt; AS</td>
<td></td>
<td>-.10 (.08)</td>
<td>[-.38, .006]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Anxiety Symptoms controlling ACE | Total indirect effect | .48 (.18) | [.17; .88] | 154 | 0.332 | 5.84 (12,141)***** |
| 1. EWB -> IWB -> AS | | -.08 (.15) | [-.40, .25] | | | |
| 2. EWB -> IWB -> body shame -> AS | | .17 (.10) | [.001, .42] | | | |
| 3. EWB -> IWB -> int. shame -> AS | | .12 (.09) | [.03, .34] | | | |
| 4. EWB -> IWB -> self-compassion -> AS | | .05 (.05) | [.01, .21] | | | |
| 5. EWB -> IWB -> body shame -> int. shame -> AS | | .06 (.05) | [.01, .19] | | | |
| 6. EWB -> IWB -> body shame -> self-compassion -> AS | | -.01 (.02) | [-.08, .02] | | | |
| 7. EWB -> IWB -> int. shame -> self-compassion -> AS | | .07 (.05) | [.0004, .20] | | | |
| 8. EWB -> IWB -> body shame -> int. shame -> self-compassion -> AS | | .03 (.02) | [.001, .10] | | | |
| 9. EWB -> body shame -> AS | | .05 (.05) | [.006, .21] | | | |
| 10. EWB -> body shame -> int. shame -> AS | | .02 (.02) | [-.003, .09] | | | |
| 11. EWB -> body shame -> self-compassion -> AS | | -.003 (.00) | [-.04, .004] | | | |
| 12. EWB -> body shame -> int. shame -> self-compassion -> AS | | .01 (.01) | [-.001, .05] | | | |
| 13. EWB -> int. shame -> AS | | .06 (.07) | [.02, .30] | | | |
| 14. EWB -> int. shame -> self-compassion -> AS | | .04 (.04) | [-.007, .18] | | | |
| 15. EWB -> self-compassion -> AS | | -.10 (.09) | [-.37, .009] | | | |

* p < .05. ** p < .01. *** p < .001.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); AS (Anxiety Symptoms)
Table 8. Depressive symptom PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates. Significant paths bolded; paths no longer significant after controlling ACE highlighted grey.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R2</th>
<th>F (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depressive Symptoms without controlling ACE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total indirect effect</td>
<td></td>
<td>.91 ( .31)</td>
<td>[ .34; 1.57]</td>
<td>154</td>
<td>0.302</td>
<td>5.59 (11,142)** ***</td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; DS</td>
<td></td>
<td>.63 ( .30)</td>
<td>[ .11; 1.31]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; DS</td>
<td></td>
<td>.10 ( .17)</td>
<td>[ -.22; .46]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; DS</td>
<td></td>
<td>-.006 ( .15)</td>
<td>[ -.32; .29]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>.08 ( .07)</td>
<td>[ -.009; .30]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; DS</td>
<td></td>
<td>-.003 ( .07)</td>
<td>[ -.14; .13]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; IWB -&gt; body shame -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>-.01 ( .04)</td>
<td>[ -.11; .05]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; IWB -&gt; int. shame -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>.13 ( .08)</td>
<td>[ .03; .37]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>.06 ( .04)</td>
<td>[ .01; .17]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. EWB -&gt; body shame -&gt; DS</td>
<td></td>
<td>.03 ( .06)</td>
<td>[ -.05; .21]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. EWB -&gt; body shame -&gt; int. shame -&gt; DS</td>
<td></td>
<td>-.001 ( .02)</td>
<td>[ -.06; .04]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. EWB -&gt; body shame -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>-.004 (.01)</td>
<td>[ -.05; .01]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. EWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>.02 ( .02)</td>
<td>[ .001; .08]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EWB -&gt; int. shame -&gt; DS</td>
<td></td>
<td>-.003 ( .09)</td>
<td>[ -.22; .15]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. EWB -&gt; int. shame -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>.06 ( .07)</td>
<td>[ -.01; .29]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. EWB -&gt; self-compassion -&gt; DS</td>
<td></td>
<td>-.17 ( .14)</td>
<td>[ -.59; -.004]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Depressive Symptoms controlling ACE** | | | | | | |
| Total indirect effect | | .78 ( .30) | [ .23; 1.39] | 154 | 0.307 | 5.20 (12,141)** *** |
| 1. EWB -> IWB -> DS | | .55 ( .28) | [ .08; 1.19] | | | |
| 2. EWB -> IWB -> body shame -> DS | | .07 ( .15) | [ -.22; .38] | | | |
| 3. EWB -> IWB -> int. shame -> DS | | -.01 ( .14) | [ -.30; .26] | | | |
| 4. EWB -> IWB -> self-compassion -> DS | | .08 ( .07) | [ -.01; .30] | | | |
| 5. EWB -> IWB -> body shame -> int. shame -> DS | | -.003 ( .06) | [ -.13; .11] | | | |
| 6. EWB -> IWB -> body shame -> self-compassion -> DS | | -.01 ( .04) | [ -.11; .05] | | | |
| 7. EWB -> IWB -> int. shame -> self-compassion -> DS | | .12 ( .08) | [ .01; .35] | | | |
| 8. EWB -> IWB -> body shame -> int. shame -> self-compassion -> DS | | .05 ( .03) | [ .01; .16] | | | |
| 9. EWB -> body shame -> DS | | .02 ( .05) | [ -.06; .18] | | | |
| 10. EWB -> body shame -> int. shame -> DS | | -.001 ( .02) | [ -.05; .04] | | | |
| 11. EWB -> body shame -> self-compassion -> DS | | -.003 (.01) | [ -.05; .01] | | | |
| 12. EWB -> body shame -> int. shame -> self-compassion -> DS | | .02 ( .02) | [ -.0002; .07] | | | |
| 13. EWB -> int. shame -> DS | | -.003 ( .09) | [ -.25; .15] | | | |
| 14. EWB -> int. shame -> self-compassion -> DS | | .06 ( .07) | [ -.01; .28] | | | |
| 15. EWB -> self-compassion -> DS | | -.17 ( .14) | [ -.59; .0002] | | | |

*p < .05.  **p < .01.  ***p < .001.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); DS (Depressive Symptoms)
Table 9. Post-traumatic stress symptom PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates. Significant paths bolded.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total indirect effect</th>
<th>Effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R2</th>
<th>F (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Traumatic Stress Symptoms without controlling ACE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; PTSS</td>
<td>1.86 (.68)</td>
<td>.06 (.37)</td>
<td>[−.64, .83]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; PTSS</td>
<td>-.05 (.22)</td>
<td>[-.54, .35]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; PTSS</td>
<td>.77 (.32)</td>
<td>[−.31, 1.59]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; self-compassion -&gt; PTSS</td>
<td>.16 (.12)</td>
<td>[.01, .51]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td>.23 (.16)</td>
<td>[−.12, .81]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; IWB -&gt; body shame -&gt; self-compassion -&gt; PTSS</td>
<td>-.05 (.06)</td>
<td>[-.23, .02]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; IWB -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.21 (.10)</td>
<td>[.07, .48]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.09 (.05)</td>
<td>[.03, .23]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. EWB -&gt; body shame -&gt; PTSS</td>
<td>-.01 (.06)</td>
<td>[-.23, .07]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. EWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td>.07 (.08)</td>
<td>[.04, .30]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. EWB -&gt; body shame -&gt; self-compassion -&gt; PTSS</td>
<td>-.01 (.02)</td>
<td>[-.10, .01]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. EWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.02 (.02)</td>
<td>[.01, .09]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EWB -&gt; int. shame -&gt; PTSS</td>
<td>.53 (.40)</td>
<td>[-.13, 1.46]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. EWB -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.14 (.11)</td>
<td>[.01, .44]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. EWB -&gt; self-compassion -&gt; PTSS</td>
<td>-.39 (.19)</td>
<td>[-.87, -.11]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post-Traumatic Stress Symptoms controlling ACE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; PTSS</td>
<td>2.14 (.61)</td>
<td>[−1.04, 3.47]</td>
<td>166</td>
<td>0.604</td>
<td>19.47 (12,153)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; PTSS</td>
<td>-.02 (.38)</td>
<td>[-.71, .82]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; PTSS</td>
<td>.04 (.24)</td>
<td>[−.58, .38]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; self-compassion -&gt; PTSS</td>
<td>.85 (.32)</td>
<td>[.38, 1.72]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td>.17 (.12)</td>
<td>[.003, .52]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; IWB -&gt; body shame -&gt; self-compassion -&gt; PTSS</td>
<td>.39 (.16)</td>
<td>[−.16, .86]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; IWB -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>-.04 (.06)</td>
<td>[-.20, .06]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.23 (.10)</td>
<td>[.09, .54]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. EWB -&gt; body shame -&gt; PTSS</td>
<td>-.01 (.08)</td>
<td>[-.22, .12]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. EWB -&gt; body shame -&gt; int. shame -&gt; PTSS</td>
<td>.11 (.09)</td>
<td>[-.01, .37]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. EWB -&gt; body shame -&gt; self-compassion -&gt; PTSS</td>
<td>-.01 (.02)</td>
<td>[-.10, .01]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. EWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.03 (.03)</td>
<td>[-.001, .11]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EWB -&gt; int. shame -&gt; PTSS</td>
<td>.54 (.37)</td>
<td>[-.10, 1.40]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. EWB -&gt; int. shame -&gt; self-compassion -&gt; PTSS</td>
<td>.14 (.11)</td>
<td>[.01, .44]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. EWB -&gt; self-compassion -&gt; PTSS</td>
<td>-.34 (.18)</td>
<td>[-.79, -.07]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05. **p < .01. ***p < .001.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); PTSS (Post-Traumatic Stress Symptoms)
Table 10. Emotional eating PROCESS protective path model summary and unstandardized indirect effects with bootstrapped standard errors (SE) and confidence intervals (CIs). Results presented without and with controlling for ACE. Models control for standard covariates. Significant paths bolded; paths no longer significant after controlling ACE highlighted grey.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total indirect effect</th>
<th>b (SE)</th>
<th>95% CI</th>
<th>n</th>
<th>Model R²</th>
<th>F (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Eating without controlling ACE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; EE</td>
<td>4.26 (1.35)</td>
<td>[1.84; 7.15]</td>
<td>164</td>
<td>0.372</td>
<td>8.20 (11,152)***</td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; EE</td>
<td>1.87 (1.26)</td>
<td>[-.36, 4.63]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; EE</td>
<td>.12 (.77)</td>
<td>[-1.43, 1.62]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; self-compassion -&gt; EE</td>
<td>.53 (.57)</td>
<td>[-.49, 1.80]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.24 (.27)</td>
<td>[-.19, .95]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; IWB -&gt; body shame -&gt; self-compassion -&gt; EE</td>
<td>-.13 (.22)</td>
<td>[-.71, .21]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; IWB -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>.79 (.41)</td>
<td>[-.27, 1.96]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>.36 (.18)</td>
<td>[.13, .91]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. EWB -&gt; body shame -&gt; EE</td>
<td>.04 (.26)</td>
<td>[-.42, .70]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. EWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.07 (.10)</td>
<td>[-.03, .45]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. EWB -&gt; body shame -&gt; self-compassion -&gt; EE</td>
<td>-.04, .08</td>
<td>[-.35, .05]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. EWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>.11 (.09)</td>
<td>[.002, .40]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EWB -&gt; int. shame -&gt; EE</td>
<td>.33 (.43)</td>
<td>[-.20, 1.70]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. EWB -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>.49 (.40)</td>
<td>[-.02, 1.66]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. EWB -&gt; self-compassion -&gt; EE</td>
<td>-1.12 (.71)</td>
<td>[-2.93, -10]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Eating controlling ACE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. EWB -&gt; IWB -&gt; EE</td>
<td>3.67 (1.30)</td>
<td>[1.30; 6.50]</td>
<td>164</td>
<td>0.373</td>
<td>7.48 (12,151)***</td>
<td></td>
</tr>
<tr>
<td>2. EWB -&gt; IWB -&gt; body shame -&gt; EE</td>
<td>1.65 (1.13)</td>
<td>[-.35, 4.08]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EWB -&gt; IWB -&gt; int. shame -&gt; EE</td>
<td>.08 (.70)</td>
<td>[-.32, 1.48]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EWB -&gt; IWB -&gt; self-compassion -&gt; EE</td>
<td>.46 (.51)</td>
<td>[-.46, 1.59]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.53 (.37)</td>
<td>[.03, 1.55]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EWB -&gt; IWB -&gt; body shame -&gt; self-compassion -&gt; EE</td>
<td>.21 (.23)</td>
<td>[-.19, .75]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. EWB -&gt; IWB -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>-.11 (.20)</td>
<td>[-.64, .17]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. EWB -&gt; IWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>.71 (.39)</td>
<td>[.23, 1.89]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. EWB -&gt; body shame -&gt; EE</td>
<td>.32 (.16)</td>
<td>[.11, .83]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. EWB -&gt; body shame -&gt; int. shame -&gt; EE</td>
<td>.03 (.25)</td>
<td>[-.41, .67]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. EWB -&gt; body shame -&gt; self-compassion -&gt; EE</td>
<td>.06 (.09)</td>
<td>[-.04, .39]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. EWB -&gt; body shame -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>-.03, .08</td>
<td>[-.33, .04]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EWB -&gt; int. shame -&gt; EE</td>
<td>.10 (.09)</td>
<td>[-.01, .40]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. EWB -&gt; int. shame -&gt; self-compassion -&gt; EE</td>
<td>.31 (.43)</td>
<td>[.23, 1.63]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. EWB -&gt; self-compassion -&gt; EE</td>
<td>.48 (.41)</td>
<td>[.03, 1.71]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05  **p < .01  ***p < .001.

Note: EWB (Experienced Weight Bias); IWB (Internalized Weight Bias); int. shame (Internalized Shame); EE (Emotional Eating)
Figures 2a – 5b. PROCESS risk path models for each outcome displayed from top to bottom panel: Anxiety, depressive, and post-traumatic stress symptoms, and emotional eating. All models are adjusted for age, BMI, sex, ethnicity, race, and SES (Medicaid status; yes/no). a models do not adjust for Adverse Childhood Experiences (ACE), while b models do. Unstandardized coefficients are presented, with unmediated betas presented in parentheses. *p < .05, **p < .01, ***p < .001, 'p < .10

Figure 2a. Risk path model of anxiety symptoms, without controlling for ACE

Figure 2b. Risk path model of anxiety symptoms, controlling for ACE
Figure 3a. Risk path model of depressive symptoms, without controlling for ACE

Figure 3b. Risk path model of depressive symptoms, controlling for ACE
Figure 4a. Risk path model of post-traumatic stress (PTS) symptoms, without controlling for ACE

Figure 4b. Risk path model of post-traumatic stress (PTS) symptoms, controlling for ACE
Figure 5a. Risk path model of emotional eating, without controlling for ACE

![Diagram of emotional eating model without ACE](image)

Figure 5b. Risk path model of emotional eating, controlling for ACE

![Diagram of emotional eating model with ACE](image)
Figures 6a – 9b.
PROCESS protective path models for each outcome displayed from top to bottom panel: Anxiety, depression, and post-traumatic stress symptoms, and emotional eating. All models are adjusted for age, BMI, sex, ethnicity, race, and Medicaid status (yes/no). a models do not adjust for adverse childhood factors (ACF), while b models do. Untandardized coefficients are presented, with unmediated betas presented in parentheses. *p < .05, **p < .01, *** p < .001, 1p < .10

Figure 6a. Protective path model of anxiety symptoms, without controlling for ACE

Figure 6b. Protective path model of anxiety symptoms, controlling for ACE
Figure 7a. Protective path model of depressive symptoms, without controlling for ACE

Figure 7b. Protective path model of depressive symptoms, controlling for ACE
Figure 8a. Protective path model of post-traumatic stress (PTS) symptoms, without controlling for ACE

Figure 8b. Protective path model of post-traumatic stress (PTS) symptoms, controlling for ACE
Figure 9a. Protective path model of emotional eating, without controlling for ACE

Figure 9b. Protective path model of anxiety symptoms, controlling for ACE