Internalized Weight-Bias: Psychological Correlates and the Role of Social Support Among Individuals Seeking Bariatric Surgery

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Abstract

An important factor to consider when examining the increased rates of mental illness among individuals seeking bariatric surgery is internalized weight bias. Internalized weight bias has been observed to be positively associated with depression, anxiety, disordered eating, binge eating, shame and emotional dysregulation, and negatively associated with self-esteem and quality of life. Insufficient attention has been paid towards adverse childhood experiences and socially desirable responding in the extant literature. The aims of the current study were to: 1) examine the associations between internalized weight bias, and symptoms of depression, anxiety, binge eating, self-esteem, adverse childhood experiences, quality of life, and social support; 2) determine which constellation of psychosocial variables account for significant unique variance in internalized weight bias; and 3) investigate whether social support moderates significant associations observed between internalized weight bias, and mental health and quality of life variables examined within the first aim. A total of 119 patients approved to receive bariatric surgery were recruited from bariatric surgery clinics in Calgary, AB and St. John's, NL. Patients completed questionnaires that measured internalized weight bias, symptoms of depression, anxiety, and binge eating, self-esteem, adverse childhood experiences, impact of weight on quality of life, health-related quality of life, socially desirable responding, and social support while awaiting surgery. Significant bivariate correlations were observed between internalized weight bias and symptoms of depression, anxiety and binge eating, self-esteem, impact of weight on quality of life, and social support, while statistically adjusting for BMI and socially desirable responding. Self-esteem, symptoms of binge eating, social support, and adverse childhood experiences accounted for significant unique variance in internalized weight bias in multiple regression models. Social support did not moderate associations between internalized weight bias

and symptoms of depression, anxiety, binge eating, self-esteem, or impact of weight on quality of life. The current study further highlights the importance of internalized weight bias among bariatric surgery populations given its association with mental health and quality of life outcomes, and the need to develop and implement effective interventions.

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Chapter 1: Introduction

Bariatric surgery is a common treatment that is recommended for adults with previous unsuccessful weight-loss attempts who have a BMI ≥ 40 kg/m2 or ≥ 35 kg/m2 with medical comorbidity (Obesity Canada, 2019). In 2018, 10,365 Canadians received bariatric surgery, with the most common types being gastric bypass and sleeve gastrectomy (Obesity Canada, 2019). Research regarding bariatric surgery has focused primarily on physical health and weight loss outcomes, with mental health conditions receiving less attention. A meta-analysis of 59 studies that included more than 65,000 patients reported that mental illnesses are heightened among individuals seeking and undergoing bariatric surgery when compared with the general population (Dawes et al., 2016). The most common mental disorders observed among patients seeking bariatric surgery are depression, binge eating disorder, and anxiety, with prevalence rates averaging to 19%, 17%, and 12% respectively (Dawes et al., 2016).

The relationship between a BMI of 30 or greater and mental health is complex and has been explained as bidirectional (Taylor & Hensel, 2017). A BMI of 30 or greater has been observed to be associated with an increase in odds of mental illness (Taylor & Hensel, 2017). One study surveyed a nationally represented sample of 9,125 US residents, and reported that a BMI of 30 or greater was associated with an approximate 25% increase in odds of experiencing a mood or anxiety disorder (Simon et al., 2006; Taylor & Hensel, 2017). Comparably, the likelihood of weight gain increases when an individual is experiencing a mental illness (Taylor & Hensel, 2017; Taylor et al., 2008). One study followed 66 patients with mood disorders who were admitted into a mood disorders program for 4 years, and reported that the prevalence of a BMI 25 or greater and a BMI of 30 or greater increased by 17% and 27% respectively (Taylor et al., 2008). Further, the association between BMI and mental health issues is more pronounced as

BMI increases, thus it is no surprise then that mental health difficulties are more common among individuals seeking bariatric surgery (Sanchez-Roman et al., 2003; Taylor & Hensel, 2017). However, the explanation of the relationship between BMI and mental illness as bidirectional is likely over simplified. An important factor to consider when examining the increased rates of mental illnesses among individuals seeking bariatric surgery that has been largely neglected until recently is internalized weight bias or self-directed weight stigma. Given that adiposity cannot be claimed to inherently cause mental illness, a more plausible explanation may be that weight bias and/or internalized weight bias are the factors that lead to poor mental health among higher weight individuals.

Weight Bias

Weight bias is an important aspect of internalized weight bias. Weight bias is defined as prejudicial attitudes that are rooted in negative stereotypes, and are directed towards individuals who are perceived to have excess body weight (Puhl & Brownell, 2001). These negative stereotypes include perceptions that individuals with a BMI of 30 or greater are lazy, unmotivated, incompetent, non-compliant, sloppy, and lack will power and self-discipline (Puhl & Brownell, 2001; Puhl & Heuer, 2009). These weight biases are prevalent in Western society; One study examined the experiences of weight-based discrimination, a behavioural manifestation of weight bias that results in unfair treatment of people because of their weight, in a nationally representative sample of 2,290 US adults (Puhl et al., 2008; Puhl, Himmelstein, & Pearl, 2020). This study observed that 40% of adults with a BMI of 35 and above reported perceived discrimination regarding their weight (Puhl et al., 2008). Additionally, this study reported that perceived weight discrimination was much more prevalent among women compared to men. Among individuals with a BMI of 30 to 35, 20.6% of women versus 6.1% of men reported

experiencing weight discrimination; 45.4% of women, and 28.1% of men with a BMI of 40 to 50 reported experiencing weight discrimination (Puhl et al., 2008). Weight bias is associated with inequities in employment, health care, and educational settings, as well as interpersonal relationships and the mass media (Puhl & Heuer, 2012).

Weight Bias in Employment Settings

In regards to employment settings, the most common stereotypes about employees who have a BMI of 30 or greater include views that they are less conscientious, agreeable, emotionally stable, and extraverted than their normal-weight counterparts (Klassen et al., 1993; Kleges et al., 1990; Polinko & Popovich, 2001; Popovich et al., 1997). Puhl and Brownwell (2001) conducted the first comprehensive review of weight bias and stigma among individuals with a BMI of 25 or greater and individuals with a BMI of 30 or greater which was updated by Puhl and Heuer (2009). This review reported that employees who had a BMI of 25 and greater experienced stereotypical attitudes from employers and disadvantages in hiring, wages, promotions, and job termination due to their weight. One study, included a national representative sample of 2,838 adults and observed that adults who had a BMI of 25 or greater were 12 times more likely to report employment discrimination compared to individuals with a BMI between 18.5-24.9; individuals with a BMI of 30 or greater and individuals with a BMI of 40 or greater were 37 and 100 times more likely, respectively (Roehling et al., 2007). Moreover, a National Longitudinal Survey of 12,686 youth reported reduced wages among individuals with a BMI of 30 or greater after adjusting for socioeconomic familial variables, and health limitations; the wage penalty ranged from 0.7-3.4% among males with a BMI of 30 or greater, and 2.3 to 6.1% among females (Baum & Ford, 2004). Similarly, a study of 52,446 individuals living in the European Union observed that a 10% increase in average BMI reduced hourly

wages among males by 1.9% and females by 3.3%. (Brunello & D'Hombres, 2007). Further, a meta-analysis of 32 experimental studies were identified that provided evidence of a causal pathway between weight-based discrimination and hiring decisions (Puhl & Heuer, 2009; Roehling et al., 2008). These experimental studies usually include asking participants to evaluate a fictional applicant's qualification for a job where weight was manipulated through written vignettes, videos, photographs or computer morphing. This meta-analysis observed that job applicants with a BMI of 25 or greater were evaluated more negatively and had more negative employment outcomes (qualification/suitability ratings, disciplinary decisions, salary assignments, placement decisions) compared to applicants with a BMI of less than 25.

More recent studies continue to highlight that weight bias exists in employment settings. An experimental study presented 127 human resource professionals with six hypothetical job candidates, two of which were labeled to have "obesity", and were asked to nominate three candidates for a supervisory position (Giel et al., 2012). This study observed that individuals with a BMI of 30 or greater were 4.5 times less likely than lower weight candidates to be chosen for a supervisory role (Giel et al., 2012). Another study included a sample of 154 individuals who were presented first with vignettes regarding a "normal weight woman", followed by vignettes that explained how the same woman gained and lost weight (Carels et al., 2015). This study found that participants perceived individuals who lost weight surgically to be less self-disciplined than individuals who lost weight behaviourally. Additionally, participants were less willing to hire an individual who had lost weight surgically versus behaviourally. This study further highlights the weight biased view that losing weight can be attributed to self-discipline, and that negative views regarding weight extend to hiring decisions (Carels et al., 2015).

Weight Bias in Healthcare Settings

In regards to healthcare settings, Puhl and Heuer (2009) identified a plethora of studies demonstrating that health-care professionals (e.g., physicians, nurses, psychologists, and medical students) possess negative attitudes towards patients with a BMI of 30 or greater, including beliefs that they are lazy, noncompliant, undisciplined, and lacking willpower. One study included 620 primary care physicians and reported that more than 50% viewed patients with a BMI of 30 or greater as awkward, unattractive, and noncompliant (Foster et al., 2003). Additionally, 30% of the primary care physicians further viewed individuals with a BMI of 30 or greater as weak-willed, sloppy, and lazy. An experimental study provided 112 primary care physicians with one of six vignettes depicting patients who were identical except for sex, and BMI (Hebi & Xu, 2001). This study reported that physicians judged heavier patients to be less healthy, worse at taking care of themselves, less self-disciplined, and more annoying. Further, as patient BMI increased, physicians reported liking their job less, having less patience, and less desire to help the patient. Furthermore, physicians reported that providing care to patients with a BMI of 30 or more was a greater waste of their time, and that these individuals would be less likely to comply with medical advice (Hebl & Xu, 2001).

More recently, a study examined the attitudes of 400 Canadian family physicians regarding individuals who have a BMI of 30 or greater and their treatment in the public healthcare system (Alberga et al., 2019). Approximately 24% of family physicians indicated disliking of or discomfort with friendship with people with a BMI of 30 or greater; 33% endorsed feeling frustrated with patients with a BMI of 30 or greater; 28% indicated beliefs that patients with a BMI of 30 or greater are often noncompliant with treatment recommendations; and 19% endorsed feeling disgusted when treating an individual with a BMI of 30 or greater.

Further, higher weight bias was associated with greater agreement that people with a BMI of 30 or greater should pay extra for public healthcare (Alberga et al., 2019).

Two studies (N = 84; N = 389) delivered the Implicit Association Test to assess implicit anti-fat bias among healthcare professionals who specialize in treating individuals with a BMI of 30 or greater (Schwartz et al., 2003; Teachman & Brownell, 2001). These studies reported that healthcare workers associated "fat people" with negative attributes such as "bad" and "lazy" compared to "thin people" with positive attributes, such as "good" and "motivated". Further, one of these studies reported that healthcare professionals endorsed implicit and explicit stereotypes that individuals with a BMI of 25 or greater are lazy, stupid, and worthless (Schwartz et al., 2003). Another study examined both explicit and implicit weight bias in 232 "obesity" specialists and assessed how weight bias changed over time between 2001 to 2013 (Tomiyama et al., 2015). These specialists described "fat people" as significantly more lazy, stupid, and worthless, when compared to "thin people". Lower levels of implicit anti-fat bias was found in 2013 compared to 2001. However, higher levels of some types of explicit anti-fat bias were found in 2013, with participants reporting more general bad feelings toward "fat people" than "thin people", and reported thinking that "fat people" were lazier than "thin people". These findings may suggest that weight bias attitudes have become more acceptable over time among specialists treating individuals with a BMI of 30 or greater (Tomiyama et al., 2015).

Research has also highlighted that medical, nursing, dietitian, and nutrition students endorse many of the same negative stereotypes regarding weight as health professionals (Puhl & Heuer, 2009; Swift et al., 2012). A study examined the attitudes of 54 medical students towards a variety of patients and found that with nearly total agreement the students reported that patients with a BMI of 30 or greater were the most common target of derogatory humor by physicians,

residents, and students (Wear et al., 2006). Additionally, the majority of these medical students did not consider the derogatory humor to be inappropriate (Wear et al., 2006). Another study assessed weight bias among 1,130 trainee dietitians, doctors, nurses, and nutritionists (Swift et al., 2012). This study reported that trainees on average had negative attitudes towards individuals with a BMI of 30 or greater, with only 1.4% of trainees expressing positive or neutral attitudes, and 10.5% endorsing high levels of fat phobia (Swift et al., 2012).

Research has emphasized that experiences of weight bias negatively impacts engagement with health care services. One review identified 21 studies that examined the perceptions of weight bias and its impact on engagement with health care services among individuals with a BMI of 30 or greater and reported themes such as scornful, patronizing, and disrespectful treatment; attributing all health issues to "excess" weight; assumptions about weight gain; expectations of different health care treatment; low trust and poor communication; and avoidance or delays of seeking healthcare services (Alberga et al., 2019).

Weight Bias in Educational Settings

Weight bias has also been documented in educational settings (Puhl & Heuer, 2009). Among a sample of 2,449 women who had a BMI of 25 or greater, 32% reported experiencing weight stigma from a teacher or a professor, and 21% reported experiencing it on multiple occasions (Puhl & Brownell, 2006). Another study included seven focus groups of 26 junior high students and observed that students who had a BMI of 25 or greater experienced negative comments from teachers that led them to feel upset and avoid participating in physical education classes (Bauer et al., 2004). Two studies examined weight bias among physical education students (n = 180) and teachers (n = 105) and observed moderate to strong anti-fat attitudes; physical education students and teachers reported that individuals with a BMI of greater than 25

lack willpower and have poorer social, reasoning, physical, and cooperation skills compared to individuals with a BMI of less than 25 (Greenleaf & Weiller, 2005; O'Brien et al., 2007).

More recent studies continue to document weight bias in educational settings. One study examined whether weight bias impacted assessment of students' academic work by having 133 teachers evaluate an assignment that was presented with a photograph of a student that was either classified as "overweight" or not (Finn et al., 2020). Teachers were found to assign lower grades to students who were labeled as "overweight", and perceived these individuals to require more tutoring and to have lower overall grades in school (Finn et al., 2020). Another study assessed whether an increase in children's weight predicted lower teacher- perceived academic ability among 3,362 students who were studied longitudinally from fifth to eighth grade (Kenney et al., 2015). An increasing BMI was found to be associated with significant reductions in teachers' perceptions of girls' ability in reading, and boys' ability in math. Further, these reductions in perceived academic ability were found despite there being no significant association between a change in BMI and standardized test scores (Kenney et al., 2015).

Weight Bias in Interpersonal Relationships

Another area where weight bias has been found to be present is among interpersonal relationships. One study surveyed 2,449 women with a BMI of 25 or greater about the most common interpersonal sources of weight stigma in their lives (Puhl & Brownell, 2006). Individuals reported that family members were the most frequent source of weight stigma, which was reported by 72% of respondents, with mothers and fathers being the family members who stigmatized individuals the most based on their weight. Friends (reported by 60%) and spouses (reported by 47%) were also reported as common sources of weight bias. Respondents reported weight stigma examples such as weight-based teasing, name calling, and pejorative comments

(Puhl & Brownell, 2006). In regards to dating, one experimental study prompted 238 college students to rate a personal advertisement of a female target seeking a dating partner; descriptors of the target's body weight were manipulated with conditions of the female being described as being "fat", "overweight", "full-figured", "obese", "5'4'' and "197lbs" or a control condition that had no weight descriptors (Smith et al., 2007). This study reported that large-size descriptors led to negative evaluations of the target by both women and men compared to the control condition (Smith et al., 2007). Another study investigated the effect of weight stigma on sexual relationships among a sample of 449 college students that were instructed to rank desirability of a sexual partner when presented with pictures (Chen & Brown, 2005). Individuals labelled as "obese" were rated as the least desirable when compared to all other conditions including individuals that were "healthy", "in a wheelchair", "missing an arm", "with a mental illness", and "with a history of sexually transmitted diseases".

In a more recent study, Collisson et al. (2017) examined whether people express more prejudice and discrimination toward "mixed-weight couples" compared to "same-weight couples" in a sample of 231 online participants. Individuals endorsed less favourability toward "mixed-weight couples" compared to "weight-matched couples". Additionally, when provided with vignettes and instructed to act as matchmakers, individuals chose to pair romantic partners together on the basis of similar weight. Further, when asked about dating advice, individuals suggested more active, public, and expensive dates, greater displays of physical affection, and earlier introduction to close others when targets were going on "healthy-weight matched dates" rather than individuals who were going on "mixed-weight dates" or "overweight-matched-dates" (Collisson et al., 2017).

Weight Bias in the Media

The media is a salient illustration of weight bias existing in our society, including areas such as entertainment, news, and advertising (Puhl & Heuer, 2009). The existence of characters who are portrayed to have a BMI of 25 or greater are more rare compared to thin characters in both adult and children's entertainment, such as television shows and movies (Greenberg et al., 2003; White et al., 1999). When characters with a BMI of 25 or greater are included in entertainment they are rarely portrayed in romantic relationships, are more likely to be objects of humor and ridicule, more likely to be depicted as unattractive, unintelligent, and unhappy, less likely to be portrayed as a "good guy" and often engaged in stereotypical eating behaviors (Greenberg et al., 2003; Klein & Shiffman, 2005; Klein & Shiffman, 2006; White et al., 1999). A content analysis of 18 prime-time television shows observed that the heavier the female character the more negative comments she received from male characters (Fouts & Burggraf, 2000). Another content analysis of 75 central male characters of television shows observed that the heavier the male character the more negative self-references were made about his own weight (Fouts & Vaughan, 2002). Further, negative comments towards larger bodied characters were followed by audience laughter in both of these studies (Fouts & Burggraf, 2000; Fouts & Vaughan, 2002). A more recent study had 2,793 adolescents list their three favourite television shows, and then analyzed 30 randomly selected episodes from the 10 most popular television shows listed (Eisenberg et al., 2014). This study observed that 50% of the television episodes contained at least one weight-stigmatizing incident, and audience laughter followed in almost half of these cases.

News is another area of the media where weight bias exists. One study analyzed 1,925 news articles and reported that individuals with a BMI of 30 or greater were often presented as stupid, ugly, naïve, irresponsible, lazy, greedy, without manners, and repugnant (Sandberg,

2007). Additionally, although a BMI of 30 or greater has been linked to a number of psychosocial, behavioral, genetic, and environmental factors, an analysis of 751 articles revealed that having a BMI of 30 or greater was described as a problem of individual willpower (Boero, 2007). Weight bias is also present in the area of advertising, particularly through advertisements of weight loss products and programs. One study examined weight loss infomercials and observed that women with a BMI of 25 or greater were depicted as unhappy and unattractive, and that the infomercials communicated that weight loss is simple, straightforward, and will make a person happier (Blaine & McElroy, 2002). In addition to weight bias being documented in employment, health care, and educational settings, as well as interpersonal relationships and the mass media, Puhl and Heur (2009) and Puhl and Brownell (2001) identified other domains where weight bias likely exists by examining media sources and legal cases on public records. Areas such as public accommodations, jury selection, housing, parental custody, adoption, and airplane policies were found to include weight bias. However, to date there is either no or limited research in these areas.

A more recent review synthesized the evidence regarding weight bias and social media (Clark et al., 2021). Clark et al., 2021 discuss that algorithms designed to censor inappropriate image on Instagram has led to posts by individuals in larger bodies being disproportionately affected by removing and selectively filtering content to reflect societal ideals of weight. This review also identified weight bias among interpersonal interactions on social media. One study analyzed 316 verified comments of two YouTube videos and found that verbal attacks on individuals with a BMI of 25 or higher were twice as frequent as comment in their defence (Jeon et al., 2018). Another study conducted a content analysis of 1.37 million posts from major social media sites, and observed that 92% of posts related to individuals with a BMI of 25 or higher

used the term “fat”, and that the posts were largely associated with negative, derogatory, and misogynist connotations, as well as sentiments of anger, disgust, and alienation (Chou et al., 2014). Further, many of the social media posts contained “fat jokes” which led to individuals with a BMI of 25 or higher being targets of ridicule.

Internalized Weight Bias

Given that weight bias is deeply ingrained in our society, individuals with a BMI of 25 or greater often internalize these stigmatizing weight biases towards themselves, which is termed internalized weight bias (Pearl & Puhl, 2018). Internalized stigma broadly includes: 1) an awareness of negative stereotypes about one’s social identity; 2) an agreement with these stereotypes; 3) applying these stereotypes to oneself; and 4) self-devaluation due to one’s social identity (Pearl & Puhl, 2018). Although more research is needed, the prevalence of internalized weight bias among individuals in the US with a BMI of 25 or greater is estimated to be 44%, with 52% of individuals with a BMI of 30 or greater endorsing high levels (Puhl, Himmelstein & Quinn, 2017). Among individuals seeking bariatric surgery specifically, 41% of individuals endorsed high levels of internalized weight bias (Lent et al., 2014). This study included a small sample size of 170 patients, and more research is needed to determine more accurate prevalence rates of internalized weight bias. Individuals with higher internalized weight bias scores have been observed to be white, have less education and income, and have a higher BMI, higher self-perceived weight, and previous experiences of weight stigma (Puhl et al., 2017). Bariatric surgery itself is often viewed as the “lazier” approach to weight loss relative to weight loss via diet and exercise, which may lead individuals who are seeking bariatric surgery to be at particularly high risk for stigmatizing experiences and internalized weight bias (Fardouly & Vartanian, 2012; Wagner et al., 2020).

Internalized weight bias has been observed to be positively associated with depression, anxiety, disordered eating, binge eating, shame and emotional dysregulation, and negatively associated with self-esteem and quality of life (Pearl & Puhl, 2018; Puhl et al., 2018). These associations remain significant after statistically adjusting for BMI, and in some cases after adjusting for experienced weight-stigma (Pearl & Puhl, 2018; Puhl et al., 2018). Additionally, one experimental study surveyed 260 individuals who had a BMI of 25 or greater and reported that internalized weight bias led to greater negative affect than the experience of weight stigma from others, suggesting that internalized weight bias may be a stronger predictor of psychological distress than experiencing weight stigma alone (Pearl & Puhl, 2016; Pearl & Puhl, 2018). Greater internalized weight bias pre-bariatric surgery is associated with less weight loss 1-year post-bariatric surgery, while statistically adjusting for baseline BMI, surgery type, depression symptoms, age, and sex (Lent et al., 2014). Additionally, preliminary evidence suggests individuals with internalized weight bias may have a heightened cardiometabolic risk (Pearl et al., 2017). Further, stigmatization due to one's weight has been associated with a number of adverse health behaviours that contribute to poor weight-related health, such as maladaptive eating behaviours, low physical activity, and weight gain. It is important to further understand these associations and investigate potential protective factors given the implications of internalized weight bias on mental, emotional, and physical health, quality of life, and surgical outcomes among individuals seeking bariatric surgery.

Chapter 2: Psychological Correlates of Internalized Weight Bias & Protective Factors

Depression

Prevalence rates of depression among individuals seeking bariatric surgery have been observed to range between 14%-58% (Dawes et al., 2016; Ribeiro et al., 2018). It is important to note that some symptoms of depression overlap with the physical consequences of having a BMI of 30 or greater, such as fatigue, increased appetite, and poor sleep (Krukowski et al., 2010). This may lead to an overdiagnosis of depression. Thus, assessors should assure that they are differentiating between symptoms that truly reflect depression from symptoms that are secondary to having a BMI of 30 or greater (Sogg et al., 2016).

A systematic review that examined the evidence for an association between internalized weight bias and mental health identified 30 studies that investigated the association between internalized weight bias and symptoms of depression measured via validated self-report measures (Pearl & Puhl, 2018). Significant positive associations between internalized weight bias and symptoms of depression were observed in 28 studies, with correlations ranging from r = 0.24 to r = 0.66, with 25 studies reporting moderate or strong correlations (Pearl & Puhl, 2018). Four studies statistically adjusted for BMI, and observed that internalized weight bias remained significantly associated with symptoms of depression (Pearl & Puhl, 2018). Strong correlations have also been observed between internalized weight bias and symptoms of depression among patients presenting for bariatric surgery specifically, with correlations ranging from r = 0.48 to r = 0.58 (Hubner et al., 2016; Lawson et al., 2021; Soulliard et al., 2021; Wagner et al., 2020). One limitation is that studies have been predominantly cross-sectional, and have used mainly correlational analyses. Thus, it cannot be discerned whether internalized weight bias represents a causal pathway towards symptoms of depression. It is likely that internalized weight bias leads to

symptoms of depression; however, symptoms of depression may lead to greater susceptibility to internalized weight bias due to increased self-criticism, negative perceptions, and rumination (Pearl & Puhl, 2018; Wagner et al., 2020).

Anxiety

The prevalence of anxiety disorders among individuals seeking bariatric surgery ranges between 6%-46%; prevalence rates range from 11%-24% for generalized anxiety disorder, 0.2%-17% for a specific phobia, 0.2%-9.2% for social phobia, 5.6 % for agoraphobia, and 0.1%- 4.4% for panic disorder (Dawes et al., 2016; Emam & Osman, 2013; Ribeiro et al., 2018). Pearl and Puhl (2018) identified 11 studies that examined the relationship between internalized weight bias and symptoms of anxiety measured via validated self-report measures, and 10 of the studies reported weak to strong positive associations, with correlations ranging from $r = 0.23$ to $r = 0.55$. This association remained significant among studies that statically adjusted for BMI. Among populations of individuals seeking bariatric surgery, moderate to strong associations have been observed between internalized weight bias and symptoms of anxiety, with correlations ranging from $r = 0.33$ to $r = 0.57$ (Hubner et al., 2016; Servincer et al., 2017; Wagner et al., 2020). While internalized weight bias may lead to anxiety, individuals with anxiety may anticipate more negative judgements from others which may make these individuals more prone to internalizing weight bias (Pearl & Puhl, 2018).

Binge & Emotional Eating

Binge eating disorder (BED) includes recurrent episodes of binge eating, which are characterized by: 1) “eating in a discrete period of time, an amount of food that is larger than what most individuals would eat in a similar period of time under similar circumstances”; and 2) “a sense of lack of control over eating during the episode” (American Psychiatric Association,

2013). It is associated with three or more of the following: eating much more rapidly than normal, eating until feeling uncomfortably full, eating large amounts of food despite not feeling physically hungry, eating alone because of feeling embarrassed by the amount the individual is eating, and feelings of disgust with oneself, or significant guilt after eating (American Psychiatric Association, 2013). Additionally, binge eating is associated with significant distress, occurs on average at least once per week for three months, is not associated with repeated use of inappropriate compensatory behaviors such as purging or fasting, and does not occur exclusively during bulimia nervosa or anorexia nervosa (American Psychiatric Association, 2013).

BED is the most common eating disorder among individuals seeking bariatric surgery, with prevalence rates ranging from 6-50% (Green et al., 2004; Sogg et al., 2016; Wimmelmann et al., 2013). The large range in prevalence for BED among individuals seeking bariatric surgery is likely due to the varying methods used among studies. Lower prevalence rates were observed among studies that used self-report questionnaires, and one study that used a semi-structured interview, whereas the largest observed prevalence rate was reported in a study that used a structured clinical interview (Eating Disorders Module Structured Clinical Interview).

A systematic review identified 18 studies that investigated the relationship between internalized weight bias and binge eating symptoms, all of which were found to have significant positive correlations (Pearl & Puhl, 2018). Moderate to strong correlations were consistently observed, with correlations ranging from $r = 0.43$-0.62. Additionally, significant correlations have been found between internalized weight bias and frequency of binge eating in the past 3 or 6 months, and both objective and subjective binge episodes (Pearl & Puhl, 2018). Further, the relationship between internalized weight bias and binge eating has been observed to remain significant after statistically adjusting for BMI, and other weight and eating-related psychosocial

and behavioural variables (Pearl & Puhl, 2018). Loss of control over eating, an important component of binge eating, was found to be significantly positively associated with internalized weight bias among samples of individuals seeking bariatric surgery (Lawson et al., 2021). Similarly, Wagner et al. (2020) observed that internalized weight bias scores were significantly higher among individuals who endorsed loss of control over eating compared to those who did not endorse loss of control over eating. Again, studies to date have not been able to determine the direction of the relationship between internalized weight bias and binge eating symptoms due to research methodology. It is possible that internalized weight bias leads to binge eating as a way to cope with emotions. Conversely, binge eating may lead to internalized weight bias through feelings of guilt and shame about the binge behaviour which is viewed negatively by society.

Studies have also investigated the relationship between internalized weight bias and other eating disorder pathology, such as emotional eating. Moderate to strong positive correlations between internalised weight and emotional eating have been reported to range between 0.46-0.65 (Pearl & Puhl, 2018). Emotional dysregulation when measured by a validated self-report measure has been observed to mediate the relationship between internalized weight bias and emotional eating among individuals seeking bariatric surgery in a cross-sectional study of 240 patients (Baldofski et al., 2016). Thus, internalized weight bias may only lead to emotional eating among individuals with poor emotional regulation skills. Specifically, individuals may experience intense unpleasant emotions due to internalized weight bias which then leads to emotional eating as a means to cope with those emotions. It is important to note that temporal causality cannot be claimed in such cross-sectional studies.

Self-Esteem

Self-esteem is an evaluation of one's worth or value, self-acceptance, and self-respect (Macdonald & Leary, 2012). In the systematic review by Pearl and Puhl (2018), 11 studies were identified that explored the relationship between internalized weight bias and self-esteem, with moderate to strong correlations observed (r = -0.40 to –0.68). Additionally, three studies statistically adjusted for BMI, and observed that internalized weight bias independently contributed to lower self-esteem (Pearl & Puhl, 2018). Specific to individuals seeking bariatric surgery, one study observed a significant correlation (r = -0.43) between internalized weight stigma and self-esteem (Servincer et al., 2017). Further, large effects have been observed for self-esteem mediating the relationship between internalized weight bias and symptoms of depression and anxiety, measured by validated self-report measures, among a sample of 1158 individuals who had a BMI of 25 or greater (Hilbert et al., 2014). However, this was a cross-sectional study, thus no causal inferences can be made.

Beyond correlational research, one experimental study delivered hypothetical weight-stigmatizing situations to women with a BMI of greater than 25. Participants were randomly assigned to one of two conditions: 1) the experience condition where the vignette focused on unfair treatment, and 2) the internalization condition where the vignette focused on self-blame and worthlessness due to weight. Thus, the experience condition directed individuals towards the external event, whereas the internalization condition directed individuals towards thoughts and feelings. This study found that the internalization condition induced greater levels of reported internalized weight bias compared to the experience condition; internalized weight bias led to lower self-esteem, and this was over and above the effects of BMI (Pearl & Puhl, 2016).

Quality of Life

Internalized weight bias has been observed to be consistently associated with several types of quality of life, such that as internalized weight bias increases quality of life decreases. The aspects of quality of life that have been investigated include health-related quality of life, weight-specific health-related quality of life, mental-health-related quality of life, and physical-health-related quality of life (Pearl & Puhl, 2018). One study assessed the relationship between internalized weight bias and weight-specific health-related quality of life among 78 individuals seeking bariatric surgery, and found a significant correlation, $r = 0.57$ (Hubner et al., 2016). Another study examined the relationship between internalized weight bias measure and subscales of weight-specific health related quality of life among 120 pre-bariatric patients who had a BMI of 40 or greater. This study reported significant correlations between internalized weight bias and the following types of weight specific health related quality of life: physical function ($r = .30$), self-esteem, ($r = .43$), public distress ($r = .56$), and work ($r = .28$) (Servincer et al., 2017).

In regards to the associations between mental-health-related and physical-health quality of life and internalized weight bias, a systematic review identified six and seven studies, respectively (Pearl & Puhl, 2018). Moderate to strong significant negative correlations between internalized weight bias and mental and physical domains of quality of life were observed. Further, studies have performed mediation analyses, and reported that internalized weight bias mediated the relationship between BMI and weight-related quality of life, and BMI and health-related quality of life (Lillis et al., 2011; Pearl et al., 2014). However, directionality and causality cannot be concluded due to cross-sectional nature of these studies. Nevertheless, it appears clear that internalized weight bias is an important factor in regards to quality of life.

Limitations of the Current Literature

Adverse Childhood Experiences

One limitation of the current literature is the limited focus on adverse childhood experiences in relation to internalized weight bias. Adverse childhood experiences have been defined as chronic and pervasive events, including experiences of emotional, physical, and sexual abuse, neglect, and household dysfunction (Felitti et al., 1998; Felitti et al., 2019; Wiss & Brewerton, 2020). Household dysfunction includes living with a household member who abused substances, had a mental illness, or was imprisoned (Felitti et al., 1998; Wiss & Brewerton, 2020). In comparison to the general population, individuals who undergo bariatric surgery have been found to report increased rates of adverse childhood experiences (Clark et al., 2007; Fink & Ross, 2017; Grilo et al., 2005; Sansone et al., 2008; Wildes et al., 2008). One study included a chart review of 152 adults who received bariatric surgery, and observed that 27% of these individuals reported childhood sexual abuse (Clark et al., 2007). Another study examined the prevalence of childhood trauma among 121 individuals seeking bariatric surgery, and observed that 43% reported that they experienced emotional abuse, 19% sexual abuse, 17.4% physical abuse, 9.1% physical neglect, and 39% witnessed violence (Sansone et al., 2008). Wildes et al., (2008) investigated childhood maltreatment among 230 individuals who received bariatric surgery and observed that 65.7% reported some form of childhood maltreatment, with roughly 48% reporting that they experienced emotional abuse, 42% physical abuse, 30% sexual abuse, 30% emotional neglect, and 35% physical neglect. Further, another study found that among 340 candidates for bariatric surgery 69% reported experiencing childhood maltreatment, with 46% reporting emotional abuse, 29% physical abuse, 32% sexual abuse, 49% emotional neglect, and 32% physical neglect (Grilo et al., 2012). While prevalence rates appear to differ among studies, it is clear that adverse childhood experiences, particularly related to abuse and neglect, is prevalent among individuals seeking and undergoing bariatric surgery.

Adverse childhood experiences have been investigated as a risk factor for internalized weight bias among individuals with a BMI of 30 or greater, and specifically individuals seeking bariatric surgery. Adults who report experiencing adverse childhood events are at increased risk for having a BMI of 30 or greater in adulthood (Berens et al., 2017; Keirns et al., 2021; Palmisano et al., 2016). These factors may increase the risk for experiencing weight stigma among individuals' who experience adverse childhood events (Keirns et al., 2021; Puhl et al., 2008). Additionally, adverse childhood experiences, especially experience of childhood abuse, have been associated with attentional biases for threatening information (Keirns et al., 2021; McLaughlin et al., 2014). Thus, adverse childhood experiences may increase the likelihood that individuals will recognize weight biases and discrimination, and identify them as stigmatizing (Keirns et al., 2021). Further, adverse childhood events are linked to unhelpful negative cognitions and emotional patterns, such as self-criticism and shame (Palmisano et al., 2017; Sachs-Ericson et al., 2006). Self-criticisms and shame center on negative evaluation and are closely related to devaluing oneself based on weight or internalized weight bias (Blum, 2008; Braun et al., 2020; Braun et al., 2021; Fekete et al., 2021). Given these observations, it appears that adverse childhood experiences are likely a risk for internalized weight bias.

Two recent studies have investigated this link between adverse childhood experiences and internalized weight bias. Keirns et al. (2021) examined this relationship among 46 women who had a BMI of 25 or greater, and observed that a higher number of adverse childhood experiences was associated with greater internalized weight stigma. Additionally, this study explored whether subtypes of adverse childhood experiences are particularly relevant, given that there is some evidence of abuse and neglect types of adverse childhood experiences being more detrimental than household dysfunction on adults' mental health outcomes (Atzl et al., 2019;

Keirns et al., 2021). Keirns et al. (2021) determined that childhood abuse, which included physical, emotional and sexual abuse, was uniquely and significantly associated with increased internalized weight bias, whereas neglect and household dysfunction were not significantly related. The authors explain that childhood physical, sexual, or emotional abuse often includes extensive and unpredictable exposure to acute stressors, which may have particular impacts on tendencies for self-deprecation and shame, as compared to other adverse childhood experience subtypes (Keirns et al., 2021). This study further conducted a post-hoc analysis to further unpack the differences between abuse types, and observed that emotional and sexual abuse, but not physical abuse, were associated with greater internalized weight bias.

Lastly, the relationship between adverse childhood experiences and internalized weight bias has been investigated in one study with a sample of 229 individuals presenting for bariatric surgery (Braun et al., 2021). It was found that adverse childhood experiences were positively associated with experienced weight stigma and internalized weight stigma (Braun et al., 2021). Considering the significance of these findings and that the research regarding adverse childhood experiences and internalized weight bias is sparse it is important to confirm and investigate this relationship further.

Social Desirability

Another limitation of current research investigating the relationship between internalized weight bias and symptoms of depression, anxiety, binge and emotional eating, self-esteem, adverse childhood experiences, and quality of life is the limited consideration paid to socially desirable responding. Validated measures of socially desirable responding are often used pre-bariatric surgery to account for the response bias of presenting oneself in an overly positive light (Butt et al., 2020). Studies have reported that a significant proportion of individuals presenting

for bariatric surgery will engage in socially desirable responding as a means to minimize psychopathology due to concerns about retaining eligibility to receive bariatric surgery (Ambwani et al., 2013). To the best of our knowledge, only one study to date examining the relationship between internalized weight bias and related psychological factors has used a measure of social desirability among samples of individuals presenting for bariatric surgery (Wagner et al., 2020). This study statistically adjusted for social desirability while examining the association between internalized weight bias and depression, anxiety, quality of life, emotional eating, and quality of life. Thus, to date no study has yet statistically adjusted for socially desirable responding while examining the relationship between internalized weight bias, and self-esteem, binge eating symptoms, or adverse childhood experiences.

Potential Protective Factor of Internalized Weight Bias

Social Support

Due to the negative impacts of internalized weight bias, it is paramount to investigate factors that may be protective against internalized weight bias and related consequences. One potential protective factor of internalized weight bias is social support, which to the best of our knowledge has not yet been explored. Social support is defined as providing assistance or comfort to others, to help individuals cope with biological, psychological, and social stressors (APA, 2020). Support may come from interpersonal relationships in an individual's social network, including family members, friends, neighbors, religious institutions, colleagues, caregivers, or support groups (APA, 2020). Social support is theorized to have two important dimensions: a structural dimension and a functional dimension (Charney, 2004). The structural dimension includes social network size and frequency of social interactions. The functional dimension includes emotional support, such as receiving love and empathy, and instrumental

support, which includes practical help such as help with money or assistance with childcare (Charney, 2004). Although both dimensions of social support are important, research has found that quality of relationships (functional dimension) is a better predictor of good health than quantity of relationships (structural dimension; Southwick et al., 2005). Social support has been observed to be a protective factor for several psychological factors, such as depression, anxiety, and eating disorders, as well as helps with emotional regulation (Leonidas & dos Santos, 2014; Marroquin, 2011; Wang et al., 2018).

Although measures of social support have not been used to investigate the relationship between internalized weight bias and social support, one study conducted a narrative inquiry, and reported that internalized weight bias can lead to social isolation (Ramos Salas et al., 2019). Additionally, one study observed that adults who had a BMI of 25 or greater, who used socially-oriented coping strategies (e.g., obtaining social support to deal with stigmatizing situations) reported healthier psychological adjustment (Puhl & Brownell, 2007). Given these findings, it is likely that social support acts as a protective factor against internalized weight bias and associated mental health outcomes. Support for this hypothesis by using a validated measure of social support could inform interventions for internalized weight bias, such as delivering interventions via groups, and/or offering support groups.

Current Study

The first aim of this current study was to examine the associations between internalized weight bias and symptoms of depression, anxiety, binge eating, as well as associations with self-esteem, adverse childhood experiences, quality of life, and social support in a sample of individuals seeking bariatric surgery. It was hypothesized that internalized weight bias would be positively associated with symptoms of depression, anxiety, binge eating, adverse childhood

experiences, and impact of weight on quality of life, and negatively associated with self-esteem, health-related quality of life, and social support. The second aim of this study was to determine which constellation of psychosocial variables accounted for greatest variance in internalized weight bias. The third aim of this study was to investigate whether social support moderated significant associations observed between internalized weight bias and mental health and quality of life variables examined from the first aim. We hypothesized that social support would moderate the relationship between internalized weight bias and significant variables; specifically, we hypothesized a reduced effect between these variables among individuals who reported high social support.

Chapter 3: Methods

Participants

In total, 119 patients who were waiting for surgery were recruited from bariatric surgery clinics in St. John's, Newfoundland and Labrador, and Calgary, Alberta, Canada. Eligible patients were adults who had a BMI ≥ 35 kg/m2 with at least one weight-related comorbidity or a BMI ≥ 40 kg/m2 independent of comorbidities who had been approved to receive bariatric surgery.

Overall Design

A cross-sectional cohort design was used to: 1) examine the association between internalized weight bias, and symptoms of depression, anxiety, binge eating, self-esteem, impact of weight on health-related quality of life, health related quality of life, adverse childhood experiences, and social support; 2) determine which constellation of psychosocial variables accounted for greatest variance in internalized weight bias; and 3) investigate whether social support moderated the significant association observed between internalized weight bias, and variables evaluated from the first aim. The current study used baseline data from two larger studies which aimed to use pre-surgical psychosocial variables to predict short- (6-month) and long-term (1-year) weight loss and quality of life outcomes following bariatric surgery. Study sites were located in St. John's, Newfoundland and Labrador, and Calgary, Alberta.

Procedure

This study was reviewed and given ethics approval by the Newfoundland and Labrador Health Research Ethics Board. The medical staff at the Bariatric Surgery Clinics provided patients who had been approved for bariatric surgery with a brief explanation of the larger study. Interested patients consented to be contacted and provided their information to our study team.

Our research teams called interested patients to explain the study further and review informed consent. Patients were given the option to complete a questionnaire package online using Qualtrics survey software or via telephone. All participants except one completed the questionnaires online. Patients from the NL study location received a $20 honorarium for completing the questionnaire. Survey completion time was approximately one hour. Data collection for the NL site was completed from April 2019 to May 2021 and for the Calgary site from May 2019 to May 2021.

Measures

Demographic characteristics

A demographic questionnaire was used to collect information regarding age, sex, ethnicity, employment status, marital status, highest level of education, years of education, household income, weight, and height.

Modified Weight Bias Internalization Scale

The Modified Weight Bias Internalization Scale (WBIS-M) was used to measure internalized weight bias (Pearl & Puhl, 2014; Appendix A). The WBIS-M is an 11-item self-report measure that detects the degree to which individuals apply weight-based stereotypes to themselves and base their self-evaluations on weight. Respondents are asked to rate their level of agreement with each statement on a 7-point scale, ranging from strongly disagree to strongly agree. Higher scores demonstrate greater internalized weight bias. The WBIS-M has been found to have sound psychometric properties, with both good internal consistency ($\alpha = 0.94$) and predictive value for relevant psychological outcomes (Pearl & Puhl, 2014).

Beck Depression Inventory- II

The Beck Depression Inventory-II (BDI-II) was used to measure symptoms of depression (Beck et al.,1996; Appendix B). The BDI-II is a 21-item self-report measure that detects the presence and severity of depression. Respondents are asked to reflect on the last 2 weeks and rate each item on a 4-point scale. Scores are summed and range from 0-63, with higher scores indicating greater symptoms of depression. The BDI-II is a widely-used measure, with good reliability and validity (internal consistency $\alpha = 0.90$, test-retest reliability $r = 0.73$-0.96; Wang & Gorenstein, 2013). The BDI-II has been proven to be an adequate measure for screening for depression among individuals seeking bariatric surgery (Hayden et al., 2012; Wang & Gorenstein, 2013).

Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI) was used to measure symptoms of anxiety (Beck & Steer, 1993; Appendix C). The BAI is a 21-item self-report measure that detects the presence and severity of anxiety. Respondents are asked to rate each item on a 4-point scale, from not at all to a great deal. Scores are summed and range from 0-63, with higher scores indicating more symptoms of anxiety. The BAI is a widely-used measure, with well-established cut-off scores, strong internal consistency ($\alpha = 0.91$), and adequate test-retest reliability ($r = 0.65$-0.75; Bardhoshi et al., 2015; Beck & Steer, 1993). The BAI has been widely-used among individuals seeking bariatric surgery (Gill et al., 2019).

Binge Eating Scale

The Binge Eating Scale (BES) was used to measure symptoms of binge eating (Gormally et al., 1982; Appendix D). The BES is a 16-item self-report measure which measures behavioral symptoms and affective/cognitive symptoms that precede or follow a binge. Scores are summed and range from 0 to 46 with a higher score indicating a greater level of symptoms of binge eating

(Marcus et al., 1985). Respondents are asked to select one of four statements for each item that best describes their experience. The BES is a widely-used measure, with good reliability and validity in both the general and clinical populations (Duarte et al., 2015). Additionally, the BES has demonstrated high sensitivity and specificity for discriminating between binge eating and non-binge eaters among individuals seeking bariatric surgery (Duarte et al., 2015).

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem Scale (RSE) was used to measure self-esteem (Rosenberg, 1965; Appendix E). The RSE is a 10-item self-report scale that measures global self-worth by measuring both positive and negative feelings about the self. Respondents are asked to rate each item on a 4-point scale, ranging from strongly agree to strongly disagree. Higher scores indicate higher self-esteem. The RSE is a widely used measure with good reliability and concurrent, predictive, and construct validity (Rosenberg, 1979). The RSE has been found to have a Guttman scale coefficient of reproducibility of 0.92, and test-rested reliability correlations of 0.85-0.88, indicating great internal consistency and reliability (Rosenberg, 1979).

Impact of Weight on Quality of Life

The Impact of Weight on Quality of Life questionnaire (IWQOL-Lite) was used to measure the impact of having a BMI of 30 or greater on quality of life (Kolotkin et al., 2012; Appendix F). The IWQOL-Lite is a 31-item self-report measure that assesses overall impact of having a BMI of 30 or greater on quality of life with use of the total score, and consists of five subscales: Physical Function (11-items), Self-Esteem (7-items), Sexual-Life (4-items), Public Distress (5-items), and Work (4-items). The Physical Function scale is related to mobility and day-to-day physical functioning. The Self-Esteem scale assesses self-esteem concerns regarding weight. The Sexual Life scale measures sexual limitations related to weight. The Public Distress

scale is related to fitting in public places and negative reactions from others. The Work scale assesses work performance related to weight. Items are rated by respondents on a 5-point scale, ranging from always true to never true. Higher scores indicate poorer quality of life. The IWQOL-Lite has been found to have good validity, and internal consistency for both the total score ($\alpha = 0.96$) and among subscales ($\alpha = 0.90$-0.94).

European Quality of Life Five Dimensions

The European Quality of Life Five Dimensions scale (EQ-5D-5L) was used to measure health-related quality of life (Herdman et al., 2011; EuroQol Group, 1990; EuroQol Research Foundation, 2019; Appendix G). The EQ-5D-5L contains a descriptive system which is a self-report questionnaire that provides an overall score, and contains five subscales: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Respondents are asked to indicate their health state by choosing the response that they are in the best agreement with by using a 5-point scale. This descriptive system yields a 5-digit health state profile for each respondent, with 1 indicating no problem, 2 indicating slight problems, 3 indicating moderate problems, 4 indicating severe problems, and 5 indicating extreme problems. Health state scores were converted into a normed single index utility value to reflect how good or bad a health state is according to the general population. In this study, the UK value set and scoring algorithm were used to calculate utility scores as Canadians norms are not yet available. The second part of the EQ-5D-5L measure contains a visual analog scale where patients self-rate their health on a vertical visual analog scale, with endpoints anchored on 100 = “the best health you can imagine” and 0 = “the worst health you can imagine”. The EQ-5D-5L is one of the most widely used instruments for measuring health status and has been found to be a valid and reliable measure

across numerous populations, including patients presenting for bariatric surgery (EuroQol Research Foundation, 2019; Fermont et al., 2017).

Medical Outcomes Study Social Support Questionnaire

The modified Medical Outcomes Study Social Support Questionnaire (mMOSS-SS) was used to measure social support (Appendix H). It is a slightly modified version of the original Social Support Survey developed as part of the Medical Outcomes Study (Sherbourne & Stewart, 1991). This questionnaire was designed to measure overall perceived social support in clinical settings, as well as subscales measuring tangible and emotional social support.. The mMOSS-SS is a self-report measure comprised of 8-items where respondents are asked to use a 5-point scale, ranging from none of the time to all of the time, to demonstrate their agreement with statements. The mMOSS-SS has been found to have good internal consistency (α = 0.88-0.93), and good convergent, divergent, and discriminate validity (Moser et al., 2012).

Social Desirability Scale-17

The Social Desirability Scale-17 (SDS-17) was used to control whether questionnaire responses are biased by socially desirable responding (Stober, 2001; Appendix I). The SDS-17 is a 17-item self-report questionnaire that measures socially desirable responding, with higher scores indicating a greater level of socially desirable responding. Respondents are asked to choose "true" or "false" for each statement. The SDS-17 has been found to have good reliability, with test-retest reliability correlation, r =0.82, and good internal consistency (α = 0.80).

Adverse Childhood Experiences

The Adverse Childhood Experiences questionnaire (ACE-Q) was used to measure adverse childhood experiences (Felitti et al., 1998; Appendix J). The ACE-Q includes 10-items that measures the following adverse childhood experiences before an individual's 18th birthday:

psychological, physical, and sexual abuse, parental violence, and a member of the household using substances, having a mental illness, or being imprisoned. The ACE-Q is a widely used measure, and has been found to have adequate to good reliability and validity (Karetekin & Hill, 2019).

Data Analysis

Missing Data

At least one missing datum point was present among 24 participants (20% of participants), and across 14 variables (58% of variables) for a total of 3.75% missing data across the dataset. The variable with the largest amount of missing data was adverse childhood experiences with 10.9%. Missing data were handled using estimation-maximization in SPSS 26. Little's test for missing completely at random (MCAR) indicated that data were not missing completely at random, χ^2 (318)=366.89, p = .031. An examination of the pattern of missing data indicated that missing data were frequent in questionnaires placed towards the end of the survey, suggesting fatigue as one possible explanation for the observed pattern.

Data Processing

BMI was calculated by dividing weight in kilograms by height in meters squares. Age was calculated by subtracting date of birth from the date that the survey was completed.

Is Internalized Weight Bias Associated with Mental Health, and Quality of Life?

Partial correlation analyses were conducted to examine the associations between internalized weight bias and symptoms of depression, anxiety, binge eating, self-esteem, impact of weight on health-related quality of life, health-related quality of life, adverse childhood experiences, and social support after statistically adjusting for socially desirable responding and BMI.

Which Psychosocial Variables are Uniquely Associated with Internalized Weight Bias?

A statistical approach was adopted using hierarchical linear regression to evaluate the combination of psychosocial variables that are uniquely associated with internalized weight bias. Internalized weight bias was entered as the criterion variable. Socially-desirable responding, and BMI were entered in STEP 1 as covariates using an "ENTER" method. Symptoms of depression, symptoms of anxiety, symptoms of binge eating disorder, self-esteem, adverse childhood experiences, health-related quality of life, weight-related quality of life, and social support were entered in STEP 2 using a "Forward STEPWISE" method.

Does Social Support Moderate Associations with Internalized Weight Bias?

Moderated multiple regression analyses were performed using Hayes' PROCESS Macro version 3.4, Model 1, to investigate whether social support moderated significant associations observed between internalized weight bias and variables from the first aim (Hayes, 2017). Internalized weight bias was entered as the focal predictor "X" variable, the significant associated variable of interest as the criterion "Y" variable, and social support as the moderator variable. The influence of socially desirable responding and BMI were statistically adjusted throughout these analyses.

Exploratory Data Analysis

Is Internalized Weight Bias Associated with Subtypes of Adverse Childhood Experiences?

The relationship between internalized weight bias and specific subtypes of adverse childhood experiences (abuse, neglect, emotional abuse, physical abuse, and sexual abuse) was examined during exploratory analyses. Individual items of the ACE questionnaire were used to measure:

- Emotional abuse: “Prior to your 18th birthday - Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you? Or act in a way that made you afraid that you might be physically hurt?”
- Physical abuse: “Prior to your 18th birthday - Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you? Or ever hit you so hard that you had marks or were injured?”
- Sexual abuse: “Prior to your 18th birthday - Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? Or attempt or actually have oral, anal, or vaginal intercourse with you?”
- Abuse was measured by including emotional, physical, and sexual abuse items.
- Neglect was measured by using two items from the ACE questionnaire: “Prior to your 18th birthday - Did you often or very often feel that ... No one in your family loved you or thought you were important or special? Or your family didn't look out for each other, feel close to each other, or support each other?” and “Prior to your 18th birthday - Did you often or very often feel that ... You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? Or your parents were too drunk or high to take care of you or take you to the doctor if you needed it?”

Subtypes of adverse childhood experiences were recoded into categorical variables: no abuse = 0, abuse (emotional, physical or sexual) = 1; no neglect = 0, neglect (endorsed either one of 2 items) = 1; no emotional abuse = 0, emotional abuse = 1; no physical abuse = 0, physical abuse = 1; and no sexual abuse = 0, sexual abuse = 1. A hierarchical linear regression was conducted to investigate the relationship between internalized weight bias and subtypes of adverse childhood experiences: abuse, neglect, emotional abuse, physical abuse, and sexual abuse. Socially

desirable responding and BMI were included in Model 1 to statistically adjust throughout these analyses; subtypes of adverse childhood experiences were included in Model 2.

Chapter 4: Results

Assumptions of Statistical Analyses

Social support was negatively skewed and was corrected by using reflection and log transformation as recommended by Tabachnick and Fidell (2019). Results did not differ appreciably when the transformed and non-transformed variables were used. Results are reported on non-transformed variables to aid in interpretation. All other assumptions of normality, linearity, and homoscedasticity of residuals were met; the assumptions of multicollinearity and independence were met.

Sample Characteristics

Demographic characteristics of the sample are presented in Table 1. A total of 119 patients completed the questionnaire package. Four patients were excluded from the final analysis due to a large amount of missing data (e.g., only completed a portion of the demographic questionnaire and no other measures). The final sample consisted of 115 patients. The sample was comprised of 72.2% Albertans and 27.8% Newfoundlander and Labradorians. The sample was predominantly female (83.5%), White (91.3%), married or common-law (73.9%), and employed full-time (65.2%). The most common level of education was community college/trade certificate (49.6%), and household income greater than $100,000 (37.4%). The mean age was 47.35 and mean BMI was 46.69 kg/m^2.

On average, participants reported relatively low levels of depressed mood (in the mild range; 24 who scored above 19, the clinical cut-off suggestive of moderate severity), few symptoms of anxiety (in the minimal range; 24 who scored above 16, the clinical cut-off suggestive of moderate severity), few symptoms associated with binge eating disorder (in the none-to-minimal range), few adverse childhood experiences, and self-esteem that fell within the

"normal" range based on recognized clinical cut-points. The sample reported relatively high health related quality of life (76th percentile relative to the UK normative population), and rated their health as fair. Patients indicated that weight had a substantial adverse impact on their quality of life (Table 2).

Is Internalized Weight Bias Associated with Mental Health, and Quality of Life?

Descriptive statistics are presented in Table 2. Results of the partial correlations analyses are presented in Table 3. Internalized weight bias was significantly associated with symptoms of depression, symptoms of anxiety, symptoms of binge eating, self-esteem, impact of weight on quality of life, and social support. Internalized weight bias was higher among individuals who reported more symptoms of depression, more symptoms of anxiety, more symptoms of binge eating, lower self-esteem, greater impact of weight on quality of life, and lower social-support. Internalized weight bias was not significantly associated with health-related quality of life or adverse childhood events.

Which Psychosocial Variables are Uniquely Associated with Internalized Weight Bias?

Results of the hierarchical linear regression analysis are presented in Table 4. Self-esteem, binge eating symptoms, social support, and adverse childhood events exhibited significant unique associations with internalized weight bias above and beyond BMI and socially desirable responding, accounting for 19.0%, 10.9%, 3.5% and 2.3% of unique variance, respectively. Internalized weight bias was higher among individuals who reported lower self-esteem, more symptoms associated with binge eating, lower social support, and fewer adverse childhood events. The following variables were not significantly associated with internalized weight bias above and beyond variables included in the model: symptoms of depression, symptoms of anxiety, impact of weight on quality of life, and health-related quality of life.

Does Social Support Moderate Associations with Internalized Weight Bias?

Results of the moderated multiple regression analyses are presented in Tables 5-9. Social support did not moderate associations between internalized weight bias and symptoms of depression, symptoms of anxiety, symptoms of binge eating, self-esteem, or impact of weight on quality of life.

Exploratory Data Analysis

Is Internalized Weight Bias Associated with Subtypes of Adverse Childhood Experiences?

Fifteen participants did not complete the ACE questionnaire, thus a total sample of 100 was included for examining the relationship between internalized weight bias and subtypes of adverse childhood events. A total of 42% of respondents reported experiencing abuse (emotional, physical or sexual abuse), 30% emotional abuse, 25% sexual abuse, 19% physical abuse, and 36% neglect. Results of the linear regression analyses are presented in Table 10. Internalized weight bias was not significantly associated with abuse, neglect, emotional abuse, physical abuse, or sexual abuse.

Chapter 5: Discussion

Is Internalized Weight Bias Associated with Mental Health, and Quality of Life?

The present study found that internalized weight bias was significantly positively associated with symptoms of depression, symptoms of anxiety, symptoms of binge eating, self-esteem, and impact of weight on quality of life, with small to medium effect sizes. These findings are consistent with previous studies that found a significant relationship between internalized weight bias and symptoms of depression (Hubner et al., 2016; Lawson et al., 2021; Pearl & Puhl, 2018; Soulliard et al., 2021; Wagner et al., 2020), symptoms of anxiety (Hubner et al., 2016;. Pearl & Puhl, 2018; Servincer et al., 2017; Wagner et al 2020), symptoms of binge eating (Pearl & Puhl, 2018), self-esteem (Hilbert et al., 2014; Pearl & Puhl, 2018; Servincer et al., 2017), and impact of weight on health related quality of life (Hubner et al., 2016; Pearl & Puhl, 2018; Servincer et al., 2017). This is the first study to statistically adjust for socially desirable responding while examining the relationship between internalized weight bias, and self-esteem, binge eating symptoms, and adverse childhood experiences. The current study further highlights that internalized weight bias is an important factor to consider among individuals seeking and undergoing bariatric surgery given its association with mental health and quality of life outcomes.

This is the first study to date that has examined the relationship between internalized weight bias and social support. The current study observed that internalized weight bias was higher among individuals with low social support. This result is consistent with previous research in which a narrative inquiry observed that individuals reported that internalized weight bias led to social isolation (Ramos Salas et al., 2019). Thus, it is plausible that individuals who struggle with heightened internalized weight bias withdraw from their social supports which

limits their opportunity to receive support specific to internalized weight bias (e.g., validation of feelings given weight bias in society and offering an outsider perspective to challenge dysfunctional beliefs). Further, if individuals with elevated internalized weight bias are isolating from their social support networks, internalized weight bias is likely preventing individuals from having meaningful supportive relationships more broadly.

Internalized weight bias was not significantly associated with health-related quality of life. This is consistent with the results of one previous study that examined this association in a sample of 94 endocrinology patients who had a BMI of 30 or greater (Hain et al., 2015). This result is inconsistent with seven previous studies that reported significant associations between internalized weight bias and health-related quality of life; where higher internalized weight bias was found to be associated with lower health-related quality of life (Farhangi et al., 2017; Hilbert et al., 2015; Latner et al., 2013; Latner et al., 2014; Pearl et al., 2014; Pearl et al., 2021; Schvey et al., 2017). However, it is important to note that in the current study the correlation between internalized weight bias and health-related quality of life was close to significance in the expected direction and the strength of the association indicated a practically significant effect size for social science data (Fergueson, 2009).

Differences in research methodology when compared to the present study could possibly account for this difference in observed results. While the majority of previous studies did use the Weight Bias Internalization Scale to measure internalized weight bias, measures of health-related quality of life differed from the present study. The current study was the first to measure health-related quality of life by using The European Quality of Life Five Dimensions scale (EQ-5D-5L). The majority of studies that observed significant associations with internalized weight bias used the Short-Form Health Survey (SF-36), or the Short-Form Health Survey (SF-12) to

measure health-related quality of life. Further, while the majority of previous studies were samples of individuals who met criteria for individuals with a BMI of 25 or greater or individuals with a BMI of 30 or greater, none were among samples of individuals seeking bariatric surgery, which could possibly contribute to difference in results.

Internalized weight bias was not significantly associated with adverse childhood experiences. This is inconsistent with two studies that did observe a significant association between internalized weight bias and adverse childhood experiences among individuals who had a BMI of 25 or greater (Braun et al., 2021; Keirns et al., 2021). There is some evidence that adverse childhood experiences of abuse and neglect are more detrimental to adult mental health outcomes than household dysfunction (Atzl et al., 2019; Keirns et al., 2021). Thus, the current study conducted exploratory analyses to investigate the relationship between internalized weight bias and abuse and neglect subtypes of adverse childhood experiences.

Internalized weight bias was not associated with subtypes of adverse childhood experiences, including abuse, neglect, or specifically sexual, emotional, or physical abuse. This finding is inconsistent with Keirns et al. (2021) who observed a significant positive association between internalized weight bias and overall abuse, as well as emotional and sexual abuse. A potential reason that could account for the differences in findings may be the difference in measurement of adverse childhood experiences. The current study used the commonly used 10-item adverse childhood experiences questionnaire, whereas Keirns et al. (2021) used an expanded version. The expanded adverse childhood experiences questionnaire includes 17-items and allows for a more nuanced assessment of adverse childhood experiences (Keirns et al., 2021). For example, the 10-item adverse childhood experiences questionnaire assesses physical abuse by using one item asking “Did a parent or other adult in the household often or very often

push, grab, slap, or throw something at you? Or ever hit you so hard that you had marks or were injured?" whereas the expanded version breaks this item into two questions/items: "Did a parent or other adult in the household often push, grab, slap, or throw something at you?" and "Did a parent or other adult in the house ever hit you so hard that you had marks or were injured" (Keirns et al., 2021). Thus, this more nuanced assessment of adverse childhood experiences may have better allowed for the detection of associations between subtypes of adverse childhood experiences with internalized weight bias.

Which Psychosocial Variables are Uniquely Associated with Internalized Weight Bias?

The present study sought to investigate which psychosocial variables are most uniquely associated with internalized weight bias. When considering all variables, self-esteem, symptoms of binge eating disorder, social support, and adverse childhood events were significantly associated with internalized weight bias while statistically adjusting for BMI and socially desirable responding. Symptoms of depression, anxiety, impact of weight on quality of life and health-related quality of life were not significantly associated with internalized weight bias after self-esteem, symptoms of binge eating, social support, adverse childhood experiences, BMI and socially desirable responding were considered in the model. Among the current sample, associations between internalized weight bias, psychological distress (i.e., depressed and anxious mood) and quality of life appear to be accounted for by feelings of self-worth and symptoms of binge eating.

Self-esteem accounted for 19% of the variance in internalized weight bias which makes sense given that self-devaluation is a part of internalized weight bias. It has been extensively documented that self devaluation and/or self-criticism is a latent construct that underlies low self-esteem, anxiety, and depression. Self-esteem may reflect the negative self evaluation that

accompanies internalized weight bias in the current study and accounting for symptoms of psychological distress (Sowislo & Orth, 2013). Symptoms of binge eating accounted for 10.9% of the variance in internalized weight bias which may be explained by individuals using binge eating to cope with unpleasant emotions that arise from internalized weight bias. Specifically, depression and anxiety have been found to be risk factors for binge eating behaviour (Rosenbaum & White, 2015). Further, binge eating and depression are associated with reduced quality of life (Costa & Pinto, 2015; Lerdal et al., 2011). Thus, self-esteem and binge eating symptoms may be the most pertinent psychological factors to assess for among individuals who present for bariatric surgery with elevated internalized weight bias and to target in therapy to improve mental health and well-being.

Adverse childhood events were significantly associated with internalized weight bias once self-esteem, symptoms of binge eating, and social support were accounted for in the model and may only be pertinent once patients are equated on these influences. Two points are important to note: 1) internalized weight bias was not significantly associated with adverse childhood events in the partial correlation analysis with a minimal correlation; and 2) adverse childhood experiences only accounted for 2% unique variance in internalized weight bias in the fully adjusted model. As such, we caution readers in interpreting this result. It is equally plausible that this result could be spurious.

Does Social Support Moderate Associations with Internalized Weight Bias?

In the current study, social support did not significantly moderate the relationship between internalized weight bias and symptoms of depression, symptoms of anxiety, symptoms of binge eating disorder, self-esteem or impact of weight on quality of life.

Shame

The emotion shame is one factor that can potentially explain these results. Shame may prevent individuals from reaching out to their social support networks about their experience with internalized weight bias. Brown (2006) interviewed 215 women about their experience of shame with the purpose of explaining why and how women experience shame, and the impacts of shame on women. This qualitative analysis led to shame being defined as "an intensely painful feeling or experience of believing we are flawed and therefore unworthy of acceptance and belonging" (Brown, 2006). An important distinction that emerged when understanding the construct of shame is the difference between guilt and shame. Guilt and shame are both emotions of self-evaluation. The emotion of guilt pertains to a person's behaviour, where the feeling results from behaving in a way that is viewed as flawed or bad. Conversely, the emotion of shame is in relation to a person's character, where the self is seen as flawed or bad. In other words, when an individual feels guilt they experience the thought "I did something bad" whereas when an individual feels shame they have the thought that "I am bad". Shame has been observed to be associated with isolation and secrecy, which can be explained by the relationship between shame and fear of social disconnection (Brown, 2006; Brown, 2008). When individual's experience shame they fear speaking their shame due to the fear of being ridiculed, diminished or seen as flawed (Brown, 2008).

Internalized weight bias has been observed to be associated with shame (Braun et al., 2021; Hain et al., 2015; Ramos Salas et al., 2019; Webb & Hardin, 2016). That is, as internalized weight bias increases the experience of shame increases. Shame resilience theory (SRT) may offer an explanation of the link between internalized weight bias and shame. SRT proposes that shame is a psycho-social-cultural construct (Brown, 2006). The psychological component of shame includes individuals' emotions, thoughts, and behaviors. The social component relates to

the way in which individuals experience shame in an interpersonal context that is related to relationships and connection. The cultural component highlights the prevalent role of cultural expectations and the relationship between shame and the real or perceived failure of meeting cultural expectations. Sociocultural expectations are interpretations of who individuals are supposed to be based on their identity, and are often imposed, enforced, or expressed by individuals and groups. Further, socio-cultural expectations are constantly reinforced by media culture (Brown, 2006). Specifically, shame is often felt when individuals cannot meet the socio-cultural expectations. Brown (2006) found that appearance and body image was a prevalent area in which individuals struggle the most with feelings of shame. Thus, in congruence with this theory, it is possible that internalized weight bias is associated with shame as individuals who have a BMI of 25 or greater do not meet the socio-cultural expectation to be thin. Thus, based on this weight related socio-cultural expectation, individuals believe that there is something wrong with their character due to their body size and thus experience shame.

To summarize, internalized weight bias has been associated with shame, and shame has been found to lead to secrecy and isolation. If individuals feel shame in relation to their body weight, then it is likely that individuals who experience internalized weight bias are not talking about this experience with their social support networks. Additionally, given that loved ones are reported as frequent sources of weight stigma, this may further increase shame and increase the likelihood that individuals will not discuss their experience with internalized weight bias (Puhl & Brownell, 2006). Thus, it may be that individuals are not talking about their experience of internalized weight bias and they therefore cannot get support from their social networks even if individuals report having supportive individuals in their lives. If this is the case then there is no opportunity for social support to be a protective factor between internalized weight bias and

symptoms of depression, symptoms of anxiety, symptoms of binge eating, and self-esteem simply because individuals are not seeking support about these difficulties. The clinical implications of this finding may be that social support groups that probe individuals to talk about their experiences with internalized weight bias may be warranted. Further, given that individuals would likely be reluctant to discuss their experience with internalized weight bias due to shame, it would be helpful to have a moderated support group where discussions of complex emotions such as shame can be normalized.

Weight Bias and Diet-Culture Beliefs

The high prevalence of weight bias in society and engagement with diet-culture beliefs is another potential explanation for why social support was not observed to be a significant moderator between internalized weight bias and symptoms of depression, symptoms of anxiety, symptoms of binge eating, and self-esteem (Puhl & Heuer, 2009; Santos et al., 2017). Diet culture can be defined as "a system of beliefs that equates thinness to health and moral virtue, that promotes weight loss as a means of attaining higher status, and that demonizes certain ways of eating while elevating others" (Davidson, 2020). Additionally, diet culture has been further defined as being "characterised by a conflation of weight and health including myths about food and eating, and a moral hierarchy of bodies derived from patriarchal, racist, and capitalist forms of domination" (Jovanovski & Jaeger, 2022). Weight-biases and engagement in diet-culture beliefs may prevent individuals' social support network from being able to provide support for internalized weight bias. A systematic review and meta-analysis was conducted to estimate the prevalence of personal weight control attempts, including either weight loss and/or maintenance (Santos et al., 2017). A total of 72 studies were identified with a sample size of 1,184,942. Results revealed that 42% of adults from general populations reported trying to lose weight in

the past year, and 23% of adults reported trying to maintain their weight. The highest overall prevalence rate of weight loss attempts in the past year was observed in North America, with a prevalence rate of 44%. Another study examined the prevalence of dieting across ages among a sample of 31, 636 individuals (Slof-Op ‘t Landt, 2017). This study observed that dieting was most frequently reported by 35 to 65 year old women (56.6%-63%) and 45-65 year old men (31.7%-31.9%); this is important to note as these age ranges are similar to the age at which individuals seek bariatric surgery. Additionally, samples of individuals seeking bariatric surgery often include a majority of women. Importantly, these studies focused specifically on dieting behaviours, whereas the prevalence of holding a diet-culture belief system could be higher. Further, as discussed previously weight bias is pervasive in society, specifically in western society (Puhl & Heuer, 2009).

One component of the diet culture definition includes using dieting and thinness as a way of gaining social power. The second component is placing moral value on specific food and body types. The third component is rigidly associating thin bodies with health (Davidson, 2020). Thus, diet culture beliefs overlap with weight biases that exist and are promoted in society. Davidson (2020) conducted four focus groups with a total of 13 participants to better understand the experience of diet culture to develop a scale to measure diet-culture beliefs. Morality related to food and body was one of the strongest themes that emerged in this study. Diet-culture beliefs, specifically regarding morality related to the body, as well as the belief that thin equals a more valuable character, overlaps with beliefs involved in internalized weight bias.

Given the extensive weight biases and heightened prevalence of diet-culture in the general population, it stands to reason that people within an individuals’ social support systems are engaged in these beliefs and cannot adequately provide support for distress related to

internalized weight bias. From this perspective, social supports may be directly or indirectly reinforcing the problematic weight stereotypes that relate to internalized weight bias, and unable to challenge or offer another perspective to the beliefs of those struggling with internalized weight bias, and symptoms of depression, symptoms of anxiety, symptoms of binge eating and low self-esteem. Following this argument, it may be useful to provide psychoeducation to the loved ones of individuals who present for bariatric surgery about weight bias, internalized weight bias, and the harms of diet culture belief systems. This could potentially help family and friends be more supportive and helpful to individuals experiencing internalized weight bias and associated mental health concerns.

Clinical Intervention for Internalized Weight Bias: Self Compassion

It may also be the case that social support is simply not powerful enough to moderate the relationship between internalized weight bias and symptoms of depression, symptoms of anxiety, symptoms of binge eating, or impact of weight on quality of life; a more clinically informed intervention may be needed. Due to the negative impacts of internalized weight bias, it is paramount to investigate factors that may be protective against internalized weight bias and related consequences. Research has recently focused on investigating the clinical approach of self-compassion as a protective factor of internalized weight bias.

Self-compassion evolved from Buddhist philosophy and is a construct that entails having a healthy attitude and relationship with oneself (Neff, 2003a; 2003b). Self-compassion includes: i) viewing one's own experience in the light of common human experience; ii) acknowledging suffering, failure, and inadequacies as part of being human; and iii) appreciating that all people, including oneself, are worthy of compassion (Neff, 2003b). Self-compassion has been conceptualized to be comprised of three components: self-kindness, common humanity, and

mindfulness (Neff, 2003a; 2003b). Self-kindness means to interact with oneself in a kind and understanding manner, instead of being self-critical or judgemental (Neff, 2003a; 2003b). Common humanity includes understanding that suffering is a part of the human experience, and thus perceiving one's own struggles as a shared experience as opposed to an isolating one (Neff, 2003a; 2003b). Mindfulness encompasses the ability to acknowledge and experience painful thoughts and feelings without over-identifying with or minimizing them (Neff, 2003a; 2003b). Although these three components are perceived to be conceptually distinct, they are theorized to enhance each other (Neff, 2003b). While self-compassion is suggested to be a dispositional trait, it is also a skill that can be learned, practiced, and incorporated into the identity of individuals who are low in self-compassion (Gilbert & Procter, 2006; Neff & Germer, 2013).

Self-compassion has been consistently observed to be a protective factor against mental health symptoms. A meta-analysis explored the associations between self-compassion and psychopathology, and found that as self-compassion increases, symptoms of depression and anxiety, and stress decrease, with reported mean correlations of -0.52, -0.51, -0.54, respectively (MacBeth & Gumley, 2009). Similarly, one study that delivered a Mindfulness Self-Compassion Program, an 8-week group intervention, was observed to lead to significant increases in self-compassion, and reduction of symptoms of depression, anxiety, stress (Neff & Germer, 2013). Additionally, Compassionate Mind Training, a clinical group intervention, has been reported to lead to reductions in depression, anxiety, shame, feelings of inferiority, and self-critical thoughts (Gilbert & Procter, 2006). Further, self-compassion has been observed to reduce binge eating and related psychopathology (Kelly & Carter, 2015). One study reported that a compassion focused therapy intervention, which was delivered to individuals with binge eating disorder, led to

significantly heightened self-compassion and reduced weekly binges, global eating disorder pathology, eating concerns, and weight concerns (Kelly & Carter, 2015).

Research suggests that self-compassion may lead to better mental health, by enabling more adaptive emotion regulation (Inwood & Ferrari, 2018). A systematic review aimed to summarize the available evidence on the relationship between self-compassion and emotion regulation, and their effects on psychopathology (Inwood & Ferrari, 2018). A total of 5 studies were identified, and concluded that the use of self-compassion impacts mental health by facilitating adaptive emotion regulation, possibly through enabling unpleasant emotions to be processed. Specifically, integrating compassionate processing of unpleasant emotions reduces the use of maladaptive emotion regulation strategies such as avoidance and helps to manage distress (Inwood & Ferrari, 2018). This supports previous research which suggests that tolerance of unpleasant emotions is a critical component for the recovery and maintenance of mental health difficulties (Berking & Whitley, 2014). Thus, self-compassion may be effective in reducing internalized weight bias and associated mental health concerns through improvements in emotion regulation.

A paucity of research has investigated the relationship between internalized weight bias, self-compassion, and related psychological factors. Two recent studies reported significant negative associations between internalized weight bias and self-compassion (Braun et al., 2021; Fekete et al., 2021). This is unsurprising giving that self-compassion includes acceptance and non-judgemental views towards one's self, whereas internalized weight bias includes negative perceptions towards the self. Additionally, one study that conducted a narrative inquiry, reported that one way that individuals embraced recovery from internalized weight bias was by developing self-compassion (Ramos Salas et al., 2019). Further, a cross-sectional study

conducted an exploratory examination of the indirect effects of self-compassion on maladaptive eating behaviours through lower levels of internalized weight bias and increased psychological well-being (Fekete et al., 2021). Results indicated a significant indirect effect of self-compassion on less emotional eating through lower levels of internalized weight bias, as well as a non-significant indirect effect of self-compassion on emotional eating through depression or anxiety. These findings suggest that internalized weight bias alone, as opposed to a sequence of internalized weight bias and psychological well-being, explained the link between self-compassion and fewer maladaptive eating behaviours among women (Fekete et al., 2021). Another cross-sectional study, that specifically included a population of individuals seeking bariatric surgery observed that internalized weight bias was associated with greater emotional eating through heightened internalized shame and low self-compassion which remained significant after accounting for symptoms of depression and anxiety (Braun et al., 2021). Given the significance of self-compassion, a protocol for a 2-arm randomized controlled trial was designed to test the efficacy of a 4-week digital self-compassion intervention to reduce internalized weight bias compared with a wait-list control, however results are not yet available (Hopkins et al., 2021). Despite the limitations of the research to date (e.g., cross-sectional) these findings highlight the relevance of self-compassion among individuals with high levels of internalized weight bias.

Limitations

The results reported in this dissertation must be considered in light of several limitations. First, the current study used a cross-sectional design, and directionality and causality between internalized weight bias and mental health and quality of life variables could not be determined. Second our sample primarily included individuals who identified as White, female, and are

relatively high in socioeconomic status. Thus, our findings may not be generalizable to males, or other ethnicities, and socioeconomic status groups. Further, the sample reported relatively few adverse childhood experiences, symptoms of depressed mood, anxiety, and binge eating, and high health-related quality of life. This may have contributed to difficulty in detecting meaningful relationships due to restrictions in range of scores (i.e., associations between internalized weight bias and psychopathology may be more evident, or only observed, among those with scores of greater severity). Additionally, these low scores would place prevalence of psychopathology lower than most other studies which indicates that our sample may not be representative. Third, the sample size was relatively small. As a rule of thumb, a sample size of "$N \geq 104 + m$" is required for testing individual predictors in multiple regression where m reflects the number of predictors (Tabachnick & Fidell, 2019). Following this rule, the sample size of the current study was minimally adequate to evaluate individual predictors in a multiple regression with up to 11 predictors and covariates. That said, the study may be limited by low statistical power, particularly for moderation analyses. Similarly, multiple statistical tests were performed without adjusting for familywise error associated with multiple tests. This choice was made a-priori to maintain statistical power. Fourth, selection bias could be present in the sample as there were subtle differences between study sites. For example, St. John's participants were provided some compensation for participation in the study which could have influenced participation in the study. Fifth, while we measured socially desirable responding, the measure is somewhat antiquated and could be improved. For example one of the items pertains to illegal drug use and lists marijuana. Finally, other important variables may not have been captured or measured, such as shame, self-compassion, coping styles (e.g., emotion regulation), and experienced weight stigma.

Future Research

Future studies should further investigate the relationship between internalized weight bias, and mental health and quality of life outcomes; investigating potential mediating variables would be helpful to increase our understanding of these relationships. Shame in particular should be further explored as a mediating variable. More research is needed given the mixed findings and limited research to date examining the relationship between internalized weight bias and adverse childhood experience. Further, longitudinal and more experimental studies are needed to confirm the direction of these relationships and to more reliably investigate mediating variables.

Additional research is needed in order to improve confidence in conclusions that can be drawn given that this was the first study to examine the association of internalized weight bias and social support, and social support as a moderator between internalized weight bias, mental health and quality of life. Studies should also investigate whether individuals seek support from their social networks about their experience with internalized weight bias and investigate their experience (i.e., did individuals feel supported if they reached out to their social support systems about internalized weight bias); the development of a questionnaire and/or a qualitative approach may be helpful to investigate this aim to gain a more detailed understanding of this experience. Additionally, studies investigating the effectiveness of social support groups where individuals are probed to talk about internalized weight bias would be useful to better understand if social support could be helpful in reducing internalized weight bias. Experimental research is needed to investigate the effectiveness of clinical approaches, such as self-compassion, to reduce internalized weight bias. Finally, more research is needed to investigate the relationship between internalized weight bias, as well as weight-based discrimination experiences, and bariatric surgery outcome.

Conclusion

In summary, the current study observed that internalized weight bias was positively associated with symptoms of depression, anxiety, and binge eating disorder, and impact of weight on quality of life, and negatively associated with self-esteem. This further highlights that internalized weight bias is an important factor to consider among individuals seeking and undergoing bariatric surgery given its association with mental health and quality of life outcomes. Results also suggested that associations between internalized weight bias, psychological distress and quality of life were largely accounted for by feelings of self-worth and symptoms of binge eating disorder. Thus, self-esteem and symptoms associated with binge eating disorder may be the most pertinent psychological factors to evaluate among individuals who present for bariatric surgery with elevated internalized weight bias, and to target in therapy to improve mental health and well-being.

Internalized weight bias was negatively associated with social support, however social support was not a significant moderator between internalised weight bias, and mental health or quality of life variables. Shame and belief systems associated with diet-culture may be barriers to social support being a protective factor for internalized weight bias and related mental health and quality of life outcomes; however more research is needed. Specifically, shame often leads to isolation. If individuals feel shame in relation to their body weight then it is likely that individuals who experience internalized weight bias will not discuss their experience with their social support networks. Additionally, given the extensive weight biases and heightened prevalence of diet-culture in the general population, it stands to reason that people within an individuals' social support systems are hold some degree of these beliefs and may not be able to provide adequate support for distress related to internalized weight bias. Social support groups

that encourage individuals to talk about their experience with internalized weight bias may be warranted. It may also be useful to provide psychoeducation to the loved ones of individuals who present to bariatric surgery about weight bias, internalized weight bias, and the harms of diet culture belief systems. Lastly, more research is needed to determine the effectiveness of clinically informed interventions to target internalized weight bias and related consequences.

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Table 1

Sample Characteristics

	M (*SD*)	Range
Age	47.35 (9.66)	23-67
BMI	46.69 (7.97)	35.44-93.4
Years of Education	15.65 (2.71)	9-23
	N	%
Province		
Alberta	83	72.2
Newfoundland	32	27.8
Sex		
Female	96	83.5
Male	19	16.5
Ethnicity		
White	105	91.3
Indigenous	5	4.3
Asian	2	1.7
Latino/Latina	1	0.9
Arab	1	0.9
Multiracial	1	0.9
Marital Status		
Single, Never Married	20	17.4
Married or Common Law	85	73.9
Separated or Divorced	8	7.0
Widowed	2	1.7
Employment Status		
Full-Time	75	65.2
Part-Time	11	9.6
Retired	6	5.2
Sick/Disability Leave	5	4.3
Homemaker	5	4.3
Unemployed	5	4.3
Other	8	7.0
Highest Level of Education		
Less than High School	5	4.3
High School Diploma	20	17.4
Trade Certificate	18	15.7
Community College	39	33.9
Bachelor's Degree	19	16.5
University Degree Above Bachelor's	10	8.7
Other	4	3.5
Household Income		
Less than $10,000/year	1	0.9
$10,001-$20,000	4	3.5

$20,001-$40,000	6	5.2
$40,001-$60,000	13	11.3
$60,001-$80,000	18	15.7
$80,001-$100,000	21	18.3
Greater than $100,000	43	37.4
Prefer Not to Say	9	7.8

Note. $N = 115$.

Table 2

Descriptive Statistics

	M (*SD*)	Range
Internalized Weight Bias	45.16 (12.19)	16-68
Depression Symptoms	13.09 (8.83)	0-43
Anxiety Symptoms	10.36 (8.71)	0-42
Binge Eating Symptoms	14.95 (7.59)	0-40
Self-Esteem	20.79 (5.98)	10-37
Impact of Weight on Quality of Life	91.65 (21.44)	42-139
Health-Related Quality of Life Norms	0.73 (0.15)	.25-1.00
Health-Related Quality of Life Analog	62.09 (17.79)	16-100
Social Support	33.50 (6.54)	11-41
Social Desirability	9.23 (1.79)	5-13
Adverse Childhood Experiences	1.98 (2.02)	0-8

Note. $N = 115$.

Table 3

Partial Correlation Analyses

	Internalized Weight Bias	
	r	*p*
Depression Symptoms	.306	.001
Anxiety Symptoms	.193	.041
Binge Eating Symptoms	.488	.000
Self-Esteem	-.455	.000
Impact of Weight on Quality of Life	.284	.002
Health-Related Quality of Life Normed relative to the UK population	-.175	.064
Health-Related Quality of Life rated on a visual Analog scale	-.123	.194
Adverse Childhood Events	-.009	.921
Social Support	-.339	.000

Note. Influences of BMI and Socially Desirable Responding were statistically adjusted. $N = 115$.

Table 4

Hierarchical Linear Regression Analysis: Psychosocial Variables Uniquely Associated with Internalized Weight Bias

Outcome Variable: Internalized Weight Bias					
Model	*B* (*SE*)	*t*	*r*(zero-order)	*r*(partial)	ΔR^2
Constant	13.72 (9.53)	1.44			
Self-Esteem	-0.65(0.15)	4.19**	-.41	-.37	.19
Binge Eating Symptoms	0.55(0.12)	4.43**	.44	.39	.11
Social Support	-0.42(0.14)	2.95**	-.29	-.27	.04
ACEs	-0.95(0.46)	2.09*	-.02	-.20	.02
Statistically Adjusted Variables					
Social Desirability	0.43(0.50)	0.86	.08	.08	
Body Mass Index	0.47(0.11)	4.21**	.28	.38	
Model Summary	$F(6, 108) = 14.20$, $SE = 9.36$, $p < .01$, $R^2 = .44$				

Note. $N = 115$, $df(6, 108)$; * = $p < .05$; ** = $p < .01$.

Table 5

Moderated Multiple Regression Analysis Evaluating Social Support as a Moderator of the Association Between Internalized Weight Bias and Symptom of Depression

	R	R^2	*MSE*	*F* (*df*1,*df*2)	*p*
Model Summary	.36	.13	70.85	3.28 (5,109)	.009
Outcome Variable: Symptoms of Depression					
Model		Coeff	*SE*	*t*	*p*
Constant		24.05	18.43	1.30	.195
Internalized Weight Bias		.21	.35	0.61	.543
Social Support		-.18	.50	0.35	.727
Internalized Weight Bias*Social Support		-.00	.01	0.06	.956
Statistically Adjusted Variables					
Social Desirability		-.59	.44	1.33	.186
Body Mass Index		-.17	.11	1.67	.097

Note. $N = 115$.

Table 6

Moderated Multiple Regression Analysis Evaluating Social Support as a Moderator of the Association Between Internalized Weight Bias and Symptoms of Anxiety

	R	R^2	*MSE*	*F* (*df*1,*df*2)	*p*
Model Summary	.27	.07	73.48	1.75 (5,109)	.129
Outcome Variable: Symptoms of Anxiety					
Model		Coeff	*SE*	*t*	*p*
Constant		34.31	18.77	1.83	.070
Internalized Weight Bias		-.19	.35	0.53	.597
Social Support		-.61	.51	1.20	.234
Internalized Weight Bias*Social Support		.01	.01	0.86	.394
Statistically Adjusted Variables					
Social Desirability		-.08	.45	0.18	.858
Body Mass Index		-.16	.11	1.44	.154

Note. $N = 115$.

Table 7

Moderated Multiple Regression Analysis Evaluating Social Support as a Moderator of the Association Between Internalized Weight Bias and Symptoms of Binge Eating

	R	R^2	*MSE*	*F* (*df*1,*df*2)	*p*
Model Summary	.48	.23	46.49	6.48 (5,109)	.000
Outcome Variable: Symptoms of Binge Eating					
Model		Coeff	*SE*	*t*	*p*
Constant		31.02	14.93	2.08	.040
Internalized Weight Bias		-.20	.28	0.73	.467
Social Support		-.76	.41	1.86	.066
Internalized Weight Bias*Social Support		.01	.01	1.77	.080
Statistically Adjusted Variables					
Social Desirability		.10	.36	0.27	.786
Body Mass Index		-.08	.09	0.93	.355

Note. $N = 115$.

Table 8

Moderated Multiple Regression Analysis Evaluating Social Support as a Moderator of the Association Between Internalized Weight Bias and Self-Esteem

	R	R^2	*MSE*	*F* (*df*1,*df*2)	*p*
Model Summary	.49	.24	28.55	6.78 (5,109	.000
Outcome Variable: Self-Esteem					
Model		Coeff	*SE*	*t*	*p*
Constant		4.83	11.71	0.41	.680
Internalized Weight Bias		-.58	.22	2.63	.010
Social Support		.45	.32	1.41	.162
Internalized Weight Bias*Social Support		-.01	.01	1.66	.099
Statistically Adjusted Variables					
Social Desirability		-.34	.28	1.21	.230
Body Mass Index		-.13	.07	2.00	.048

Note. $N = 115$.

Table 9

Moderated Multiple Regression Analysis Evaluating Social Support as a Moderator of the Association Between Internalized Weight Bias and Impact of Weight on Quality of Life

	R	R^2	*MSE*	*F* (*df*1,*df*2)	*p*
Model Summary	.50	.25	360.93	7.25 (5,109)	.000
Outcome Variable: Impact of Weight on Quality of Life					
Model		Coeff	*SE*	*t*	*p*
Constant		-9.84	41.60	0.24	.813
Internalized Weight Bias		1.78	.78	2.28	.025
Social Support		1.41	1.13	1.25	.215
Internalized Weight Bias*Social Support		-.04	.02	1.84	.068
Statistically Adjusted Variables					
Social Desirability		-.57	1.00	0.57	.569
Body Mass Index		.88	.24	3.66	.000

Note. $N = 115$.

Table 10

Linear Hierarchical Regression Analyses: Internalized Weight Bias and Subtypes of Adverse Childhood Events

Independent Variable	*B*	*SE B*	β	*t*	*p*
Abuse	-3.86	2.30	-.16	1.68	.097
Sexual Abuse	-2.98	2.66	-.11	1.12	.266
Emotional Abuse	-1.25	2.57	-.05	0.49	.627
Physical Abuse	-.89	3.01	-.03	0.30	.769
Neglect	.85	2.46	.03	0.347	.730

Note. Influences of BMI and Socially Desirable Responding were statistically adjusted. N = 100.

Appendix A

Modified Weight Bias Internalization Scale (WBIS-M)

Items
1. Because of my weight, I feel that I am just as competent as anyone.[1,2]
2. I am less attractive than most other people because of my weight.
3. I feel anxious about my weight because of what people might think of me.[1]
4. I wish I could drastically change my weight.
5. Whenever I think a lot about my weight, I feel depressed.[1]
6. I hate myself for my weight.[1]
7. My weight is a major way that I judge my value as a person.
8. I don't feel that I deserve to have a really fulfilling social life, because of my weight.[1]
9. I am OK being the weight that I am.[2]
10. Because of my weight, I don't feel like my true self.[1]
11. Because of my weight, I don't understand how anyone attractive would want to date me.

Items are rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).
[1] Item modified, [2] Item reverse-scored

Appendix B

Beck Depression Inventory - II

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** that best describes the way you have been feeling during the **past two weeks, including today**. Circle the letter beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all of the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

0 I am not discouraged by my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

0 I feel the same way about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying

0 I don't cry any more than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

11. Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have a much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I don't have enough energy to do very much.
3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.
1a I sleep somewhat more than usual.
1b I sleep somewhat less than usual.
2a I sleep a lot more than usual.
2b I sleep a lot less than usual.
3a I sleep most of the day.
3b I wake up to 1-2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.
1a My appetite is somewhat less than usual.
1b My appetite is somewhat greater than usual.
2a My appetite is much less than before.
2b My appetite is much more than usual.
3a I have no appetite at all.
3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely

Appendix C

Beck Anxiety Inventory

Here is a list of symptoms often due to anxiety. Please read each symptom carefully. Indicate, by circling the appropriate number, to what degree you have been affected by each symptom **in the last week**, including today.

In the last seven days, I was affected by...	**Not at all**	**Somewhat** (It did not bother me that much)	**Moderately** (It was unpleasant but tolerable)	**A great deal** (I could barely tolerate it)
1. Numbness or tingling sensations	0	1	2	3
2. Hot flashes	0	1	2	3
3. Feeling “weak in the knees”	0	1	2	3
4. Difficulties relaxing	0	1	2	3
5. Thinking the worst will happen	0	1	2	3
6. Dizziness or feeling disoriented	0	1	2	3
7. Noticeable or rapid heart beat	0	1	2	3
8. Feeling insecure in my movements	0	1	2	3
9. Feeling terrified	0	1	2	3
10. Nervousness	0	1	2	3
11. Shortness of breath	0	1	2	3
12. Trembling hands	0	1	2	3
13. Shaking	0	1	2	3
14. Fears of losing control	0	1	2	3
15. Difficulties breathing	0	1	2	3
16. Fears of dying	0	1	2	3
17. Feeling afraid, having the shivers	0	1	2	3
18. Indigestion or abdominal distress	0	1	2	3
19. Feeling lightheaded or faint	0	1	2	3
20. Blushing (face)	0	1	2	3
21. Sweating (unrelated to heat)	0	1	2	3

Appendix D

Binge Eating Scale

Bellow are groups of numbered statements. Read all of the statements in each group and mark on this sheet the one that best describes the way you feel about the problems you have controlling your eating behavior.

#1.

1. I don't feel self-conscious about my weight or body size when I'm with others.
2. I feel concerned about how I look to others, but it normally does not make me feel disappointed with myself.
3. I do get self-conscious about my appearance and weight, which makes me feel disappointed with myself.
4. I feel very self-conscious about my weight and frequently, I feel intense shame and disgust for myself. I try to avoid social contacts because of my self-consciousness.

#2.

1. I don't have any difficulty eating slowly in the proper manner.
2. Although I seem to "gobble down" foods, I don't end up feeling stuffed because of eating too much.
3. At times, I tend to eat quickly and then, I feel uncomfortably full afterwards.
4. I have the habit of bolting down my food, without really chewing it. When this happens I usually feel uncomfortably stuffed because I've eaten too much.

#3.

1. I feel capable to control my eating urges when I want to.
2. I feel like I have failed to control my eating more than the average person.
3. I feel utterly helpless when it comes to feeling in control of my eating urges.
4. Because I feel so helpless about controlling my eating I have become very desperate about trying to get in control.

#4.

1. I don't have the habit of eating when I'm bored.
2. I sometimes eat when I'm bored, but often I'm ale to "get busy" and get my mind off food.
3. I have a regular habit of eating when I'm bored, but occasionally, I can use some other activity to get my mind off eating.
4. I have a strong habit of eating when I'm bored. Noting seems to help me break the habit.

#5.

1. I'm usually physically hungry when I eat something.
2. Occasionally, I eat something on impulse even though I really am not hungry.
3. I have the regular habit of eating foods, that I might not really enjoy, to satisfy a hungry feeling even though physically, I don't need the food.
4. Even though I'm not physically hungry, I get a hungry feeling in my mouth that only seems to be satisfied when I eat a food, like a sandwich, that fills my mouth.

Sometimes, when I eat the food to satisfy my mouth hunger, I then spit the food out so I won't gain weight.

#6.

1. I don't feel any guilt or self-hate after I overeat.
2. After I overeat, occasionally I feel guilt or self-hate.
3. Almost all the time I experience strong guilt or self-hate after I overeat.

#7.

1. I don't lose total control of my eating when dieting even after periods when I overeat.
2. Sometimes when I eat a "forbidden food" on a diet, I feel like I "blew it" and eat even more.
3. Frequently, I have the habit of saying to myself, "I've blown it now, why not go all the way" when I overeat on a diet. When that happens, I eat even more.
4. I have a regular habit of starting strict diets for myself, but I break the diets by going on an eating binge. My life seems to be either a "feast" or "famine".

#8.

1. I rarely eat so much food that I feel uncomfortably stuffed afterwards.
2. Usually about once a month, I eat such a quantity of food, I end up feeling very stuffed.
3. I have regular periods during the month when I eat large amounts of food, either at mealtime or at snacks.
4. I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous.

#9.

1. My level of calorie intake does not go up very high or go down very low on a regular basis.
2. Sometimes after I overeat, I will try to reduce my caloric intake to almost nothing to compensate for the excess calories I've eaten.
3. I have a regular habit of overeating during the night. It seems that my routine is not to be hungry in the morning but overeat in the evening.
4. In my adult years, I have had week-long periods when I practically starve myself. This follows periods when I overeat. It seems I live a life of either "feast" or "famine".

#10.

1. I usually am able to stop eating when I want to. I know when "enough is enough".
2. Every so often, I experience compulsion to eat which I can't seem to control.
3. Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges.
4. I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.

#11.

1. I don't have any problem stopping eating when I feel full.
2. I usually stop eating when I feel full but occasionally overeat leaving me feeling uncomfortably stuffed.

3. I have a problem stopping eating once I start and usually I feel uncomfortably stuffed after I eat a meal.
4. Because I have a problem not being able to stop eating when I want, I sometimes have to induce vomiting to relieve my stuffed feeling.

#12.

1. I seem to eat just as much when I'm with others (family, social gatherings) as when I'm by myself.
2. Sometimes, when I'm with other persons, I don't eat as much as I want to eat because I'm self-conscious about my eating.
3. Frequently, I eat only a small amount of food when others are present, because I'm very embarrassed about my eating.
4. I feel so ashamed about overeating that I pick times to overeat when I know no one will see me. I feel like a "closet eater".

#13.

1. I eat three meals a day with only an occasional between meal snack.
2. I eat three meals a day, but I also normally snack between meals.
3. When I am snacking heavily, I get in the habit of skipping regular meals.
4. There are regular periods when I seem to be continually eating, with no planned meals.

#14.

1. I don't think much about trying to control unwanted eating urges.
2. At least some of the time, I feel my thoughts are pre-occupied with trying to control my eating urges.
3. I feel that frequently I send much time thinking about how much I ate or about trying not to eat anymore.
4. It seems to me that most of my waking hours are pre-occupied by thoughts about eating *or* not eating. I feel like I'm constantly struggling not to eat.

#15.

1. I don't think about food a great deal.
2. I have strong cravings for food but they last only for brief periods of time.
3. I have days when I can't seem to think about anything else but food.
4. Most of my days seem to be pre-occupied with thoughts about food. I feel like I live to eat.

#16.

1. I usually know whether or not I'm physically hungry. I take the right portion of food to satisfy me.
2. Occasionally, I feel uncertain about knowing whether or not I'm physically hungry. At these times, it's hard to know how much food I should take to satisfy me.
3. Even though I might know how many calories I should eat, I don't have any idea what is a "normal" amount of food for me.

Appendix E

Rosenberg Self-Esteem

Please record the appropriate answer for each item, depending on whether you strongly agree, agree, disagree, or strongly disagree with it.

	Strongly agree	Agree	Disagree	Strongly disagree
1. On the whole, I am satisfied with myself.	1	2	3	4
2. At times, I think I am no good at all.	1	2	3	4
3. I feel that I have a number of good qualities.	1	2	3	4
4. I am able to do things as well as most other people.	1	2	3	4
5. I feel I do not have much to be proud of.	1	2	3	4
6. I certainly feel useless at times.	1	2	3	4
7. I feel that I'm a person of worth.	1	2	3	4
8. I wish I could have more respect for myself.	1	2	3	4
9. All in all, I am inclined to think that I am a failure.	1	2	3	4
10. I take a positive attitude toward myself.	1	2	3	4

Appendix F

Impact of Weight on Quality of Life Questionnaire

Impact of Weight on Quality of Life Questionnaire—Lite Version (IWQOL-Lite)

Please answer the following statements by circling the number that best applies to you in the past week. Be as open as possible. There are no right or wrong answers.

Physical Function		ALWAYS TRUE	USUALLY TRUE	SOMETIMES TRUE	RARELY TRUE	NEVER TRUE
1.	Because of my weight I have trouble picking up objects.	5	4	3	2	1
2.	Because of my weight I have trouble tying my shoes.	5	4	3	2	1
3.	Because of my weight I have difficulty getting up from chairs.	5	4	3	2	1
4.	Because of my weight I have trouble using stairs.	5	4	3	2	1
5.	Because of my weight I have difficulty putting on or taking off my clothing.	5	4	3	2	1
6.	Because of my weight I have trouble with mobility.	5	4	3	2	1
7.	Because of my weight I have trouble crossing my legs.	5	4	3	2	1
8.	I feel short of breath with only mild exertion.	5	4	3	2	1
9.	I am troubled by painful or stiff joints.	5	4	3	2	1
10.	My ankles and lower legs are swollen at the end of the day.	5	4	3	2	1
11.	I am worried about my health.	5	4	3	2	1
Self-esteem		ALWAYS TRUE	USUALLY TRUE	SOMETIMES TRUE	RARELY TRUE	NEVER TRUE
1.	Because of my weight I am self-conscious.	5	4	3	2	1
2.	Because of my weight my self-esteem is not what it could be.	5	4	3	2	1
3.	Because of my weight I feel unsure of myself.	5	4	3	2	1
4.	Because of my weight I don't like myself.	5	4	3	2	1
5.	Because of my weight I am afraid of being rejected.	5	4	3	2	1
6.	Because of my weight I avoid looking in mirrors or seeing myself in photographs.	5	4	3	2	1
7.	Because of my weight I am embarrassed to be seen in public places.	5	4	3	2	1

Sexual Life		ALWAYS TRUE	USUALLY TRUE	SOMETIMES TRUE	RARELY TRUE	NEVER TRUE
1.	Because of my weight I do not enjoy sexual activity.	5	4	3	2	1
2.	Because of my weight I have little or no sexual desire.	5	4	3	2	1
3.	Because of my weight I have difficulty with sexual performance.	5	4	3	2	1
4.	Because of my weight I avoid sexual encounters whenever possible.	5	4	3	2	1

Public Distress		ALWAYS TRUE	USUALLY TRUE	SOMETIMES TRUE	RARELY TRUE	NEVER TRUE
1.	Because of my weight I experience ridicule, teasing, or unwanted attention.	5	4	3	2	1
2.	Because of my weight I worry about fitting into seats in public places (e.g. theaters, restaurants, cars, or airplanes).	5	4	3	2	1
3.	Because of my weight I worry about fitting through aisles or turnstiles.	5	4	3	2	1
4.	Because of my weight I worry about finding chairs that are strong enough to hold my weight.	5	4	3	2	1
5.	Because of my weight I experience discrimination by others.	5	4	3	2	1
Work (Note: For homemakers and retirees, answer with respect to your daily activities.)		ALWAYS TRUE	USUALLY TRUE	SOMETIMES TRUE	RARELY TRUE	NEVER TRUE
1.	Because of my weight I have trouble getting things accomplished or meeting my responsibilities.	5	4	3	2	1
2.	Because of my weight I am less productive than I could be.	5	4	3	2	1
3.	Because of my weight I don't receive appropriate raises, promotions or recognition at work.	5	4	3	2	1
4.	Because of my weight I am afraid to go on job interviews.	5	4	3	2	1

Appendix G

The Five Level EuroQol Five Dimension Questionnaire

Health Questionnaire (EQ-5D-5L)

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

- ☐ 1 I have no problems in walking about
- ☐ 2 I have slight problems in walking about
- ☐ 3 I have moderate problems in walking about
- ☐ 4 I have severe problems in walking about
- ☐ 5 I am unable to walk about

SELF-CARE

- ☐ 1 I have no problems washing or dressing myself
- ☐ 2 I have slight problems washing or dressing myself
- ☐ 3 I have moderate problems washing or dressing myself
- ☐ 4 I have severe problems washing or dressing myself
- ☐ 5 I am unable to wash or dress myself

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

- ☐ 1 I have no problems doing my usual activities
- ☐ 2 I have slight problems doing my usual activities
- ☐ 3 I have moderate problems doing my usual activities
- ☐ 4 I have severe problems doing my usual activities
- ☐ 5 I am unable to do my usual activities

PAIN / DISCOMFORT

- ☐ 1 I have no pain or discomfort
- ☐ 2 I have slight pain or discomfort
- ☐ 3 I have moderate pain or discomfort
- ☐ 4 I have severe pain or discomfort
- ☐ 5 I have extreme pain or discomfort

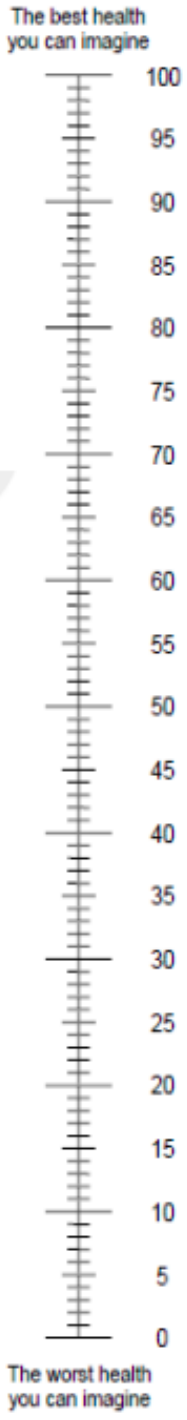
ANXIETY / DEPRESSION

- ☐ 1 I am not anxious or depressed
- ☐ 2 I am slightly anxious or depressed
- ☐ 3 I am moderately anxious or depressed
- ☐ 4 I am severely anxious or depressed
- ☐ 5 I am extremely anxious or depressed

Health Questionnaire (EQ-5D-5L)

- We would like to know how good or bad your health is **TODAY**.
- This scale is numbered from 0 to 100.
- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Mark an X on the scale to indicate how your health is **TODAY**
- Now, please write the number you marked on the scale in the below.

YOUR HEALTH TODAY = ☐



Appendix H

Social Support Survey

A. Roughly how many close friends and close relatives do you have (people you feel at ease with and can talk to about what is on your mind)?

Write in number of close friends and close relatives: | | |

B. People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to YOU if vou need it?

	(Circle one number for each line)				
	None of the time	A little of the time	Some of the time	Most of the time	All of the time
1. Someone to help you if you were confined to bed?	1	2	3	4	5
2. Someone to take you to the doctor if you need it?	1	2	3	4	5
3. To prepare your meals if you were unable to do it yourself?	1	2	3	4	5
4. To help you with daily chores if you were sick?	1	2	3	4	5
5. To have a good time with you?	1	2	3	4	5
6. To turn to for suggestions about how to deal with personal problems?	1	2	3	4	5
7. Who understand your problems?	1	2	3	4	5
8. To love you and make you feel wanted?	1	2	3	4	5

Appendix I

The Social Desirability Scale

Instructions: Please read each statement carefully and decide if the statement describes you or not. Check the word "true" if the statement describes you and "false" if it does not.

	True	False
1. I sometimes litter.		
2. I always admit my mistakes openly and face the potential negative consequences.		
3. In traffic I am always polite and considerate of others.		
4. I have tried illegal drugs (for example, marijuana, cocaine, etc.).		
5. I always accept others' opinions, even when they don't agree with my own.		
6. I take out my bad moods on others now and then.		
7. There has been an occasion when I took advantage of someone else.		
8. In conversations I always listen attentively and let others finish their sentences.		
9. I never hesitate to help someone in case of emergency.		
10. When I have made a promise, I keep it--no ifs, ands or buts.		
11. I occasionally speak badly of others behind their back.		
12. I would never live off other people.		
13. I always stay friendly and courteous with other people, even when I am stressed out.		
14. During arguments I always stay objective and matter-of-fact.		
15. There has been at least one occasion when I failed to return an item that I borrowed.		
16. I always eat a healthy diet.		
17. Sometimes I only help because I expect something in return.		

Appendix J

Adverse Childhood Experiences (ACES)

Prior to your 18th birthday:

1. Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?

No___If Yes, enter 1 __

2. Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?

No___If Yes, enter 1 __

3. Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? or Attempt or actually have oral, anal, or vaginal intercourse with you?

No___If Yes, enter 1 __

4. Did you often or very often feel that ... No one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?

No___If Yes, enter 1 __

5. Did you often or very often feel that ... You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

No___If Yes, enter 1 __

6. Was a biological parent ever lost to you through divorce, abandonment, or other reason?
No___If Yes, enter 1 __

7. Was your mother or stepmother:
Often or very often pushed, grabbed, slapped, or had something thrown at her? or Sometimes, often, or very often kicked, bitten, hit with a fist,

or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

No___If Yes, enter 1 __

8. Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?

No___If Yes, enter 1 __

9. Was a household member depressed or mentally ill, or did a household member attempt suicide?

No___If Yes, enter 1 __

10. Did a household member go to prison?

No___If Yes, enter 1 __