

A Third-Wave Intervention for Internalized Weight Bias Combined with a Weight Loss Program
Using Video Conferencing Software

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ABSTRACT

Background: Obesity is highly prevalent and associated with a plethora of adverse outcomes on health (e.g., heart disease, type II diabetes, certain forms of cancer), suggesting a clear need for effective weight loss strategies. Behavioral weight loss programs (BWLP) can produce weight loss for mild to moderate obesity, with a 5-10% weight loss on average by modifying lifestyle factors. However, complex biological, psychological, social, and environmental factors also contribute to an individual's weight. Specifically, individuals who are overweight or obese are often frequently subjected to discrimination, prejudice, or stigmatization in a variety of settings. It is possible for individuals to internalize stereotypes about weight, such as the belief that individuals who are obese or overweight are lazy. This internalization, known as internalized weight bias (IWB), has been shown to impact mental (e.g., depression and anxiety) and physical health (e.g., cardiometabolic functioning), as well as weight loss and weight loss associated behaviors (e.g., interference with exercise and healthy eating). These associated behaviors especially pose a risk for weight regain and disruption of healthy weight loss. Therefore, given the association between IWB and weight loss associated behaviors, as well as the psychological and health risks associated with IWB, IWB interventions are also needed independently and in

conjunction with BWLPs. Interventions using third-wave strategies (such as acceptance commitment therapy; ACT) have begun to show promise in reducing IWB, but have not yet been conducted in conjunction with a BWLP. Finally, there has also been a growing need for telehealth-based programs and interventions. The COVID19 pandemic demonstrated a clear need for efficacious telehealth programs, and a further benefit is that these programs may reach populations with limited access to resources (i.e., rural populations). Thus, the current study aims to pilot a novel ACT-based IWB intervention paired with a standard BWLP delivered through video conferencing software.

Methods: The baseline sample included 54 men, women, and individual identifying as nonbinary, with 28 participants completing some form of post data. The mean age was 45.4 years ($SD = 12.2$) and the average weight was the average weight was 227.4 lbs ($SD = 42.8$) and 38.5 for BMI ($SD = 6.6$), Racial and ethnic breakdown was as follows: Black ($N = 13$, 24.1%), Hispanic or Latino/a ($N = 3$, 5.6%), Native American/Native Alaskan ($N = 2$, 3.7%) or White ($N = 34$, 63%). Ten 90-minute weekly sessions were offered over video conferencing software, with 60 minutes of weight loss programming and 30 minutes of IWB intervention. The BWLP used was adapted from the Diabetes Prevention Program, while the IWB intervention used ACT-based principles, self-compassion, and the dialectical behavioral therapy skill DEAR MAN.

Results: Participants demonstrated a significant reduction in IWB ($p = .002$), as well as externalized weight bias ($p < .001$). In addition, participant weight loss was significant, as participants lost an average of 2.16% of their body weight ($SD = 2.34\%$; $p < .001$). Participants also demonstrated a decrease in emotional eating ($p = .001$) and saturated fat intake ($p = .016$), and an increase in moderate physical activity ($p = .005$). Participants reported several other benefits including a reduction in depressive symptoms ($p = .026$), self-judgement ($p = .023$), and

psychological inflexibility ($p = .004$), and an increase in self-esteem ($p = .007$), mindfulness ($p = .013$), and self-compassion ($p < .001$). Participants reported high treatment acceptability and that the program was helpful.

Discussion: While the current study does note limitations (e.g., small sample size, no control group), this is the first intervention combining treatment for IWB using third-wave skills (including ACT, self-compassion, and DEARMAN skill of DBT) in conjunction with a BWLP. In addition, this is the first IWB intervention that has utilized a virtual format. The intervention was successful in reducing IWB (and weight) among a sample of weight loss seeking participants.

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I. Introduction

Overweight and Obesity

Obesity is a medical state in which the body accumulates a higher amount of fat. It is commonly diagnosed when an individual has a body mass index (BMI) at 30 or greater. Obesity is highly prevalent throughout the world, with 39% of adults being overweight and 13% obese (World Health Organization, 2020). The United States population especially holds high rates of individuals with obesity and overweight, with 42.4% of its adult population classified as obese and another 31.1% classified as overweight and this rate continues to rise each year (Hales et al., 2020).

Obesity is associated with a variety of serious, noncommunicable diseases, such as diabetes mellitus (type II), coronary heart disease/coronary artery disease, certain types of cancer, gallbladder disease, and respiratory diseases (Jung, 1997). It is also associated with increased risk of heart failure, atrial fibrillation, as well as overall mortality (Kenchiah et al., 2002; Nalliah et al., 2016; Peeters et al., 2003). Due to these risks, obesity has been associated with high costs to society, with an estimated cost of \$99 billion in the U.S. alone for the year of 1995 (Wolf & Colditz, 1998), which had climbed to a total estimated cost of \$216.7 billion by 2008 (Parks et al., 2012). Obesity has been tied to numerous lifestyle factors, including dietary habits (with a high intake of fats, sugars, and carbohydrates) and low levels of physical activity (World Health Organization, 2020). It is clear that interventions are needed that target increasing these healthy behaviors.

Weight Loss Interventions

Effective weight loss methods and interventions have been created to combat high and growing rates of obesity. Of course, simply dieting (calorie restriction) is a common approach to

weight loss, however, this strategy on its own rarely produces successful weight loss (French et al., 1999). Thus, more effective strategies are needed. Weight loss treatment also includes medication, surgical procedures (e.g., bariatric surgery), and behavioral management. Behavioral management typically entails making lifestyle changes with dietary modification and increased physical activity, and behavioral weight loss programs are often considered to be the “gold standard” for treatment of mild to moderate obesity (Wing & Phelan, 2005). Behavioral weight loss programs (BWLPs) seek to guide individuals through these lifestyle changes (i.e., nutrition, physical activity) while supplying additional strategies to assist with weight loss, as well as strategies to continue weight maintenance after program conclusion, and can be conducted on an individual basis or through group settings. Some studies have explored and compared programs to identify the most effective BWLPs, however, promoting combined diet and exercise is a common element of successful weight loss and maintenance (Simpson et al., 2011). Additional behavioral strategies (e.g., goal setting, problem solving) aside from purely diet and exercise have found to further enhance weight loss (Michie et al., 2011). Further, many BWLPs generally tend to have common core elements found to be successful in contributing to weight loss; behavioral strategies for effective change, setting goals/planning, self-monitoring, noting/using cues, and utilization of social support (Tate et al., 2019).

These programs are considered to be effective for treatment of mild to moderate obesity. In 2012, a task force reviewed 89 BWLPs and found that most participants lost an average of 1 to 20 pounds (Curry et al., 2018). This translates to a 5-10% average weight loss overall for most patients. This is especially noteworthy as a modest 5-10% drop in weight loss can result in reduced blood pressure, lower risk of hypertension, cardiovascular disease, non-insulin-dependent diabetes mellitus (type II) and hyperglycemia, gallbladder disease, respiratory

dysfunction, gout, arthritis, infertility, and health care costs (Goldstein, 1992; Pi-Sunyer, 1996; Ryan & Ryan Yockey, 2017). Data suggests this loss can be maintained: a review of 80 weight loss interventions found that programs with a reduced-energy diet and exercise approach maintained modest weight loss at 6-months (Franz et al., 2007).

The Diabetes Prevention Program (DPP) is a commonly utilized and widespread program that uses many of the aforementioned core elements of a behavioral weight loss program and has accumulated a large evidence-base (DPP Research Group, 2002a). The DPP instructs on how to improve diet and physical activity while also employing behavioral strategies (such as goal-setting, problem solving/cognitive strategies, behavioral/environmental cues). Of the 3,234 nondiabetic participants who were at risk for developing type II diabetes in the original sample, at least half met their weight loss goal of losing 7% of their body weight (DPP Research Group, 2002b). In fact, the DPP behavioral program was found to be more effective than the anti-diabetes drug, metformin, and the likelihood of developing type II diabetes was reduced by 58% after program completion. The DPP also has been shown to be effective among racially and ethnically diverse populations (DPP Research Group, 2002b).

Technology in Behavioral Weight Loss Programs. Despite the existence of effective BWLPs, these programs are not always within reach of the public. The use of technology, and specifically telemedicine, has been proposed as a cost-effective solution for limited access to care or weight loss interventions among rural communities. These communities often have significant barriers that can interfere with in person attendance. This is especially important to consider, given that obesity is especially prevalent among rural communities (Patterson et al., 2004). Further, the recent COVID-19 pandemic presented the urgent need for adaptation of efficacious programs through a virtual format.

Overall, the use of technology has been found to produce modest weight loss, with one systematic review finding that participants lost an average of 3.1 to 6 lbs in interventions utilizing technology in some capacity (Hutchesson et al., 2015). However, research among the weight loss field and use of technology is quite variable (Hutchesson et al., 2015). For example, in a study utilizing a web-based program to deliver weight loss with and without coaching, participants lost 4.6 lbs and 6.6 lbs on average with the web-based and web-based program with coaching, respectively (Collins et al., 2012). Several studies have also looked at mobile phone apps for weight loss, and a systematic review found these mobile phone apps to promote modest weight loss in comparison to various control group interventions (such as a step program, or podcast on weight loss), with the mobile groups losing 2.3 lbs more than controls (Mateo et al., 2015). Other studies have utilized online chat rooms, with one study finding that online chat rooms were an effective way to lose weight (with an average loss of 12.1 lbs lost over the course of 6 months) – though they noted that in person groups were more effective (with 17.6 lbs lost; Harvey-Berino et al., 2010).

The DPP has also been found to be efficacious when implemented through technology. One meta-analyses examined 22 studies that used the DPP and some component of technology (Joiner et al., 2017). Some of the studies used face-to-face elements supplemented with technology while other interventions used technology exclusively, with various forms utilized (e.g., videoconferencing, mobile applications, text messaging). Overall, the DPP was still found to maintain efficacy at a 15-month follow up with a 3.98% weight loss. The authors note that there was variability among the results due to the heterogeneity of interventions examined, and interventions that were self-guided with technology were not as effective (with a 3.34% weight loss) as interventions with remote behavioral support (with a 4.31% weight loss). Further, the

original DPP length was 26 sessions, but all of the 22 studies used a reduced number of sessions (with a range of 12-24 sessions). Still, this meta-analysis demonstrates the effective use of the DPP with technology, along with reduced session frequency.

Video conferencing technology offers the typical benefit of technology (i.e., reaching remote areas) while emulating an in-person feel and allowing direct feedback. Research is beginning to emerge suggesting that this is an effective method of delivery for an intervention. A study using a 12-week DPP program delivered through video conferencing software found that participants successfully lost 7.2 lbs on average (Carels et al., 2021). Another study implemented a randomized 15-week BWLP and found that participants lost an average of 4 lbs (compared to a waitlisted control group that lost no weight) and maintained this at a 6-month follow-up (Dunn et al., 2016). Another study consisting only of men found similar results using the DPP with video conferencing software over 12-weeks; participants lost 7 lbs as compared to the waitlisted control group (Azar et al., 2015).

Dunn et al. (2014) also delivered weight loss education through video conferencing technology in comparison to in-person groups and found that online condition to be even more effective (the online condition had an average weight loss of 8 lbs, while the in-person group weight lost 5.95 lbs on average). Vadheim et al. (2010) used a 16-week DPP program and found similar results for online and in person groups with participants losing an average of 14lbs.

Increasingly, video conferencing software appears to be an effective way to deliver BWLPs. A few studies that utilized the DPP produced similar weight loss results (i.e., Carels et al., 2021; Azar et al., 2015; Vadheim et al., 2010) to in-person groups. Thus, in some circumstances, video conferencing software may be just as effective as in person BWLPs (Dunn et al., 2014).

Altogether, the DPP and other BWLPs offer great education on increasing healthy eating and physical activity. Technology has also helped to make BWLPs more widely available. Despite the success of these programs, BWLPs still experience high rates of drop out (Pirodda et al., 2019). Further, not all participants who complete these programs are successful at changing their weight or health behavior. A more complex understanding of obesity is needed in order to continuously improve successful outcomes of BWLPs and address patient barriers to success.

Complex Factors for Overweight and Obesity

While this link between obesity and lifestyle factors is common knowledge, it should be noted that obesity is a complex condition that cannot be reduced solely to the aforementioned factors. Marginalized populations (particularly in terms of race and ethnicity) share a disproportionate share of obesity within the United States, with Black and Hispanic Americans having higher rates of obesity than White Americans (Hales et al., 2020). Genetics can play a prominent role, for example, some individuals have greater difficulty with weight loss and thereby are more prone to adiposity than others (Reinhardt et al., 2015). Maternal obesity also appears to impact fetal development and increase risk of offspring obesity (Power, 2012). Individuals with physical disabilities (e.g., spinal cord injury, cerebral palsy, arthritic/orthopedic conditions) and serious mental health concerns (e.g., mood disorders, anxiety, trauma, and schizophrenia) are also more likely to have obesity in comparison to individuals without (Liou et al., 2005; Avila et al., 2015). Further, some medications prescribed for mental health concerns (such as antipsychotics) carry the side effect of weight gain, prompting an increased risk for obesity (Bak et al., 2014). Medical conditions, such as overt and subclinical hypothyroidism, as well as Polycystic Ovary Syndrome, can also exacerbate weight gain, and have been found to be quite common among populations with severe obesity (Michalaki et al., 2006; Sam, 2007).

Environmental factors must be noted as well. Many countries, including the U.S., have become more industrialized, with an increase in “desk jobs” resulting in limited movement for the average American worker (Church et al., 2011). The rise in fast food restaurants have increased access and created an abundance of unhealthy food items available to the busier American lifestyle developed through industrialization (Pereira et al., 2005). Lower income communities have been found to have limited access to foods with higher nutritional content and Black communities in the U.S. are also more likely to be targeted by advertisements for unhealthy food items (Lewis et al., 2005). Finally, social factors have also been proposed to play a role; weight bias or weight stigma, which is often defined as negative or discriminatory implicit or explicit beliefs, attitudes, and cognitions about another individual based solely on their weight, has also been noted to be associated with increased weight gain and obesity (Jackson et al., 2014; Puhl et al., 2020).

Thus, while there is no doubt that lifestyle factors do significantly contribute to obesity, the additional constraints from environmental factors, mental health status, racial or ethnicity group, discrimination, and biological factors outside of one’s control must be taken into account as well among BWLPs, along with an understanding of how these factors can impact an individual’s physical activity and dietary intake. The aforementioned social component of weight bias is of key interest to the current study. The construct has gained increasing interest throughout the literature, as its possible consequences on healthy behavior are becoming increasingly noted.

Weight Bias

Despite the fact that obesity is clearly a complex issue, disparaging beliefs about individuals with overweight status and obesity remains widespread (Puhl & Brownell, 2001).

Weight bias is prominent throughout the general public in the U.S., in fact, rates of weight discrimination have been found to be comparable to racial discrimination (Puhl, Andreyeva, et al., 2008). However, this bias is not exclusive to the U.S., as rates in other countries may be quite high as well (Puhl et al., 2015). In everyday living, individuals with overweight or obese status were 40-50% more likely to report discrimination than individuals with normal weight (Carr & Friedman, 2005). Weight bias has been found to be prevalent throughout a variety of settings, including the workplace, medical settings, educational settings, interpersonal relationships, and media (Puhl & Brownell, 2001; Puhl & Heuer, 2009).

In the workplace, people with overweight status are accused of lacking in self-discipline, assumed to have less conscientious and competence, be less friendly, and less emotionally stable (Roehling, 1999). An individual with overweight or obese status may be less likely to be considered for a job position (Klesges et al., 1990; Pingitore et al., 1994). In the educational setting, young children who are either overweight or obese are more likely to be victims of bullying than their peers (Van Geel et al., 2014), which can lead to development of eating disorders or other psychosocial maladjustment (Neumark-Sztainer et al., 2002; Hawker & Boulton, 2000). Evidence for bullying persists from the elementary level to the high school level (Van Geel et al., 2014) and through college (Tiggemann & Rothblum, 1988). Teachers are more likely to assign negative grades to middle and high school students with obesity than non-obese counterparts (Finn et al., 2020). These findings persist at the graduate level, with graduate students with higher BMIs being less likely to be offered admission into psychology graduate programs (Burmeister, Kiefner, et al., 2013).

In medical settings, physicians have reported increased discomfort in working with patients with obesity and report higher stigmatization towards these individuals; perceiving them

to be more likely to have poorer hygiene and be noncompliant (Klein et al., 1982). A significant proportion of nurses (48%) in another study sample reported discomfort in working with patients with obesity (Maroney & Golub, 1992). Finally, a meta-analysis of exercise and nutrition professionals (physical therapists, physical educators, fitness trainers, and nutritionists) found weight bias was prevalent across each field (Panza et al., 2018).

The most frequent and damaging weight stigmatizing experiences may occur right in the individuals' own home or within their social group. Puhl, Moss-Racusin, et al. (2008) found that the most common source of stigma came from a peer or friend, followed by a parent, then stranger, spouse, other family member, and then a health professional, boss, and sales clerk or server. Another study found family members to be the most common source of weight stigmatizing comments (along with physicians), though peers were still quite common as a source (Puhl & Brownell, 2006). Eisenberg et al., (2012) found that weight-related comments from family members and significant others was associated with a significant risk for disordered eating. Within a heterosexual romantic relationship, when women received more weight-related comments from their partner, it was associated with decreased well-being (Eisenberg, Franz, et al., 2017). Among heterosexual relationships, expressed weight stigma from husbands (through comments or criticisms) aimed at wives was associated with an increase in depressive symptoms, as well as decreased marital satisfaction and sexual intimacy for both partners (Carels, Miller, et al., 2020). Gay men also report high levels of weight bias among relationships, with high expectations of receiving weight biased comments from a romantic partner (Foster-Gimbel & Engeln, 2016).

Weight bias is also prominent throughout media, from television aimed at youth (Harrison, 2000; Latner et al., 2007) to adult programming (Greenberg et al., 2003). Within the

news, obesity is often portrayed as a personal responsibility and a choice about half of the time, rather than a matter of complex societal factors (Kim & Anne Willis, 2007). Advertisement is particularly problematic as well. The “Diet Industry” often promotes weight as a matter of willpower in order to sell their products, accompanied by the idea that weight loss is straightforward and simple (Geier et al., 2003). The fashion industry has also been accused of promoting the ideal body type for women as thin, thereby perpetuating negative attitudes towards non-thin or overweight body types – in fact, fashion magazines were found to be positively correlated with antifat attitudes among women (Lin & Reid, 2009).

Harmful Effects. Weight bias is often viewed as socially acceptable, as many argue that obesity is a “choice” through the engagement of unhealthy behavior (Puhl et al., 2012). Weight discrimination may even be presented as a “form of caring” for an individual with overweight or obese status, meant to motivate them to “take better care of themselves.” Unfortunately, weight bias typically has the opposite effect, and is associated with a myriad of harmful consequences both psychological and physical in nature, many of which are counter to weight loss. For example, weight bias is associated with unhealthy eating behavior, such as increased food consumption, through survey findings and controlled experiments (Puhl et al., 2006; Schvey et al., 2011, respectively). Weight stigma is also a significant risk factor for binge eating disorder (Almeida et al., 2011). Additionally, evidence is beginning to emerge suggesting that weight stigma may also be associated with bulimic symptoms (Mora-Giral et al., 2004). In addition to maladaptive eating, there may be a link between weight stigma experiences and less physical activity (Jackson & Steptoe, 2017). Weight stigma experiences at a fitness gym may understandably foster negative attitudes towards this setting (Schvey et al., 2017).

In terms of psychological consequences, weight bias is associated with increased depression and anxiety (Hatzenbuehler et al., 2009) as well as low self-esteem and body image disturbance (Friedman et al., 2012). Perhaps the most compelling argument to end weight stigmatization are the findings that receiving daily weight discrimination is predictive of mortality above and beyond weight status, health, or disease (Sutin et al., 2015).

Internalized Weight Bias

Because weight bias is ubiquitous and frequently expressed, it is not surprising that some individuals may internalize these biased attitudes and beliefs. Researchers have increasingly begun to recognize internalized weight bias (IWB), which is often defined as the individuals' internalization of weight stigmatization and the application of these negative beliefs or stereotypes regarding weight towards themselves (for example, a person with obesity might believe themselves to be lazy solely based on their weight, despite having a successful career or busy lifestyle (Durso & Latner, 2008). Durso and Latner (2008) further demonstrates that it is the belief in these harmful stereotypes and applying this belief to oneself that distinguishes this construct from overall body image or the more externalized construct of weight bias or antifat attitudes. Unfortunately, research suggests that IWB is evident as early as childhood (Zuba & Warschburger, 2018).

Individuals at Risk for Internalized Weight Bias. Similar to weight bias, IWB has been found to be highly prevalent, with one in five adults reporting IWB and half of an adult population with obesity reporting IWB (Puhl, Himmelstein, et al. 2017). Women are especially more likely to have higher rates of IWB, though IWB is still prominent among males (Boswell & White, 2015; Purton et al., 2019). Individuals who identify as White also report higher levels of IWB than individuals identifying as Black and Latino or Latina (Puhl, Himmelstein, et al., 2017).

Women with higher rates of overweight or obesity in their family also may report higher rates of IWB (Eisenberg, Street Jr, et al., 2017), as well as individuals who were overweight in childhood (Schvey et al., 2013). Notably, even individuals of underweight and normal weight status report rates of IWB, especially if they erroneously believe themselves to be overweight (Schvey & White, 2015). Further, individuals who have undergone weight loss and are no longer overweight may still continue to endorse significant IWB (Levy & Pilver, 2012).

Interestingly, Durso and Latner (2008) found that IWB and BMI were not correlated among individuals with overweight and obese status, but Schvey and White (2015) found that it was among underweight to normal weight adults. Additionally, a meta-analysis of IWB and associated effects by Pearl and Puhl (2018) found that 16 studies identified a relationship between WBIS and BMI, while 17 studies did not. The authors note that studies that found an association included a broader BMI range among participants, with either inclusion of participants with higher BMIs or lower body weights. Based on these findings, there may be somewhat of a dose-dependent relationship between BMI and IWB for individuals with lower BMI that is diminished as individuals reach higher levels of overweight or obese status.

Mental Effects of Internalized Weight Bias

Nevertheless, regardless of BMI, IWB has been found to be associated with a variety of adverse mental health outcomes (Pearl & Puhl, 2018). Even further, in a study with 996 patients with severe obesity, IWB was central within a network analyses (along with interpersonal sensitivity and shape concern) that included depression, anxiety, psychotic symptoms, somatization, obsessive-compulsive symptoms, binge eating episodes, disordered eating, and BMI, suggesting that it may be a key component in mental health functioning (Calugi & Dalle Grave, 2019). Additionally, increased attention has been focused on IWB as a mediator or

moderator for many of the adverse effects or harmful consequences associated with weight bias (Durso et al., 2008). Thus, there is a clear need to understand how IWB affects mental health and contributes to weight bias; the majority of research within this area has focused on body constructs, depression, anxiety, self-esteem, and quality of life.

Body Image and Body Dissatisfaction. Considering the nature of IWB, it is perhaps not surprising that poor body image and body dissatisfaction have been found to be related and highly correlated with the construct (Durso et al., 2008; Innamorati et al., 2017, respectively). This strong relationship between IWB and body dissatisfaction has been observed across men and women (Purton et al., 2019). This correlation remains even when controlling for participant BMI, particularly for females (Boswell et al., 2015). In Calugi and Dalle Grave's (2019) network analysis, concerns about one's shape or weight was central along with IWB, which argues for body image's strong relationship to IWB, especially in relation to other mental health factors.

Depression and Anxiety. The relationship between IWB and psychopathology has consistently been studied as well; a meta-analysis by Pearl and Puhl (2018) found 28 studies suggesting a moderate link between depression and IWB, along with ten studies that found a weak to moderate relationship between anxiety and IWB. Rates of depression among individuals with IWB are prominent among both individuals who are overweight or obese, as well as individuals who are underweight or normal weight (Carels, Burmeister, Oehlhof, et al., 2013; Schvey & White, 2015, respectively). Innamorati et al. (2017) found that IWB was predictive of severity of depression. However, the link between depression and IWB may be stronger among women (Boswell & White, 2015). Then, another study of 1,391 participants with overweight and obese status found that IWB was predictive of both depressive and anxious symptoms (Hayward et al., 2018). A meta-analysis with a cumulative sample of 9,435 also found a moderate

relationship between IWB and depression as well as IWB and anxiety (Alimoradi et al., 2020). Additionally, IWB may explain the relationship between weight bias (both subtle and outwardly expressed) and depressive and anxious symptoms as a full mediator (Magallares et al., 2017).

Specific maladaptive thought patterns are thought to contribute to IWB. For example, Wang et al. (2017) found that rumination was more associated with IWB than overvaluation of weight/shape in a sample of patients with obesity and binge eating disorder, though rumination and IWB is less explored in the literature than weight and shape concerns. Psychological inflexibility has also been found to mediate the relationship between IWB and emotional eating, sedentary behavior, and mental health (Petersen et al., 2021).

Self-Esteem. Many studies have also focused on the relationship between self-esteem and IWB (Pearl & Puhl, 2018). Durso et al., (2016) found a negative relationship between IWB and self-esteem. Hilbert et al. (2013) found a moderate relationship between lower self-esteem (through lower core self-evaluation) and IWB within their sample of 1,158 individuals with overweight and obese status. The authors further suggest that self-esteem may be a moderating factor between IWB and depression, as well as IWB and anxiety. Additionally, in a sample of patients with binge eating disorder, self-esteem and IWB may be mediated by overvaluing body shape or weight (Pearl et al., 2014). Self-compassion has also been found to be a partial mediator for IWB and depression, suggesting that people who are more self-critical may have greater IWB and depression (Helbert et al., 2015).

Similar to previous findings, interpersonal sensitivity (a concept tied to self-esteem/inadequacy on the measure used within the study) and shape/weight concerns were also central with IWB in a network analyses with various psychopathologies among a sample of patients with obesity (Calugi & Dalle Grave, 2019). These findings develop clarity in how IWB

is tied to mental health, with body image/shape concern and self-esteem as key to the relationship.

Quality of Life. Several studies have examined IWB and various forms of quality of life (Pearl & Puhl, 2018). Hain et al. (2015) found that IWB was significantly related to limitations in both physical and mental quality of life among 94 patients with obesity in a medical setting. Latner et al. (2013) also found that higher IWB had a relationship with lower levels of physical and mental domains of health-related quality of life among 120 men and women with obesity signed up for a behavioral weight loss program.

Another study found an association between IWB and mental and physical health quality of life (along with weight discrimination) with IWB mediating the relationship between BMI and health quality of life (Latner et al., 2014). Similarly, Lillis et al. (2011) found that IWB mediated the relationship between BMI and health quality of life among 87 adults recruited from a weight loss clinic. However, it should be noted that many studies examining this domain often use an aggregated measure of quality of life, in terms of both physical and mental quality of life (Hain et al., 2015). More research may be warranted to examine the constructs separately, as multiple mental and physical effects have been associated with IWB, and quality of life may serve as an important component among these associations.

Behavioral and Physical Effects of Internalized Weight Bias

It is commonly believed that critical evaluation of one's weight would motivate that individual to lose that weight. Evidence does suggest that people with higher IWB report more of a desire to lose weight or diet (Koball et al., 2018). However, this desire does not appear to translate to healthy weight loss, as a myriad of harmful physical effects have been tied to IWB as

well, including adverse eating and exercise behavior, disruption of weight loss maintenance, and possible association with poor health outcomes.

Eating Behavior. Internalized weight bias has also been moderately to strongly associated with eating-related psychopathology (Pearl & Puhl, 2018). Binge eating, high eating restriction, emotional eating, and food addiction have all been found to be related to IWB. In an ecological momentary assessment study (EMA), participants also reported that they were more likely to overeat, consume larger portions, eat “forbidden” food, eat unhealthy, or cope by emotionally eating on days in which they experienced higher levels of IWB (Carels et al., 2019). Binge eating has especially been found to be associated with IWB (Carels et al., 2013; Innamorati et al., 2017). IWB was found to have a stronger relationship with binge eating in comparison to depression or body dissatisfaction (Burmeister & Carels, 2014). Another study found that IWB separately and uniquely contributed to binge eating separately from body appreciation (Soulliard et al., 2021).

Considering the suggested relationship between IWB and binge eating, it is not surprising that IWB may be a risk factor for binge eating disorder among some individuals, particularly those with obesity (Pearl et al., 2014). In a community sample, IWB was higher among participants with obesity and binge eating disorder in contrast to individuals with obesity only (Durso, Latner, Hayashi, et al., 2012). Finally, IWB may be an important mediator of the aforementioned connection between receiving weight discrimination and binge eating (Durso, Latner, White, et al., 2012) or itself mediated by self-criticism when examining the association between IWB and binge eating among a women with overweight and obese status (Palmeira, Pinto-Gouveia, Cunha, & Carvalho, 2017).

Other forms of eating pathology, aside from binge eating, have been tied to IWB. High restraint, or overly restricting oneself from eating, has been associated with IWB for women with obesity and lean individuals (Boswell & White, 2015; Schvey & White, 2015; respectively) with self-esteem mediating this relationship (Almenara et al., 2017). Other research suggests a link between emotional eating and IWB as well (Baldofski et al., 2016; Durso et al., 2012a). A relationship has also been found between purging behavior and IWB (Schvey et al., 2013). An association between IWB and eating pathology (both binge eating and purging) is apparent even among leaner individuals (Schvey & White, 2015). Romano et al. (2021) also found that IWB was correlated with binge eating, purging, and restriction, with body dissatisfaction as a mediator.

Then, the relationship between IWB and disordered eating may be mediated by a drive for thinness and body image avoidance (described as avoiding experiences that might illicit body image concerns; Marshall et al., 2020). Food addiction may also be linked to IWB, as food addiction might fuel the self-stigmatizing belief that individuals with overweight/obesity cannot control their food intake (Burmeister, Hinman, et al., 2013; Meadows & Higgs, 2020a). Puhl et al. (2007) found an association between IWB and motivation to diet and binge eating among women after they experienced a weight stigmatizing experience. Of further support, O'Brien et al. (2016) identified IWB as a mediator between weight stigmatizing experiences and disordered eating, including uncontrolled eating, emotional eating, and loss-of-control eating. In further explanation, Himmelstein et al. (2017) found that men and women may cope with a stigmatizing event through disordered eating.

Exercise and Physical Activity. Some research has noted a connection between IWB and physical activity. IWB has been linked to more negative attitudes towards the gym (Schvey

et al., 2017). In an ecological momentary assessment (EMA), after experiencing weight stigma, higher IWB was found to be associated with lower motivation to exercise and diet (Vartanian et al., 2018). Similarly, IWB was also found to moderate the relationship between experiencing frequent weight stigma and avoidance to exercise (Vartanian & Novak, 2011).

There may even be a dose-dependent relationship between healthy behavior and IWB. Another study using EMA found that on days where participants expressed higher rates of IWB, they were more likely to report an urge to skip exercise (Carels et al., 2019). Thus, IWB may be linked with a desire for weight loss (Koball et al., 2018) but may be immediately undone by an incident of weight bias or after experiencing higher IWB, potentially causing cycles of desire to increase healthy behavior and discouragement. In fact, IWB may also be related to weight cycling (Boswell et al., 2015; Schvey et al., 2013).

Weight Management. Several studies have looked at IWB and eating behavior within the context of weight management. Among participants that regained weight after an intervention, a connection was noted between reported IWB and dietary self-monitoring behavior, as well as poorer weight loss overall (Puhl, Quinn, et al., 2017). Mensinger et al. (2016) found women in a weight loss program with higher IWB had less improvement in intuitive eating and interpreting satiety cues after treatment. Further, IWB may also relate to reduced self-efficacy in preventing overeating (Burmeister, Hinman, et al., 2013). Finally, IWB may influence dietary adherence after bariatric surgery, even among patients that successfully lost weight (Purton et al., 2019).

Physical Health. Past research has noted a link between patient reported health-related quality of life and IWB, but less research has examined IWB and biomarkers of health aside from BMI. There is preliminary research suggesting a link between higher IWB and

cardiometabolic health (Pearl et al., 2017). Recent research has found that individuals with mid- or higher levels of IWB did not have a typical cortisol response to a stressful task as compared to individuals with lower IWB, suggesting IWB may be affect endocrinological responses to stress (Jung et al., 2020). Overall, more research is needed to explore the physical effects of IWB.

Social Effects of Internalized Weight Bias. Little research exists on IWB and consequential social effects. In a sample consisting of heterosexual husband and wives, wife IWB was related to lower marital satisfaction and less sexual satisfaction (Carels, Hlavka, et al., 2020). Further, husband IWB (as well as weight bias) was also linked to lower marital satisfaction and less sexual satisfaction through husband comments and criticisms made about his wife's weight (Carels, Miller, et al., 2020). Another study found that familial and work comments about weight predicted higher IWB among participants (Pearl, Wadden, et al., 2018). More research is needed to explore how social relationships may further develop IWB, or examine how IWB affects interpersonal relationships.

Criticism of IWB. Some researchers have suggested that IWB may need further conceptual clarity and distinction from similar constructs. For example, while Meadows and Higgs (2020b) found that IWB did mediate the relationship between weight stigma and disordered eating behavior, they also found that this relationship was more accurately explained by aspects of global self-esteem and body dissatisfaction, and therefore suggest this is more of an issue of "self-judgement" or being too critical towards oneself. However, other studies have found IWB to uniquely contribute to poor outcomes in comparison to these related constructs. Purton et al. (2019) found that IWB was associated with poor physical and mental quality of life, yet body dissatisfaction was not. Still, Meadows and Higgs (2020b) perhaps bring to light a need

to understand the pathways and relationships of IWB, its related constructs, and consequential outcomes on an individual's mental and physical health.

Many aforementioned studies have examined IWB as a mediator or moderator for many adverse outcomes and weight discrimination (O'Brien et al., 2016; Magallares et al., 2017; Durso et al., 2012b). However, it is important to avoid assuming that all relationships between weight bias and adverse outcomes function in this way, as weight bias may contribute to poor outcomes in its own way or through other pathways/mediating constructs. For example, Durso et al.'s (2012) finding that IWB was only a partial mediator for weight bias and binge eating suggests that weight discrimination could be a distinct, problematic issue with harmful effects separate from IWB. Magallares et al. (2017) also found that weight bias and depressive symptoms had a relationship separate from the relationship between IWB and depression.

Internalized Weight Bias Interventions.

Given obesity's contribution to both medical problems and IWB, there is a need for more effective weight loss programs as well as stigma and internalized stigma reduction programs. Further, as individuals with high IWB commonly present to BWLPs and IWB is associated with many maladaptive eating patterns, it may be pertinent, even advisable, to investigate the combination of a weight loss program and an internalized weight stigma program. Latner et al. (2013) found moderate to high levels of IWB among the majority of their sample of 120 people presenting for a BWLP. Thus, it is relevant to consider effective BWLPs, programs aimed at reducing IWB, and a combination of the two, especially as it has been suggested that IWB may be one barrier to weight loss (Boswell et al., 2015; Schvey et al., 2013).

As previously mentioned, IWB may be associated with a high desire to lose weight (Koball et al., 2018), but is also associated with weight loss program drop out and a plethora of

behaviors counter to weight loss, including reduced exercise and disordered eating (Carels et al., 2019; Vartanian et al., 2018). Considering the relationship between IWB and weight loss, it is plausible to consider that lowering IWB may produce more successful weight loss outcomes. Therefore, programs that are designed to reduce IWB may be worth investigating.

Eleven studies were found regarding efforts to reduce IWB, with two studies combining an IWB intervention and a BWLP. The other nine programs did not aim for weight loss, but did aim to lower IWB and other psychological or related quality of life outcomes. These studies tended to utilize a “third wave” approach, including an acceptance-based commitment (ACT) approach, with skills from dialectical behavioral therapy (DBT) and self-compassion approaches. Berman et al., (2016) utilized an ACT and Health at Every Size (a program meant to increase health without emphasizing weight loss as the goal, thereby aiming to reduce stigma and self-stigma) in an uncontrolled trial with 18 women with depression. Overall, participants showed a decrease in both IWB and depression. While participants did not lose weight, the authors note that participants did not gain weight either. Next, in a preliminary study, Levin et al. (2018) issued a guided self-help ACT program (participants were given a self-help book and provided coaching) aimed at reducing IWB for 13 participants with obesity. The program successfully lowered IWB, and participants reported improvement in terms of depression and weight management behaviors. They also lost weight, with an average of 4.2 pounds lost over the course of seven weeks but did not continue to lose weight at a 3-month follow-up. Weight loss was not a specific focus of the program.

Another program used ACT and self-compassion and aimed to increase healthy behavior and improve psychological well-being for 10-12 weekly sessions among 53 women with overweight status or obesity (Palmeira, Cunha, & Pinto-Gouveia, 2017). Participants reported

improved IWB and BMI at post-treatment and the 3-month follow-up, though the emphasis was not on weight loss. Then, a different study using the same program and a comparison control group with 73 women found a significant reduction in IWB and BMI, though the effect was small for BMI (Palmeira, Pinto-Gouveia, & Cunha, 2017).

Self-compassion may be an effective tool alone as well, 15 women demonstrated a reduction in IWB after a two-day intensive self-compassion group (Forbes et al., 2020). Similarly, a three session self-compassion-based IWB intervention of 13 women found a reduction of IWB, and a decrease in emotional and uncontrolled eating were noted (Haley et al., 2022). Another study implemented a 12-week mindful yoga intervention among 78 participants who were stressed and had low fruit and vegetable intake (Braun et al., 2021). Improvements were noted in IWB and intuitive eating (eating based on hunger and bodily cues and with decreased emphasis on a “dieting mindset”). Improvements were also noted in self-compassion and mindfulness, though this rise was associated with increased intuitive eating and not IWB.

Lillis et al. (2009) randomly assigned 84 participants who had completed a six month weight program to a 1-day workshop with ACT elements (mindfulness and acceptance) aimed at reducing IWB and psychological distress. At a 3-month follow-up, improvements in IWB and psychological flexibility were observed. Participants also reported continued weight loss, with a mean percent weight loss of 1.5% as measured by BMI. While the control group, which used more CBT based strategies, generally experienced benefits in these domains as well, the workshop group appeared to experience significantly greater effects.

Finally, while many weight stigma reduction utilize ACT and other “third wave” forms of therapy, Pearl, Hopkins, et al. (2018) developed a program using cognitive behavioral therapy (CBT) skills to promote reduced IWB (Weight Bias Internalization and Stigma program; BIAS).

In an initial eight session pilot study, eight men and women reported significant decrease in IWB as measured by the WBIS in comparison to a quasi-control (participants were initially randomized, but control participants could later select their group due to attrition issues).

Combined BWLP and IWB Interventions. Pearl, Wadden, Bach, Gruber, et al. (2020) later expanded their Weight BIAS program into 26 total sessions, and recruited seventy-two men and women who were randomized into either a standard BWLP or the Weight BIAS program in conjunction with the same weight loss program. In addition to its predominantly CBT approach, some third wave skills (including ACT-based skills, DBT-based skills, and self-compassion) were included. Sessions were weekly for 12 weeks, then biweekly for another two months, and then bimonthly for two months, for a total of 26 weeks. Both groups lost weight and did not significantly differ in this domain, but the Weight BIAS Group did note a more significant decrease in IWB as measured by one of the IWB scales, but not the other. At a six month follow-up of the program, both groups improved in terms of IWB, but the Weight BIAS group reported more improvement through eating behavior, affective coping, responses to weight stigma, and reduced weight-related public distress (Pearl, Wadden, Bach, Tronieri, et al., 2020).

Carels, Burmeister, Koball, et al. (2013) also compared a standard BWLP to a novel weight loss program that incorporated some intervention on externalized weight bias and IWB with 59 participants. Yet, both programs saw participants make significant progress in IWB and weight loss, but had no significant differences.

Study Rationale

The effect of experiencing weight stigma and IWB on mental health, including increased association with depression, anxiety, disrupted body image, and low self-esteem, demonstrates a clear need for effective treatments of IWB. IWB's relationship with healthy eating, disordered

eating, and physical activity warrant exploration as to how an IWB intervention may assist with behavioral weight loss intervention outcomes. This is especially pertinent as individuals with high IWB often seek weight loss programs (Pearl & Puhl, 2018) and report a high desire to lose weight (Koball et al., 2018).

Additionally, the U.S. is still currently recovering from the COVID-19 pandemic. In light of this, there is a need for more interventions to be delivered in a virtual format. Pandemic aside, virtual formats are also typically beneficial for rural communities with limited access to resources. Treatment efficacy has been preserved even when delivered via technology.

Across the eleven studies targeting IWB outlined previously, it appears that IWB can be targeted and treated, resulting in lower IWB and additional mental quality of life improvements. However, these interventions are relatively new and further research is warranted. Further, only a few have examined combining IWB reduction with a weight loss intervention. The Weight BIAS program is one approach that has been introduced and is just beginning to accumulate research (Pearl, Hopkins, et al., 2018; Pearl, Wadden, et al., 2020) and has produced some reductions in IWB (at a 12-week and 26-week follow-up).

However, the current IWB intervention literature also appears to have a growing and larger focus on ACT-based and third-wave interventions, and these interventions have noted decreases in IWB. These approaches are typically not accompanied by a BWLP, though many participants did note weight loss despite this not being a main outcome. It remains to be seen whether an ACT or third-wave-based intervention for IWB could be conducted in conjunction with a BWLP and serve as an aid to weight loss. More research is needed to determine whether these strategies may be effective at lowering IWB as well as aid with weight loss.

Aim One: Combining a Third-Wave Based Internalized Weight Intervention with a Behavioral Weight Loss Program through Virtual Format. The first aim of the current study focused on whether third-wave skills (ACT, DBT skills, self-compassion) would produce a reduction in weight bias and IWB, consistent with past literature (Berman et al., 2016; Forbes et al., 2020; Haley et al., 2022; Levin et al., 2018; Lillis et al. 2009; Palmeira, Cunha, & Pinto-Gouveia, 2017; & Palmeira, Pinto-Gouveia, & Cunha, 2017). Additionally, the study aimed to examine whether lowered IWB and weight bias using third-wave interventions can be done concurrently with weight loss and associated health behavior outcomes through this intervention, specifically among individuals seeking a BWLP. The program further aimed to examine whether these interventions could be delivered virtually.

Hypothesis One. Because Lillis et al. (2009) and Palmeira, Pinto-Gouveia, Cunha, & Carvalho (2017) saw significant drop in WBI after their ACT-based interventions, it was hypothesized that participants in an IWB intervention using third-wave skills will experience a decrease in IWB, even with participants seeking a program for weight loss. It was further hypothesized that participants will experience a decrease in weight bias.

Hypothesis Two. In addition, because Pearl et al. (2020) was able to successfully conduct an IWB intervention along with a BWLP, it was hypothesized that the current combined program would also see successful weight loss and an increase in associated healthy behaviors (i.e., healthy eating and physical activity).

Hypothesis Three. It was hypothesized that the majority of participants would evaluate the virtual aspects of the interventions positively.

Aim Two: Exploratory Secondary Outcomes. Additional analyses were conducted among common correlates of IWB. Correlates of interest included many of the most detrimental

effects of IWB, including mental health (anxiety and depression), maladaptive eating (uncontrolled and emotional), and self-esteem. In addition, pathways of change were included (rumination, psychological inflexibility, and self-compassion) to ensure that the intervention acted upon theorized mechanisms.

Hypothesis Four. It was hypothesized that the ACT-based IWB intervention would lower depression, anxiety, uncontrolled and emotional eating, and increase self-esteem.

Hypothesis Five. It was hypothesized that the ACT-based IWB intervention would promote a decrease in rumination and psychological inflexibility, and an increase in self-compassion.

II. Methods

Participants

Initial Sample. A total of 54 participants signed the informed consent and attended the initial weigh in, and 52 completed baseline questionnaires. The mean age was 45.4 years ($SD = 12.2$), with age ranging from 25 to 71 years. The average weight was 227.4 lbs ($SD = 42.8$) and 38.5 for BMI ($SD = 6.6$), with a range of 147.4 to 349.2 lbs for weight, and 27.33 to 58.1 for BMI. Most participants reported their sex was female ($N = 45$, 83.3%) and identified as women ($N = 44$, 81.5%) or non-binary ($N = 1$, 1.9%). Seven reported their sex as male ($N = 7$, 13%) and reported identifying as men ($N = 7$, 13%). Most participants identified as straight ($N = 46$, 85.2%) or bisexual ($N = 3$, 5.6%), with at least one participant identifying as gay (1.9%), pansexual (1.9%) or asexual (1.9%). Racial and ethnic breakdown was as follows: Black ($N = 13$, 24.1%), Hispanic or Latino/a ($N = 3$, 5.6%), Native American/Native Alaskan ($N = 2$, 3.7%) or White ($N = 34$, 63%). Three participants obtained a high school degree or some sort of equivalent (5.6%), sixteen obtained some college or associate's degree (29.6%), thirteen completed a college degree (24.1%), and twenty obtained a graduate or professional degree (37%). The median household income was \$77,500.00 (ranging from \$8,000 to \$200,000).

The average baseline level of internalized weight bias (IWB; as denoted by the Weight Bias Internalization Scale) was 5, with a range of 3.5 to 7.0. Initial screening criteria required participants to have a WBIS score of at least 4. However, it appeared that either some participants had dropped in WBIS over the span of by the time in which the study was initiated. Regardless, these three participants were retained as long as they had cleared initial screening

criteria, and overall there was no significant difference between IWB at baseline and the screener.

Interventions

Diabetes Prevention Program (DPP). All participants participated in a behavioral weight loss program (BWLP). The program was a 10-week adapted version of the DPP. As previously mentioned, the DPP is a widely used, evidence-based program that has been found to be applicable to individuals of varied backgrounds, and has overall become the gold-standard for behavioral weight loss programs (DPP Research Group, 2002a). Several studies have found the DPP to produce statistically significant weight loss when delivered through an online format (Azar et al., 2015; Carels et al., 2021; Vadheim et al., 2010). Further, in a comparison study, Ely et al. (2023) found that both virtual and in-person delivery of the DPP program produced successful weight loss, though participants in the in person format did meet with their weight loss goals sooner than virtual. See Appendix A for a list of session topics.

Table 1. Diabetes Prevention Program (DPP) Session Topics

Week	Session Title
Week 1	Welcome to the National Diabetes Prevention Program
Week 2	Be a Fat and Calorie Detective
Week 3	Good Carb/Bad Carb
Week 4	Three Ways to Eat Less Fat and Calories
Week 5	Healthy Eating
Week 6	Moving Muscles & Being Active – A Way of Life
Week 7	Tip the Calorie Balance
Week 8	Taking Charge of What’s Around
Week 9	Problem Solving & 4 Keys to Healthy Eating Out
Week 10	The Slippery Slope of Lifestyle Change and Looking Back and Looking Forward

Third-Wave Based Internalized Weight Bias Intervention. ACT-based programs and self-compassion have shown promise throughout research for lowering IWB (Berman et al.,

2016; Levin et al., 2018; Lillis et al., 2009; Palmeira, Cunha, & Pinto-Gouveia, 2017; Palmeira, Pinto-Gouveia, & Cunha, 2017; Forbes et al., 2020). Therefore, a weight bias reduction intervention was administered to all participants using techniques from prior ACT- and self-compassion-based programs. Session topics included psychoeducation on IWB and weight bias, observing and noting myths and stereotypes, and using internal and external coping for weight bias, and these topics will be viewed through a self-compassionate and ACT-based or DBT-based lens (for example, participants may defuse from internal critical thoughts rather than challenge them). Sessions also covered acceptance, cognitive defusion, mindfulness, committed action, and self-compassion. In addition, the DBT skill DEAR MAN was used to prepare for encountering enacted stigma. See Table 2 below for a list of session topics.

Table 2. Third-Wave Weight Bias Intervention Session Topics.

Week	Session Title
Week 1	
Week 2	
Week 3 (Session 1)	Introduction to Weight Bias
Week 4 (Session 2)	Defusion from Weight Bias
Week 5 (Session 3)	Mindfulness
Week 6 (Session 4)	Acceptance
Week 7 (Session 5)	Self-Compassion
Week 8 (Session 6)	Values and Committed Action
Week 9 (Session 7)	Encountering Weight Bias
Week 10 (Session 8)	Conclusion

Procedure

Participants completed an initial digital screener to determine eligibility. Participants were recruited for the study using an email Listerv announcement throughout the university and associated community. Participants had to indicate that they were interested in weight loss and interested in participation for the entire program before being accepted. Other inclusion and

exclusion criteria require that participants be 18 or older, a BMI of 25 kg/m² or greater, and were not pregnant or planning to become pregnant within the next few months. Based on average scores for Durso and Latner's (2008) Weight Bias Internalization Scale and in staying consistent with Pearl, Wadden, Bach, Gruber, et al.'s (2020) research, individuals were also screened for higher-than-average levels of IWB, with a cutoff of 4 or higher. Individuals who had already successfully lost more than 5% of their body weight within the past six months were excluded. Individuals with current use of medication prescribed for weight loss (such as orlistat, sibutramine, or rimonabant) were also be excluded. In addition, participants had to have access to internet, along with a web camera and sound, use video conferencing software and the ability to attend weekly online groups. They also needed access to a reliable scale to weigh themselves weekly.

According to an a priori analyses run using G*Power, a sample size of 27 was required to detect a medium effect size for a paired sample t-test. A medium effect size was selected for a couple of reasons. First, this is consistent with previous literature, as Pearl, Wadden, Bach, Gruber, et al. (2020) also structured their methodology on detecting a medium effect size. Second, the aim of this study was to examine the efficacy of an intervention. However, an intervention that produces only a small effect may be less clinically meaningful than an intervention that produces a medium or large effect size.

Once it was determined that eligibility criteria are met, participants attended an in person weigh in and completed baseline questionnaires. Participants who were not located within the city of the intervention were allowed to present a doctor's note or medical note of their current weight to improve accessibility at both baseline and study conclusion. In between these timepoints, participants were encouraged to weigh themselves using their home scales in order to

track progress. However, these self-reported weights were not used for the current study. Both groups first received a weight loss intervention using the DPP through ten weekly, hour long virtual sessions. Sessions were led by eight clinical health psychology doctoral students with previous weight loss intervention experience and were supervised by a licensed psychologist who specializes in weight loss clinical and research work. In addition, group leaders looked for opportunities to incorporate weight bias reduction strategies throughout the DPP when possible. After the third DPP session, participants began to be administered a third-wave, ACT and self-compassion-based IWB intervention for 30 minutes. The IWB program began after the first two sessions of the DPP so that participants could spend the first month adjusting to weight loss treatment. Participants also received information on how to monitor eating behavior through MyFitnessPal, exercise through MyFitnessPal or smart devices, and were encouraged to weigh themselves weekly or more. Data was collected in the Fall of 2022 and the Spring of 2023. An average of 7.00 sessions were attended by participants ($SD = 2.00$), with a range of 3 to 10 sessions.

Measures

All measures were completed at baseline and post-intervention online. Demographic information was also collected at baseline using an online survey. In addition, participant weight and height was collected in person, using a digital scale and portable stadiometer, at baseline and post-intervention. Participants who were not located in the city of the intervention and were not able to travel to weigh in were asked to provide measurements collected on a medical grade scale and stadiometer during the week that baseline data was collected. They were then asked to provide a note from the medical provider (e.g., physician, nurse, etc.) stating their weight and height.

Demographics. All participants were asked to complete demographic questions assessing age, sex, gender, race/ethnicity, sexual orientation, income, education, and self-reported height and weight.

Internalized Weight Bias. IWB was measured by both the Weight Bias Internalization Scale (WBIS; Durso & Latner, 2008; Appendix C) and Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2010; Appendix D). Both measures were chosen for several reasons. First, Pearl, Wadden, Bach, Gruber, et al. (2020) utilized both measures and did find that the two reflected IWB somewhat differently. Second, while both are commonly used throughout IWB literature, some IWB interventions only used the WSSQ (Lillis et al., 2009; Palmeira, Cunha, & Pinto-Gouveia, 2017) and some only used the WBIS (Pearl, Hopkins, et al., 2018). Because this study aims to build upon previous approaches to lowering IWB, both scales will be considered to increase generalizability to all relevant past findings. Both scales have been found to be predictive of IWB, have comparable reliability convergent validity, and are strongly correlated (Hübner et al., 2016).

In 2008, Durso and Latner developed the WBIS, which was an 11-item scale used to assess IWB among populations with overweight and obesity using a 7-point Likert scale. According to the authors, the scale was created using existing literature on antifat attitudes and similar questionnaires on internalized homophobia. The WBIS uses questions that assess the extent to which an individual accepts or rejects their weight (e.g., “Because I’m overweight, I don’t feel like my true self.”), the desire to change their weight (e.g., “I wish I could drastically change my weight.”), or how their weight influences their self-perception or mood (“I am less attractive than most other people because of my weight.”). The authors report excellent internal consistency ($\alpha = 0.90$) for the scale. In addition, they reported good validity as the WBIS was

moderately correlated with measures of antifat attitudes, self-esteem, and body image concerns when controlling for BMI. In the current study, the WBIS demonstrated acceptable internal consistency ($\alpha = 0.72$).

Another scale developed by Lillis et al. (2010), entitled the Weight Self-Stigma Questionnaire (WSSQ), uses 12 items to assess IWB among populations with overweight status and obesity on a 5-point Likert scale. The study has two factors; the self-devaluation subscale (with items such as “I feel guilty because of my weight problems” and “I caused my weight problems”) and the fear of enacted stigma subscale (with items such as “People discriminate against me because I’ve had weight problems” and “Others will think I lack self-control because of my weight problems”). The scale was developed based on substance abuse stigma. The WSSQ was found to have good internal consistency ($\alpha = 0.88$) overall, as well as for the subscales (with α 's of 0.869 and 0.812 for the fear of enacted and self-devaluation subscales, respectively) and good construct validity. In the current study, the WSSQ also demonstrated good internal consistency ($\alpha = 0.80$), and acceptable for the subscales (with α 's of 0.70 and 0.79 for the fear of enacted and self-devaluation subscales, respectively).

Weight Bias. Weight bias was examined as encountered or experienced by participants using the Stigmatizing Situations Inventory – Brief (SSI-B; Vartanian, 2015; Appendix E) and personally held biases towards higher weight using the Universal Measure of Bias (UMB-FAT; Latner et al., 2008; Appendix F). The SSI-B is a 10-item scale used to measure experiences of weight stigma, including items such as “Overhearing other people making rude remarks about you in public,” on a Likert scale ranging from 0 (never) to 9 (daily). The SSI-B has demonstrated good internal consistency ($\alpha = 0.91$) and demonstrated good validity with related constructs

(Vartanian, 2015). In the current study, The SSI-B demonstrated good internal consistency ($\alpha = 0.85$) as well.

The UMB-FAT is a 20-item scale that assesses attitudes towards fat, using a 7-point scale with “strongly agree” to “strongly disagree” (Latner et al., 2008). It includes four subscales: negative judgment (dislike towards individuals with overweight or obesity), distance (comfort with individuals with overweight or obesity in social situations), equal rights (assessing the belief that individuals with overweight or obesity deserve legal protection against discrimination) and attraction (the extent to which the participant finds individuals with overweight or obesity to be attractive). The scale has demonstrated adequate internal consistency ($\alpha=.87$), construct validity, and has been demonstrated to directly assess fat bias as opposed to an overall pattern of bias or judgement (Latner et al., 2008). The current study also demonstrated acceptable internal consistency for subscales judgement ($\alpha = 0.71$), distance ($\alpha = 0.64$), attraction ($\alpha = 0.91$), and rights ($\alpha = 0.84$).

Healthy Eating. Healthy eating was assessed through the use of the Dietary History Questionnaire III (DHQ-III; Subar et al., 2001; Appendix G). The DHQ-III was developed using a large, U.S. national nutrient and food group database, and assesses participant caloric intake and macronutrients (including fat, saturated fat, carbohydrates, and protein) and supplies an overall Healthy Eating Index-2015, which is an index assessing compliance with the Dietary Guidelines for Americans (Reedy et al., 2018). The DHQ-III has been found to have reliability for each of the nutrients (Bittoni & Wilkins, 1993).

Physical Activity. Physical activity was assessed through the revised Morgenstern Physical Activity Questionnaire (PAQ-M; Rubenstein et al., 2011; Appendix H). The PAQ-M measures the frequency of light, moderate, or vigorous physical activity within leisure time. It

also assesses physical activity during work, housework, home repairs, yardwork, running errands, caring for others, and includes a question on sedentary activities. The PAQ-M had good test-retest reliability (intraclass correlation = 0.87) good concurrent validity based on other physical activity questionnaires and BMI.

Eating Behavior. Eating behavior was assessed using the Three Factor Eating Questionnaire-R18 (TFEQ-18; Anglé et al., 2009; Appendix I) to examine overall disordered eating patterns. The TFEQ-18 is an 18-item measure designed to examine eating behavior through cognitive restraint, uncontrolled eating and emotional eating using a 4-point Likert scale, using “definitely true” to “definitely false”. The TFEQ-18 has demonstrated acceptable reliability for each subscale, with alphas of .75 for cognitive restraint, 0.85 for uncontrolled eating, and 0.87 for emotional eating. Further, it has been demonstrated to detect differing eating patterns among a general population (Fleurbaix Laventie Ville Sante (FLVS) Study Group, 2004). The current study also demonstrated acceptable to good reliability for cognitive restraint ($\alpha = .71$), for uncontrolled eating ($\alpha = .87$), and for emotional eating ($\alpha = .76$).

Mental Health. Mental health was assessed using the 21-item Depression Anxiety and Stress Scale (DASS-21; Appendix J), as it can assess clinically relevant depressive symptoms, anxious symptoms, and stress all within 21-items (Lovibond & Lovibond, 1995). Participants rate to which extent each symptom applied to them within the past week, from 1 (did not apply to me at all) and 4 (applied to me very much, or most of the time). Each scale has demonstrated good reliability, with α 's = .91, .80, and .84 for Depression, Anxiety, and Stress, respectively (Sinclair et al., 2011). The scale has also demonstrated constructive validity within a large, non-clinical sample (Henry & Crawford, 2005). The current study also demonstrated acceptable α 's = .90, .70, and .86 for Depression, Anxiety, and Stress, respectively

Rumination. Rumination was examined using the Ruminative Response Scale-Short Form (RRS-SF; Treynor et al., 2003; Appendix K). Wang et al. (2017) found IWB to be moderately and significantly correlated with brooding rumination ($r = .56$) among a sample of individuals with obesity and binge eating disorder. Thus, rumination may be relevant to the current study regarding how IWB may affect weight loss efforts. The RRS-SF includes nine items with two subscales; brooding and reflection. The form utilizes a 4-point Likert scale ranging from 1 (“almost never”) to 4 (“almost always”) for various aspects of rumination. The two subscales have shown to have acceptable reliability in a clinical and nonclinical samples, with α 's = .79 and .75 for brooding and reflection, respectively. Construct validity was also demonstrated with moderate correlations to the subscales of the DASS-21 (Ruiz et al., 2017). The current sample also noted good internal validity, with α 's = .84 and .90 for brooding and reflection, respectively.

Self-Esteem. Self-Esteem was measured utilizing the 10-item Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965; Appendix L). The RSES uses a 4-point Likert scale from 1 (strongly disagree) to 4 (strongly agree), which higher scores indicating higher self-esteem. The scale has demonstrated good reliability (with an α range of .88 to .90) and convergent validity with other measures of self-esteem (Robins et al., 2001). The current study also noted acceptable internal validity ($\alpha = .78$).

Acceptance/Psychological Inflexibility. Due to the additional third-wave components of treatment, acceptance was also assessed. The Acceptance and Action Questionnaire – Second Edition (AAQ-II) is a 7-item questionnaire that uses a 7-point Likert scale from 1 (never true) to 7 (always true; Bond et al., 2011; Appendix M). Higher scores indicate less psychological flexibility and higher experiential avoidance. The scale has demonstrated good reliability ($\alpha =$

.84) and appropriate convergent validity with measures of psychological distress. The current study also noted good internal validity ($\alpha = .91$).

Self-Compassion. In further consideration of the additional third-wave components of treatment, self-compassion was assessed as well. The Self-Compassion Scale – Short Form (SCS-SF) is a 12-item scale that uses a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always; Raes et al., 2003; Appendix N). The scale has six subscales; the first three represent crucial/core components of self-compassion: self-kindness, common humanity, and mindfulness, and the remaining three serve as counters to these core components, with self-judgement, isolation, and overidentification (becoming wrapped up in negative emotions). The three core components are added together, along with reverse-scored counter components, to create an overall score in which higher scores indicate higher self-compassion. The SCS has established good internal consistency ($\alpha = .86$) and good construct validity. In the current study, internal consistency was also good ($\alpha = .X$), as was the subscale self-judgement ($\alpha = .80$). Overidentification ($\alpha = .72$) showed acceptable validity. Subscales self-kindness ($\alpha = .66$), mindfulness ($\alpha = .67$), and isolation ($\alpha = .63$), were more questionable, and common humanity ($\alpha = .46$) was poor. This was likely due to the fact that each subscale had only two items and the current sample was small.

Treatment Acceptability. Upon treatment conclusion, participants were asked to rate the extent to which they found the treatment to be effective and feasible and the extent to which they felt connected to their behavioral coach using an adapted Satisfaction With Therapy and Therapist Scale—Revised (STTS–R; Po Oei & Green, 2008; Appendix O). The STTS-R assesses satisfaction with therapy and therapist using a 5-point Likert scale, from 1 (Strongly Disagree) to 5 (Strongly Agree). Questions regarding treatment will be adapted for the telehealth, BWLP

situation (i.e., “I am satisfied with the quality of the therapy I received” will be adapted to “I am satisfied with the quality of the telehealth weight loss treatment I received”). Similarly, questions about the therapist will be changed to “weight loss coach.” The STTS-R has been shown to have reliability for both the scale as a whole ($\alpha = .90$) and the subscales Satisfaction with Therapy ($\alpha = .91$) and Client Evaluation of Therapist ($\alpha = .80$). The current study also demonstrated good reliability for the overall scale ($\alpha = .87$) and acceptable reliability for Satisfaction with Therapy/the Program ($\alpha = .77$) and Client Evaluation of Therapist/Behavioral Coach ($\alpha = .78$).

Statistical Analysis

All analyses were conducted in SPSS 28 (IBM Corp., 2021). Data was cleaned and screened before proceeding with analysis. Descriptive statistics were examined for the overall sample. Preliminary analyses were ran to ensure that there were no significant group differences in terms of basic demographics among key variables weight and IWB. Continuous variables were examined using correlations while dichotomous and categorical variables were examined using chi-square (i.e., race/ethnicity). In addition, overall correlations were performed for a basic understanding of how variables related to IWB and weight bias as they are of key interest to the current intervention.

Hypothesis One and Hypothesis Two. A paired sample t-test was utilized to examine whether the BWLP and IWB Intervention was successful with lowering weight, IWB, and weight bias and increasing healthy eating and physical activity.

Hypothesis Three. The STTS–R was examined descriptively to examine whether the participants generally felt positive towards the intervention or not.

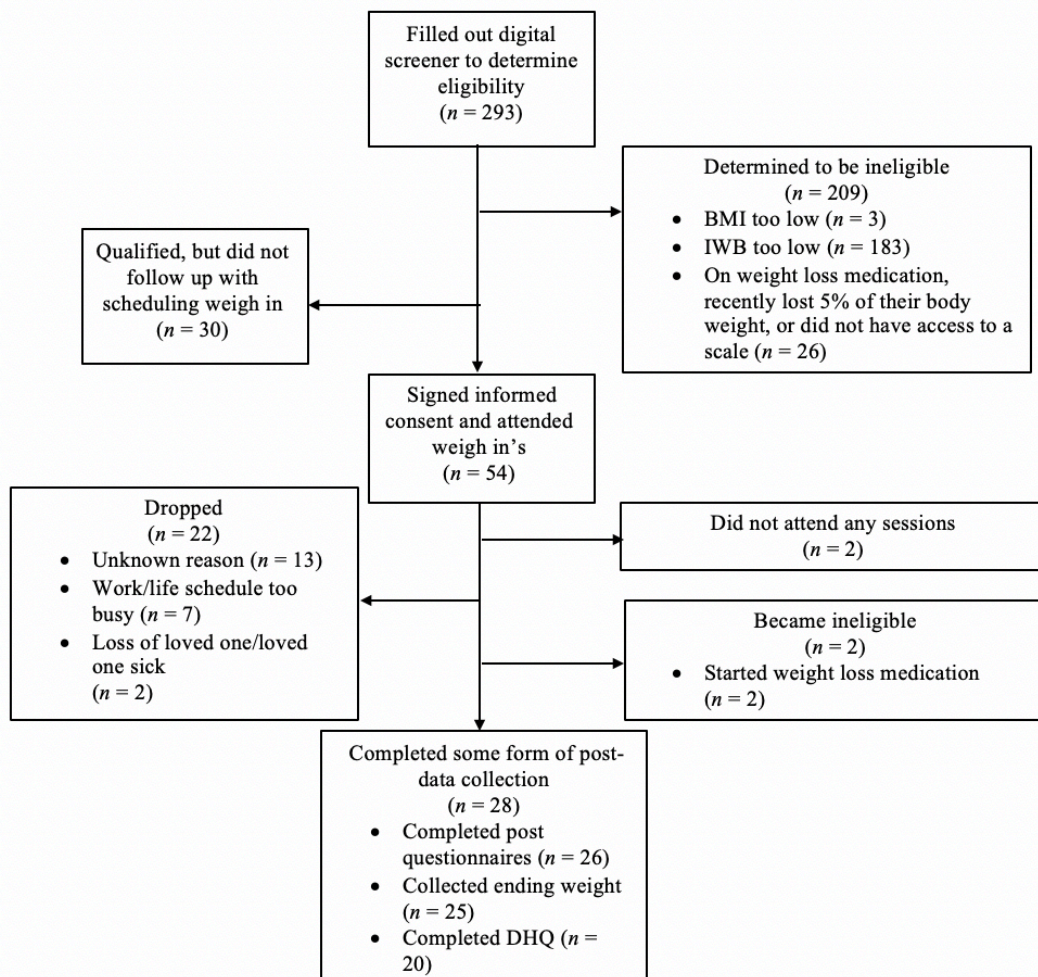
Hypothesis Four and Hypothesis Five. Additional paired sample t-tests were ran to explore whether the intervention was also helpful in reducing depressive and anxious symptoms, self-esteem, maladaptive eating, psychological inflexibility, rumination, and self-compassion.

III. Results

Attrition

Twenty eight participants completed one form of post-data; 23 participants attended post-weigh in's, 25 participants completed post-questionnaires, and 20 participants completed the post-Dietary History Questionnaire. See Figure 1 for a CONSORT figure depicting a visual representation of attrition. Significant differences were not observed on baseline characteristics or pre-intervention scores between participants who completed the program versus those that did not ($N = 24$; see Table 1 for baseline and concluding sample demographics).

Figure 1. *CONSORT Diagram*



Note. IWB = Internalized Weight Bias; DHQ = Dietary History Questionnaire

Concluding Sample. Of the initial 54 participants, 28 participants completed some form of post-data collection. Of those who completed the program, the average age was 51 years ($SD = 10.9$), ranging from 32 to 71 years. The mean weight was 227.6 lbs ($SD = 44$) and BMI was 38.1 ($SD = 7.1$), with a range of 157.8 to 344.8 lbs and 29.8 and 57.4, respectively. The majority of participants were female and identified as women ($N = 22$, 88%), while three participants reported that they were male and identified as a men (12%). Most participants identified as straight ($N = 21$, 84%), while one participant identified as each of the following: gay (4%), bisexual (4%), pansexual (4%), and asexual (4%). Racial/ethnic breakdown was as follows: Black ($N = 2$, 8%), Hispanic or Latino/a ($N = 3$, 12%), Native American or Alaskan ($N = 2$, 8%), and White ($N = 18$, 72%). The sample was highly educated, with the majority of participants holding a completed college degree ($N = 5$, 20%) or a graduate or professional degree ($N = 12$, 48%). One participant had a high school or graduate equivalent (GED; 4%) and seven participants had some college or an associate's degree (28%). Household income ranged from \$38,400 to \$200,000 ($M = \$98,996$, $SD = \$47,789$). See Table 3 for initial and concluding sample demographics.

Table 3. Demographics of Participants.

	Initial Sample	Concluding Sample
Weight M (SD) , Range	227.4 lbs (42.8), 147.4 to 349.2	227.6 lbs (44.0), 157.8 to 344.8
BMI M (SD) , Range	38.5 (6.6), 27.33 to 58.1	38.1 (7.1), 29.8 to 57.4
Age M (SD) , Range	45.4 years (12.2), 25 to 71	51 years (10.9), 32 to 71
Income M (SD) , Range	\$86,855 (\$52,506), \$8,000 to \$200,000	\$98,996 (\$47,789), \$38,400 to \$200,000
Sex (N, %)		
Female	45 (83.3%)	22 (88%)
Male	7 (13%)	3 (12%)
Gender (N, %)		
Men	7 (13%)	3 (12%)
Non-Binary	1 (1.9%)	0
Women	44 (81.5%)	22 (88%)
Sexual Orientation (N, %)		

Asexual	1 (1.9%)	1 (4%)
Bisexual	3 (5.6%)	1 (4%)
Gay	1 (1.9%)	1 (4%)
Pansexual	1 (1.9%)	1 (4%)
Straight	46 (85.2%)	21 (84%),
Race/Ethnicity (N, %)		
Black	13 (24.1%)	2 (8%)
Latino/a	3 (5.6%)	3 (12%)
Native American/Native Alaskan	2 (3.7%)	2 (8%)
White	34 (63%)	18 (72%)
Education (N, %)		
High school or equivalent degree	3 (5.6%)	1 (4%)
Some college or Associate's Degree	16 (29.6%)	7 (28%)
College Degree	13 (24.1%)	5 (20%)
Graduate or Professional Degree	20 (37%)	12 (48%)

Note. Fifty four participants presented initially, while 28 participants completed some form of post assessment data.

Data Screening and Cleaning

The data was examined for missing data, univariate outliers, and extreme skew/kurtosis. No other missing items among the questionnaires administered were identified throughout the dataset.

Next, univariate outliers were examined using the z score method. Several variables contained participants who deviated from the rest of the sample with a z score of 3 or greater (though no z scores were above 4 for any participant on any variable). Calories (pre-intervention and post-intervention), weight (pre-intervention and post-intervention), SSI (post-intervention), UMB Rights subscale (post-intervention), DASS-21 anxiety subscale (post-intervention), and the brooding subscale of the RSS Short Form (post-intervention) each contained one participant with a z-score greater than 3 for the construct. However, high variation among weight and caloric intake is typical within the general population of the United States, as is weight bias and psychopathology. Therefore, these slight deviations were found to be theoretically supported and were subsequently not removed.

In terms of skew and kurtosis, no higher values were noted aside from the SSI in terms of pre- (*skewness* = 1.4, *kurtosis* = 1.9) and post-intervention (*skewness* = 1.4, *kurtosis* = 3.0), as well as UMB Rights subscale pre- (*skewness* = 1.5, *kurtosis* = 1.5), and post-intervention (*skewness* = 1.8, *kurtosis* = 3.7). In terms of post-intervention scores, the DASS-21 subscales for depression (*skewness* = 1.3, *kurtosis* = 0.5), anxiety (*skewness* = 1.4, *kurtosis* = 2.6), stress (*skewness* = 1.4, *kurtosis* = 1.5), and the brooding subscale of the RSS – Short (*skewness* = 1.2, *kurtosis* = 2.4) also demonstrated more extreme scores. Hair et al. (2010) posit that an extreme scores falls outside the range of -2 to +2 for skew and -7 to +7 for kurtosis, suggesting that there is no need for correctional transformations or removal of outliers in the current dataset.

Potential Covariate Screening

The data was screened for any potential demographic differences among the key variables of weight and internalized weight stigma (as measured by both the IWB and WSSQ). Per correlation, no relationship was observed between participant age, education, or income regarding weight or IWB. Participants did not significantly differ regarding weight or IWB in terms of sexual orientation, sex and gender. However, participants who identified as Black ($M = 4.52$, $SD = .82$) did generally report lower levels of IWB than participants who identified as White ($M = 5.26$, $SD = .95$) as measured by the WBIS ($t(25.4) = -2.63$, $p < .05$).

Correlations

Correlations were examined in terms of key IWB outcome variables to examine basic patterns and relationships at baseline (see Table 2, Table 3, Table 4, and Table 5 for summation of all correlations and p values). The WBIS was positively correlated with the overall WSSQ score and both the WBIS and WSSQ were positively correlated with WSSQ subscales. Both scales were also positively correlated emotional eating, rumination, brooding, psychological

inflexibility, and SCS subscales judgement, isolation, and overidentification. They were both also negatively correlated with encountering stigmatizing situations, self-esteem and overall self-compassion. However, only the WBIS was negatively correlated SCS subscale kindness, and positively correlated with the UMB Attraction subscale, light physical activity, depression, anxiety, stress, and the reflection subscale of the rumination scale. Only the WSSQ was positively correlated with caloric intake, sugar intake, carbohydrate intake, and uncontrolled eating. See Tables 4, 5, 6, and 7 for correlations.

Table 4. Correlations of Weight and Weight Bias Related Scales.

	Weight	WBIS	WSSQ	Self-Devaluation	Enact Stigma	SSI	Judgment (UMB)	Distance (UMB)	Attraction (UMB)	Rights (UMB)
Pre Weight	--									
WBIS	-.13	--								
WSSQ	.15	.52***	--							
Self Devaluation	.23	.41**	.87***	--						
Enact Stigma	.01	.48***	.80***	.41**	--					
SSI	.39**	.30*	.37**	.25	.38**	--				
Judgement (UMB)	-.08	-.10	-.21	-.31*	-.02	-.26	--			
Distance (UMB)	-.10	-.06	-.03	-.03	-.03	.07	.44***	--		
Attraction (UMB)	-.23	.37**	.07	.08	.03	.07	.23	.45**	--	
Rights (UMB)	.09	.01	-.26	-.21	-.22	-.22	.27	.10	.20	--

Note. * denotes significance at the $p < .05$ level, ** denotes significance at the $p < .01$ level, *** denotes significance at the $p < .001$ level. In terms of acronyms, WBIS = Weight Bias Internalization Scale, WSSQ = Weight Self-Stigma Questionnaire, SSI = Stigmatizing Situations Inventory, and UMB = Universal Measure of Bias.

Table 5. Correlations of Weight Stigma and Health Behavior.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WBIS (1)	--															
WSSQ (2)	.52***	--														
Self-Devaluation (3)	.41**	.88***	--													
Enact Stigma (4)	.48**	.80**	.41**	--												
SSI (5)	.30*	.37*	.25	.38**	--											
Judgement (UMB)(6)	-.10	-.21	-.31*	-.02	-.29	--										
Distance (UMB)(7)	-.06	-.03	-.03	-.03	.05	.64***	--									
Attraction (UMB)(8)	.37**	.07	.08	.03	-.33	.47*	.42*	--								
Rights (UMB)(9)	.01	-.26	-.21	-.22	-.01	.12	.13	.42*	--							
Calories (10)	.21	.36*	.37*	.20	.05	.01	.18	.13	-.06	--						
Sugar (g) (11)	.16	.30*	.24	.24	.14	-.13	-.09	-.03	-.26	.56***	--					
Saturated Fat (g) (12)	.24	.26	.26	.15	.06	.11	.26	.23	.18	.83***	.18	--				
Carbohydrates (g) (13)	.20	.44**	.40**	.29*	.08	-.13	.04	.04	-.22	.82***	.86***	.42**	--			
Protein (g) (14)	.17	.25	.26	.15	.03	.17	.31*	.21	.07	.88***	.21	.92***	.48***	--		
Light Physical Activity (15)	.30*	.20	.27	.04	.17	-.10	.16	.15	-.16	.11	.00	.16	.04	.18	--	
Moderate Physical Activity (16)	-.01	.14	.31*	-.12	-.19	-.02	.15	-.04	.01	.04	-.19	.12	-.09	.19	.48***	--
Vigorous Physical Activity (17)	.08	.17	.08	.21	-.14	.23	.05	-.06	.10	-.04	-.19	-.04	-.09	.07	-.01	.25

Note. * denotes significance at the $p < .05$ level, ** denotes significance at the $p < .01$ level, *** denotes significance at the $p < .001$ level. In terms of acronyms, WBIS = Weight Bias Internalization Scale, WSSQ = Weight Self-Stigma Questionnaire, SSI = Stigmatizing Situations Inventory, and UMB = Universal Measure of Bias.

Table 6. Correlations of Weight Stigma and Mental Health and Eating Behavior.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WBIS (1)	--															
WSSQ (2)	.52***	--														
Self-Devaluation (3)	.41**	.88***	--													
Enact Stigma (4)	.48**	.80**	.41**	--												
SSI (5)	.30*	.37*	.25	.38**	--											
Judgement (UMB) (6)	-.10	-.21	-.31*	-.02	-.29	--										
Distance (UMB) (7)	-.06	-.03	-.03	-.03	.05	.64***	--									
Attraction (UMB) (8)	.37**	.07	.08	.03	-.33	.47*	.42*	--								
Rights (UMB) (9)	.01	-.26	-.21	-.22	-.01	.12	.13	.42*	--							
Depression (10)	.39**	.26	.32	.10	.16	-.35*	-.02	.05	.01	--						
Anxiety (11)	.38**	.25	.25	.17	.32*	-.34*	-.01	.07	-.04	.56***	--					
Stress (12)	.30*	.24	.22	.17	.24	-.17	.08	.01	-.00	.56***	.79***	--				
Self-Esteem (13)	-.70***	-.45***	-.40**	-.36**	-.27	.28	.07	-.04	-.00	.60***	-.45***	.42**	--			
Controlled Eating (14)	-.08	-.18	-.24	-.04	.05	.11	.13	.02	.15	-.19	.03	.12	.01	--		
Emotional Eating (15)	.32*	.41**	.42**	.25	.37**	-.20	.20	.19	-.01	.30*	.35*	.35*	-.29*	-.1	--	
Uncontrolled Eating (16)	.25	.50***	.52***	.29*	.20	-.22	-.01	.06	-.16	.33*	-.35*	.39**	-.27	-.22	.46***	--

Note. * denotes significance at the $p < .05$ level, ** denotes significance at the $p < .01$ level, *** denotes significance at the $p < .001$ level. In terms of acronyms, WBIS = Weight Bias Internalization Scale, WSSQ = Weight Self-Stigma Questionnaire, SSI = Stigmatizing Situations Inventory, and UMB = Universal Measure of Bias.

Table 7. Correlations of Weight Stigma and Cognitive Patterns.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
WBIS (1)	--																		
WSSQ (2)	.52***	--																	
Self- Devaluation (3)	.41**	.88***	--																
Enact Stigma (4)	.48**	.80**	.41**	--															
SSI (5)	.30*	.37*	.25	.38**	--														
Judgement (UMB) (6)	-.10	-.21	-.31*	-.02	-.29	--													
Distance (UMB) (7)	-.06	-.03	-.03	-.03	.05	.64***	--												
Attraction (UMB) (8)	.37**	.07	.08	.03	-.33	.47*	.42*	--											
Rights (UMB) (9)	.01	-.26	-.21	-.22	-.01	.12	.13	.42*	--										
Rumination (10)	.45***	.45***	.37**	.38**	.24	-.09	.09	.16	.02	--									
Brooding (11)	.49***	.46***	.39***	.39***	.24	-.08	.05	.17	.04	.90***	--								
Reflection (12)	.30*	.24	.22	.17	.24	-.17	.08	.01	-.00	.88***	.58***	--							
Inflexibility (13)	.36*	.28*	.27	.18	.27*	.25	.11	.03	.08	.65***	.62***	-.54**	--						
Self-Compassion (14)	-.56***	-.28*	-.27	-.20	-.22	.24	.05	-.07	-.08	-.53***	-.60***	-.33*	-.66***	--					
Kindness (15)	-.41*	-.22	-.34**	.00	-.13	.25	-.20	.08	-.04	-.27	-.36**	-.10	-.51*	.80***	--				
Humanity (16)	-.25	.02	-.08	.13	.01	.17	-.07	.03	-.03	-.20	-.17	-.18	-.35*	.67***	.54***	--			
Mindfulness (17)	-.22	-.06	.03	-.14	-.08	.22	.03	-.02	.09	-.13	-.28*	-.06	-.31*	.65***	.51***	.46***	--		
Judgement (18)	.54***	.31*	.24	.29	.18	.10	.01	.18	.16	.62***	.63***	.47***	.45***	-.68***	-.44***	-.19	-.20	--	
Isolation (19)	.54***	.32*	.26	.28*	.20	-.20	-.19	-.00	.02	.44***	.51***	.27	.53***	-.80***	-.51***	-.51***	-.39**	.46***	--
Overidentification (20)	.48***	.29*	.26	.22	.34*	-.32*	-.09	.05	.19	.62***	.64***	.46***	.72***	-.83***	-.56***	-.39**	-.40**	-.64***	.64***

Note. * denotes significance at the $p < .05$ level, ** denotes significance at the $p < .01$ level, *** denotes significance at the $p < .001$ level. In terms of acronyms, WBIS = Weight Bias Internalization Scale, WSSQ = Weight Self-Stigma Questionnaire, SSI = Stigmatizing Situations Inventory, and UMB = Universal Measure of Bias.

Paired Sample T-Tests.

Paired sample t-tests were performed to compare outcome measures within subjects at baseline and post-intervention.

Weight, Dietary and Physical Activity Outcomes. Participant percentage of weight lost was significant, with participants losing an average of 2.6% of their body weight [$SD = 2.34\%$, $t(23) = 2.16$, $p < .001$]. Participant weight loss ($p < .001$) and BMI decrease ($p < .001$) was significant from baseline to post-intervention (see Table 6). The average loss in weight was 4.7 lbs ($SD = 5$) and BMI loss was .78 ($SD = .8$), with a range of -3.4 lbs (gained) to 15.6 lbs (lost), and a change of -.62 and 2.37, respectively. Participants also demonstrated significant reductions in saturated fat intake ($p = .016$). In addition, participants reported an increase in moderate physical activity ($p = .005$). Participants also reported a significant decrease in emotional eating ($p < .001$), as well as an increase in controlled eating ($p = .004$). See Table 8 for relevant statistics, including p value and effect size.

Table 8. Physical Health Treatment Outcomes for Participants.

	Pre M (<i>SD</i>)	Post M (<i>SD</i>)	<i>df</i>	t value	<i>p</i> value	Cohen's <i>d</i>
Weight Outcomes						
Weight	232.358 (42.92)	227.43 (44.987)	24	4.628	<.001	.95
BMI	39.445 (6.827)	38.661 (7.133)	24	4.618	<.001	.94
Nutrition Outcomes						
Calories	1919.65 (1151.67)	1482.9 (766.7)	20	1.88	.076	1.57
Sugar	55.8 (32.17)	45.9 (57.8)	20	.69	.50	.15
Saturated Fat	25.82 (16.1)	17.57 (7.03)	20	2.66	.016	.59
Carbohydrates	207.5 (103.31)	165.25 (89.53)	20	1.81	.087	.40
Protein	79.4 (50.83)	73.1 (47.81)	20	.5	.623	.11
Eating Behavior						
Restricted	2.29 (0.55)	2.61 (0.43)	24	-3.18	.004	-.61
Uncontrolled	2.55 (0.60)	2.27 (0.51)	24	1.75	.092	.75
Emotional	3.14 (0.63)	2.91 (0.66)	24	3.92	<.001	.34

Physical Activity Outcomes						
Light	2.96 (0.98)	3.24 (1.2)	24	-1.27	.215	-.26
Moderate	2.0 (0.87)	2.8 (1.5)	24	-3.1	.005	-.62
Vigorous	1.32 (0.85)	1.44 (0.77)	24	-.57	.287	-.11

Note. Significant *p* values are represented in bold text.

Psychological Outcomes. Participants demonstrated a significant reduction in IWB, as measured by both the WBIS ($p = .002$) and WSSQ ($p = .014$) total scale scores (see Table 7). In terms of IWB subscales, the WSSQ subscale fear of enacted stigma also significantly lowered ($p = .013$), though the self-devaluation subscale did not quite reach significance ($p = .08$). In terms of weight bias, the UMB subscales judgement ($p < .001$) and attraction ($p < .001$) were significantly reduced. In terms of experienced weight stigma, participants' scores on the SSI significantly increased ($p < .001$), indicating a rise in stigma encountered.

Further, participants reported a significant decrease in depressive symptoms ($p = .026$) and an increase in self-esteem ($p = .007$). Participants experienced a decrease in psychological inflexibility ($p = .004$). Participants also reported an increase in mindfulness ($p = .013$), decrease in judgement towards the self ($p = .023$) and overidentification ($p = .007$), and an increase of overall self-compassion ($p < .001$). See Table 9 for relevant statistics, including *p* value and effect size.

Table 9. Mental Health Treatment Outcomes for Participants.

	Pre M (<i>SD</i>)	Post M (<i>SD</i>)	<i>df</i>	<i>t</i> value	<i>p</i> value	Cohen's <i>d</i>
Weight Bias Related Constructs						
WBIS (Internalized Weight Bias)	4.93 (.85)	4.42 (1.14)	24	3.41	.002	.68
WSSQ (Internalized Weight Bias)	40.08 (5.67)	37.08 (7.52)	24	2.66	.014	.53
Self-Devaluation	19.92 (4.58)	18.32 (5.3)	24	1.84	.079	.37
Fear of Enacted Stigma	20.16 (3.17)	18.76 (4.15)	24	2.69	.013	.54
Weight Stigmatizing Situations	1.07 (0.84)	1.90 (1.17)	24	-4.62	<.001	-.91
Judgement (UMB)	2.54 (1.15)	1.89 (.1)	24	3.89	<.001	.78
Distance (UMB)	2.03 (.87)	1.78 (.86)	24	1.97	.06	.39
Attraction (UMB)	4.17 (1.52)	3.59 (1.27)	24	4.79	<.001	.96
Rights (UMB)	1.85 (.88)	1.82 (.93)	24	0.15	.881	.03

Mental Health						
Depression	10.64 (8.42)	7.6 (8.58)	24	2.37	.026	.48
Anxiety	7.84 (6.73)	5.84 (5.8)	24	1.49	.149	.30
Stress	13.36 (7.23)	11.28 (9.33)	24	1.12	.275	.22
Self-Image						
Self-Esteem	28.8 (4.49)	30.96 (4.11)	24	-2.96	.007	-.59
Cognitive Patterns						
Brood	10.84 (3.05)	9.72 (3.37)	24	2.03	.054	.41
Reflection	9.00 (3.16)	8.60 (3.24)	24	0.8	.432	.16
Psychological Inflexibility	22.48 (10.34)	18.44 (7.83)	24	3.21	.004	.64
Self-Compassion	2.89 (0.81)	3.24 (0.77)	24	-3.68	.001	-.73
Self-Kindness	2.96 (0.97)	3.22 (0.89)	24	-1.64	.114	-.33
Mindfulness	3.18 (1.04)	3.60 (0.76)	24	-2.69	.013	-.95
Humanity	3.18 (1.04)	3.34 (0.92)	24	-.97	.342	-.19
Self-Judgement	3.56 (1.14)	3.18 (1.02)	24	2.43	.023	.49
Self-Isolation	3.21 (1.11)	2.78 (1.14)	24	1.74	.094	.35
Overidentification	3.34 (1.06)	2.78 (1.09)	24	2.95	.007	.59

Note. In terms of acronyms, WBIS = Weight Bias Internalization Scale, WSSQ = Weight Self-Stigma Questionnaire, SSI = Stigmatizing Situations Inventory, and UMB = Universal Measure of Bias.

Variables Related to Weight Loss. Pre- and post-intervention related variables were examined in relation to percent weight lost. At baseline, higher light physical activity ($r = .39, p > .05$) and protein intake ($r = .40, p > .05$), were moderately correlated with percent weight lost. However, no correlations were present at post-intervention.

Treatment Acceptability

The STTS-R revealed that the majority of participants who completed the study regarded the treatment positively, with most participants indicating they agreed the IWB treatment was helpful ($M = 4.4, SD = .51$). The range of scores on the STTS-R was 3 to 5, indicating that at least all participants found the treatment neutral. In terms of the subscales, participants generally agreed that the behavioral coaches were helpful ($M = 4.01, SD = .57$), but more importantly, reported agreeing that the program was helpful ($M = 4.4, SD = .51$).

IV. Discussion

The serious consequences of IWB have become increasingly clear, prompting new developments in IWB-related interventions. The current study introduced a novel intervention for reducing internalized weight bias using a third-wave framework in conjunction with an established, efficacious weight loss program delivered virtually, all within a brief format. In addition, the intervention supplied skills for encountered weight stigma and awareness of potential weight stigma towards others. This intervention remains of key interest as IWB is often associated with significantly adverse mental and physical health outcomes that can interfere with weight loss and potentially contribute to weight gain, including binge eating, disordered eating, and avoidance of exercise (Carels et al., 2019; Carels et al., 2013; Innamorati et al., 2017; Baldofski et al., 2016; Durso et al., 2012a; Vartanian & Novak, 2011). Moreover, higher IWB has also been shown to be associated with poorer weight loss as compared to individuals with lower IWB (Puhl, Quinn, et al., 2017).

In the current study, consistent with prior research, at baseline greater IWB was generally associated with a myriad of harmful effects, including higher depression, anxiety, stress, emotional eating, uncontrolled eating, psychological inflexibility, and ruminative habits (brooding), and low self-esteem and self-compassion (Pearl & Puhl, 2018; Carels et al., 2020; Petersen et al., 2021; Wang et al., 2017). However, it is somewhat surprising that controlled or overly restrained eating was not associated with IWB, as this has been noted throughout literature (Boswell & White, 2015; Schvey & White, 2015). While Boswell and White (2015) noted the correlation among 566 female-identifying participants only, Schvey and White (2015) found a relatively moderate correlation among 197 men and women ($r = .501, p < .001$). In contrast, the current sample noted a non-significant correlation ($r = -.08$). Both aforementioned

studies included nontreatment seeking participants, while the current study includes individuals seeking a weight loss program. It is perhaps not surprising that weight loss participants would not report a relationship between IWB with overly restrained eating. As noted above, IWB was significantly associated with emotional and uncontrolled eating within the current study.

With respect to change in constructs associated with an intervention, several recent studies designed to reduce IWB have utilized third-wave approaches, and been relatively successful in reducing IWB (Berman et al., 2016; Forbes et al., 2020; Levin et al., 2018; Lillis et al. 2009; Palmeira, Cunha, & Pinto-Gouveia, 2017; Palmeira, Pinto-Gouveia, & Cunha, 2017). However, previous interventions recruited individuals for the purpose of lowering IWB, while the current study incorporated IWB into a BWLP and advertised to participants seeking weight loss and likely attracted participants more interested in losing weight than reducing IWB. As previously discussed, this element was added as IWB is associated with several concerning eating and physical activity patterns counter to weight loss and many weight loss program participants suffer from high IWB (Carels et al., 2019). Further, despite the fact that individuals with high IWB are likely to express interest in losing weight, higher IWB is associated with difficulty losing weight (Koball et al., 2018; Puhl, Quinn, et al., 2017). Yet, it was unknown whether the focus on weight loss would diminish or dilute the interventions effect on reducing IWB. Indeed, IWB, as measured by both the WBIS and WSSQ, was significantly lowered post-intervention. However, when the WSSQ subscales were examined individually, while the Fear of Enacted Stigma subscale was significantly lowered, the WSSQ self-devaluation subscale failed to reach conventional levels of statistical significance ($p = .079$), possibly due to low power secondary to a small sample size. Further, while Lillis et al. (2012) noted that each aspect of the WSSQ did have change sensitivity, he did find that the overall WSSQ score and Fear of Enacted

Stigma subscale seemed to be more sensitive than the self-evaluation scale to change following an intervention. It is possible that this subscale is most closely related to core beliefs about oneself, which can be more resistant to change. While some slight differences have been noted on the two scales, both the WBIS and overall WSSQ score have been deemed to be reliable measures of IWB (Hübner et al., 2016) and therefore support the current study's primary aim of reducing IWB.

Though the primary focus was on IWB, the intervention also appeared to be successful in lowering weight bias, as measured by the UMB subscales Judgement and Attraction, with near significance for Distance. This was not a surprising outcome and was hypothesized. IWB and external weight bias have often been noted to be significantly correlated (Durso & Latner, 2012). Both concepts apply the same set of stereotypes – therefore, it is plausible to consider that targeting IWB would also target weight bias as more awareness is brought to these stigmatizing beliefs. Yet, it is also important to note that sessions took place in a group format, which provides participants with the chance to see other individuals of a certain size engaging in healthy behaviors that are not consistent with stereotypes. It is difficult to say with certainty the exact mechanism by which external weight bias was lowered, but its proximity to the concept of IWB makes it an important treatment consideration (though it should be noted that not all individuals with high IWB will have weight bias and vice versa!)

To my knowledge, this is the first intervention to provide an ACT-based IWB in conjunction with a behavioral weight loss program (BWLP), as Pearl et al. (2020) used a CBT-based weight loss and weight bias reduction program. In addition, the Weight BIAS Intervention was in person, while the current intervention was virtual. At 12 weeks, Pearl et al.'s (2020) Weight BIAS Intervention saw an average weight loss of 3.7%, and a decrease of 1.3 on the

WBIS scale and 6.0 for the WSSQ. At 26 weeks, there was a 4.5% loss for weight, a decrease of 1.5 on the WBIS scale and a decrease of 7.1 for the WSSQ. In comparison, the current study noted a decrease of 2.2% weight loss, and a decrease of 0.51 on the WBIS scale and 3.0 for the WSSQ. While the Weight BIAS intervention has demonstrated compelling results, the current intervention is quite different in numerous ways. Pearl et al.'s (2020) intervention ran for the course of 26 weeks, while the current intervention was only 10 weeks. In addition, Pearl et al. (2020) was able to offer make up sessions if participants missed a session. Of course, the current study also utilized a different treatment modality, with the current investigation offering an IWB intervention for clinicians who may be more third-wave or ACT inclined. Finally, Pearl et al.'s (2020) BWLP also was conducted in person, while the current intervention was virtual. Overall, participants in the current intervention were successful in losing weight, with average loss of 4.7 lbs and a 2.16% change in body weight. Though this loss is rather modest, it is important to note that the current study utilized a shortened version of the DPP with a total of ten sessions and that this was a telehealth weight loss intervention using video conferencing software. Weight loss results for a BWLP using video conference software may range from a loss of 4 to 14lbs, suggesting that the current study was consistent with previous literature (Azar et al., 2015; Carels et al., 2021; Dunn et al., 2016; Dunn et al., 2014; Vadheim et al., 2010). Further, participants also reported a significant increase in moderate physical activity and a decrease in saturated fat intake. A decrease in overall caloric intake was almost significant ($p = .076$), with average caloric baseline at 1919.7 decreasing to 1482.9 at the study's conclusion, resulting in an 436.8 reduction overall. It is possible that this was an issue of power, and significance might have been achieved with a larger sample.

This dissertation squarely falls within a larger debate about the appropriateness of adding stigma reduction to a BWLP in general and whether BWLP are efficacious or stigmatizing. Previous IWB interventions with an ACT or third-wave theoretical orientation typically solely focused on reducing IWB (Lillis et al., 2009; Palmeira, Pinto-Gouveia, Cunha, & Carvalho, 2017). Palmeira et al. (2017) did recruit participants seeking nutritional treatment for weight loss within primary care units, but no behavioral-based weight loss strategies were offered. Though these ACT-based interventions were successful in lowering IWB, there are theoretical differences to consider between patients presenting for solely an IWB intervention in comparison to a BWLP. It is plausible that participants presenting to an IWB intervention may have increased awareness around self-image related concerns and the harm this can bring.

However, not all individuals with high IWB may be aware of this since weight bias is so widely accepted (Puhl & Brownell, 2001). Due to the nature of IWB, many participants may feel they deserve their poor self-image. In short, people who may need treatment for IWB may not receive it. In contrast, the current study was advertised as a weight loss program, though participants were advised there would be an experimental component. Then, participants were screened for higher levels of IWB. Accordingly, it is hoped that this intervention may have reached both individuals who were and were not aware of their own beliefs about themselves regarding weight, but the primary interest for their participation was weight loss. Further, high IWB has been associated with a number of concerning methods for attempting weight loss, such as disordered or overly restricted eating (Pearl & Puhl, 2018). In fact, Mensinger et al. (2016) found that women with high IWB did not benefit in terms of reducing disordered eating in either a BWLP or weight-neutral BWLP, as compared to women with lower IWB. This underlines the

serious need for interventions for individuals seeking weight loss who also have high IWB, as well as a combined BWLP with an effective IWB intervention.

Still, there are compelling reasons to pursue an ACT-based IWB with a BWLP. First, ACT-based programs have been effective at reducing IWB (Palmeira et al., 2017). Second, as a whole, ACT-based approaches have also shown strong promise in comparison to CBT, with a large meta-analysis finding ACT interventions to be somewhat more effective at treatment than CBT for a variety of conditions, including depression, anxiety, stress, obsessive compulsive disorder, smoking, and coping with cancer (Ruiz et al., 2012). Finally, Cattivelli et al. (2021) found that ACT was more effective in maintaining weight loss over time than CBT. In summation, the current intervention has shown promising results with a short duration of treatment and may benefit from continued refinement and further examination with a larger sample size. Though CBT elements of the DPP were not emphasized within the current study, it may have even been beneficial to use a BWLP and IWB intervention with a congruent theoretical orientation, such as an ACT-based weight loss program.

A secondary aim of the study was to examine whether the program had an impact on weight-related secondary outcomes, including mental health, self-image, and eating behavior. Surprisingly, participants actually reported an increase in weight stigmatizing situations. Research suggests that weight bias can be highly engrained within society, to the point where it is not even recognized as bias or stigma (Puhl & Brownell, 2001). It is possible that participants became sensitized to the issue while participating in the study and/or better able to identify and label weight stigma. In fact, in support of this, the second session especially focused on increasing awareness around this stigma. Pinel (2004) found a similar effect in an experimental design study – women (initially low in stigma awareness) were more likely to note

discriminatory behavior from men after an increase in stigma consciousness. With this in mind, it will be important for future interventions to ensure that participants are well equipped to cope with a potential perceived increase in the experience of stigma. The WSSQ subscale of Fear of Enacted Stigma may provide further context and assurance, as participants reported a reduced fear of situations in which stigma may be enacted towards themselves and hopefully suggests they feel more confident to self-advocate using skills from the intervention.

Upon study conclusion, participants also reported a decrease in depressive symptoms and an increase in self-esteem. IWB is closely linked to depression and self-esteem (Pearl & Puhl, 2018), and it is therefore possible to suppose the current intervention may have been helpful in ameliorating these symptoms. After all, maladaptive thoughts about oneself and attention to negative information are maintenance factors of depression (LeMoult & Gotlib, 2019), and a concept that is inherent within IWB as maladaptive thoughts about oneself due to weight is central to the construct (Ratcliffe & Ellison, 2013). It may bring relief to cognitively defuse from both depressive and IWB critical thoughts. Similarly, IWB and self-esteem are both related to beliefs and evaluation of oneself (Ratcliffe & Ellison, 2013). From a behavioral perspective, depression is maintained by avoidance (internal and external) and a lack of engagement in pleasurable activities (Kanter et al, 2004). IWB has been found to be associated with avoidance of activities that might incur weight-related judgement (Ratcliffe & Ellison, 2013).

Yet, it is also important to note that these trends (decrease in depressive symptoms and an increase in self-esteem) are common among BWLP in general. The positive mood increases after participation within a BWLP have been noted since the 1980's (Wing et al., 1984). There are many theories as to why a BWLP may reduce depressive symptoms. BWLPs characteristically encourage participants to consume more nutrient-dense foods and less unhealthy foods, thereby

naturally benefitting the body and brain functioning (Patsalos et al., 2021). In addition, BWLPs also encourage increased exercise and physical activity, which has also demonstrated improvements in mood comparable to the use of antidepressants (Dinas, Koutedakis, & Flouris; 2010). Similarly, BWLPs have also been observed to increase self-esteem secondary to weight loss, possibly due to increased confidence and self-efficacy upon completion of a program and successful weight loss (Blaine, Rodman, & Newman, 2007). Still, Berman et al.'s (2016) ACT-based IWB intervention specifically recruited women with depression and did not promote weight loss, but significance decreases were still noted for depressive symptoms along with IWB. Finally, it is likely that a combination of an IWB and BWLP may both have positive impacts on mood and beliefs about oneself. There are clearly numerous mechanisms for reducing depression and improving self-esteem.

A significant increase in restrained eating and reduction for emotional eating was noted, with uncontrolled eating somewhat close to significance ($p = .092$). These findings are important as IWB is associated with a myriad of concerning eating patterns (Pearl & Puhl, 2018), which in turn can be harmful behavior and counter to weight loss and maintenance. Additionally, BWLPs emphasize healthier eating patterns, and teach skills to regulate eating habits. Again, participants likely benefited from a combination of skills. For example, Braden et al. (2016) reported that 29% participants reported a decrease in emotional eating after participation in a BWLP alone, while the current study noted 67% of participants reported a decrease in emotional eating. Thus, it is reasonable to speculate that the combined intervention may have enhanced this outcome, especially as research has noted urges toward disordered eating (including emotional eating) after IWB experiences (Carels et al., 2019).

Mechanisms and maintaining-based constructs were assessed to ensure proper targets of intervention for an ACT-based study. Significant improvements were noted within psychological flexibility, and near significant for rumination. Psychological flexibility is proxy for acceptance and goal driven action, and therefore remains one of the main targets of an ACT-based intervention (Doorley et al., 2020). As this was an ACT-based intervention, it was reassuring to note decreases in psychological inflexibility, and it was likely that the intervention operated through appropriate channels. This is consistent with other ACT-based IWB interventions, as Palmeira, Pinto-Gouveia, and Cunha (2017) also saw a significant decrease in psychological inflexibility. Though Palmeira, Pinto-Gouveia, and Cunha (2017) saw a more pronounced effect, with a 10.6 decrease in psychological inflexibility, it should be considered that these 12 in person sessions were solely focused on ACT and self-compassion concepts for two and a half hours, resulting in a higher dose of treatment.

Improvements were also noted among self-compassion related constructs within the current study, including an increase in self-compassion and mindfulness, and a decrease in self-judgement and overidentification with ones' thoughts. Self-compassion is intuitive in its application to IWB as it is designed to challenge the inherent self-critical nature of IWB, and the two constructs have known to be associated (Fekete et al., 2021). Therefore, self-compassion has been studied in conjunction with both BWLPs and IWB/body image interventions. In a randomized controlled trial combining a BWLP with self-compassion in comparison to BWLP only, Carels et al. (2021) found the intervention group participants demonstrated a significant increase in self-compassion (though the two groups remained similar on other outcomes). Haley et al. (2022) examined whether three sessions of self-compassion could lower IWB among women. Significant improvements were seen for IWB (with a 0.6 decrease on the WBIS), eating

behavior (for emotional and uncontrolled eating) and body appreciation. Though this is a modest drop on the WBIS, notably, Haley's intervention targeted global self-compassion and was not exclusively targeted to IWB. Generic self-compassion alone that does not directly target IWB may not be efficient in enhancing weight loss or lowering IWB, but it may be an especially effective component.

In fact, Palmeira, Pinto-Gouveia, and Cunha's (2017) ACT-based IWB intervention and Pearl et al.'s (2020) CBT-based IWB intervention and BWLP also focused on self-compassion, and saw significant increases in the construct. Moreover, in a recent study, Tosca et al. (2022) utilized a mindful self-compassion training along with a lifestyle modification with 28 women with class-III obesity, and significant improvements in self-compassion, IWB, and weight were noted. Therefore, several studies argue for an increased focus on self-compassion as a treatment for IWB. Further, Haley et al.'s (2022) findings showcase how self-compassion may mitigate some of the concerning and unhealthy outcomes associated with IWB, despite the fact that the intervention did not focus on IWB and was simply a general self-compassion intervention. This is especially compelling considering that both IWB and self-compassion have been found to separately mediate experienced weight stigma and psychological distress separately (Forbes & Donovan, 2018). Perhaps self-compassion is not only a helpful tool for combating harmful IWB, but is also important for combating its inverse (self-judgment or critique) as this may be its own separate pathway with concerning eating pathology or body image.

The current study also noted an increase on the mindfulness subscale from the Self-Compassion Scale – Short. Neff (2003) proposed that mindfulness is an important component of self-compassion, as it allows oneself to observe one's own thoughts and put psychological distance between self-disparaging thoughts and perceptions of reality. ACT also utilizes

mindfulness as one of its core components in a similar manner. Increased self-awareness of one's inner experiences is the first step in changing maladaptive patterns, as a point of intervention must be identified. Thus, it was encouraging to see participants improve in terms of mindfulness, and this was likely an important mechanism in terms of driving change. Tosca et al. (2022) also serves as an example as to the importance of mindfulness within the context of self-compassion and intervention for IWB.

Treatment Acceptability

Responses from the 25 participants who completed treatment were generally positive, in especially regarding the program itself. It was important that this treatment was regarded positively by participants – IWB is a difficult subject and can be distressing to discuss. Similarly, BWLPs could be difficult for an individual with high IWB. Accordingly, it was essential to illicit this feedback. Participants were also checked-in on at the beginning of each session and at study conclusion. During weigh in's, several participants reported that the self-compassion chapter was especially helpful for their well-being. One participant noted they had received CBT-based therapy before, but felt the self-compassion was an entirely new skill they had not encountered and responded positively to.

The current study also utilized technology through video conferencing software to deliver session content every week. This research adds to the growing database demonstrating effective telehealth for behavior change and weight loss (Azar et al., 2015; Carels et al., 2021; Dunn et al., 2016; Dunn et al., 2014; Vadheim et al., 2010). As previously mentioned, Carels et al. (2021) also found the use of video conferencing software to be an effective delivery of a BWLP along with an additional component (self-compassion), with high participant approval, and this study also took place in an area with high needs and limited service to a surrounding rural community.

This study, as well as the current study, demonstrates how telehealth can be effective in reaching a more rural population and provide care during pandemics. Further, approximately a quarter of the United States workforce reports working too many hours, making it difficult for many to keep up with other commitments outside of work (Menasce Horowitz & Parker, 2023). This is especially a compounded issue for individuals who are also caretakers. Indeed, the current study did include several participants from outside the city in which the study was being conducted. In addition, multiple participants in the current study had a demanding job and children or elderly, disabled relatives to take care of. In light of this, video conferencing software deserves to be a serious consideration as a method of delivery, especially for rural areas with limited access to resources and the convenience it offers to participants. Additionally, this was the first study to utilize a BWLP and IWB combined intervention using video conferencing software. This suggests that IWB can effectively be lowered through telehealth-based interventions.

Limitations

While this study includes many strengths, as it is one of the first interventions using an ACT-based approach for IWB with a combined BWLP, all within a virtual, video conferencing format, several limitations should be noted. First, the concluding sample size was quite small (N=28), drawing concerns regarding power while noting that several constructs approached, but did not reach, significant treatment gains (e.g, self-devaluation subscale of the WSSQ, distance subscale of the UMB scale, brooding rumination, and the isolation subscale of the SCS).

Relatedly, attrition was a significant concern within the current study, as only 28 participants completed some sort of outcome data out of the 54 participants who signed the initial consent form, resulting in an attrition rate of 51.9%. While this is a rather large drop, it is not uncommon for weight loss programs – a study examining attrition with 250 participants with

obesity in a 12-week program noted a 53.6% attrition rate, which is comparable to the current study (Ponzo et al., 2021). The authors identify several risk factors for early dropout, including lower weight/BMI, living alone, and presence of depressive symptoms. The latter is especially an important consideration as IWB tends to be correlated with depression – within the current study, depression and IWB were significantly and moderately correlated ($r = .389$). However, other IWB interventions have shown higher attrition rates, with up to 80% attrition at 12-weeks (Pearl et al., 2020; Palmeira, Pinto-Gouveia, & Cunha, 2017). It should be considered that these aforementioned studies conducted extensive screenings, including exclusion criteria regarding mental health and lower BMI. Performing an Intention-to-Treat analysis is perhaps another option in dealing with the issue of attrition. Yet, this analysis is often more relevant for studies with treatment arms or randomized control trials. The hypothesis of the current study revolved around whether a new intervention would successfully lower IWB – accordingly, including participants that did not attend sessions or only one or two sessions would not advise the hypothesis. Still, the current intervention may benefit from improved attempts to retain participants.

Moreover, the current study lacked BWLP only comparison group. While the current study did show improvements within subjects, the intervention cannot rule out that some changes (IWB, depression, etc.) would not have occurred without a focus on IWB or perhaps by factors not assessed in this investigation. After all, participants may naturally benefit mentally from a BWLP (including improved IWB and associated constructs). If the benefits of this IWB intervention do not extend past what is naturally accumulated by participating in a BWLP, then an extra 30-minute IWB intervention on top of the already established extensive protocol would potentially be ill-advised. Still, Pearl et al. (2020) did incorporate a control group, and found that

the treatment group experienced significant gains in IWB reduction as compared to the control group. Further, improvements in eating behavior, affective coping, and responses to weight stigma also were noted at follow up for the intervention group as compared to the control group (Pearl, Wadden, Bach, Tronieri, et al., 2020). These treatment gains argue for the utility of an IWB intervention despite the additional time component, and suggests merit in additional testing of the current intervention using an RCT approach.

The current intervention did not collect follow-up data. This is crucial data for determining whether weight loss was maintained or continued. Still, it is not unreasonable to speculate that treatment gains could have been maintained, as Pearl, Wadden, Bach, Tronieri, et al., (2020) did establish that treatment gains for an IWB intervention are possible at a 6-month measurement point. The current intervention would be greatly strengthened by collection of follow up data and may be a worthwhile endeavor.

Along with having a larger sample, the current study would also have benefitted from increased diversity among the sample to ensure that the intervention is generalizable to individuals from varied backgrounds. For example, all participants in the current sample had at least a high school degree, and the median income for the concluding sample was \$77,500. The median income in the United States is \$74,580 (U.S. Census Bureau, n.d.). This is slightly above the average income, suggesting a somewhat more wealthy sample than the rest of the population. While the DPP has been normed with individuals with varied economic and educational backgrounds, the current, novel intervention will need to be tested further before it can be concluded that it is effective for the aforementioned economic considerations.

On another note, while the sample did have individuals with varied sexual orientation and racial/ethnic identities, it must be noted that many of these identities were only represented by

one or two people, which is not sufficient to generalize from. Moreover, many identities were also not represented within the current study. In fact, race and ethnicity are a concern in itself among the construct of IWB, as an alarming proportion of research examining IWB did not collect or report race/ethnicity among their sample (Pearl & Puhl, 2018). Similarly, research is only just beginning to emerge on IWB among the LGBTQ+ community (Shonrock et al., 2022; Panza et al., 2021), with concerning high rates for some groups and noted interaction with minority stress. This issue among the literature leads to confusion about whether IWB operates similarly across these groups or has varying or culture-bound considerations. For example, one large and multinational study used a high and formidable sample size to identify common correlates of IWB, but nationalities included countries with a significantly higher White populations (e.g., U.S, Australia, France, etc.) and used a dichotomized approach for sexual orientation of straight or not (Peal et al., 2021). This intervention was derived from data such as this and especially drew influence from Pearl and Puhl, 2018, bringing significant concern and a need for consideration as to whether this intervention is skewed too greatly towards the concerns of dominant groups. Though the intervention was successful for most participants in terms of lowering IWB, unique considerations still may need to be made for how IWB can be culturally enhanced for particular identities or experiences. The current intervention may have benefitted from soliciting qualitative feedback and documented input from each participant to enhance future trials, along with increased representation.

It is important to consider treatment burden when designing a research intervention, especially when asking participants to take part in a 10-week study with long batteries of questionnaires at the beginning and end of the study. The current study does indeed have strengths in the multiple constructs that were examined, but this resulted in a weakness as well,

with challenges in collecting data. Relatedly, there were also other very relevant constructs that were not included in the current study due to the aforementioned constraints. For example, though body image and a drive for particular body types are distinct concepts from IWB, they are still frequently found to be correlated (Pearl & Puhl, 2018). Further, body image avoidance and drive for thinness may mediate IWB and disordered eating (Marshall et al., 2020). Arguably, noting a decrease in problematic views of one's own body or an increase in body acceptance would have certainly strengthened results for the current intervention. Still, the current intervention did demonstrate significant treatment gains among depression, eating behavior, and self-esteem as well as IWB. This was a novel intervention, and therefore, heavier consideration was needed for mechanisms of intervention (e.g., brooding or psychological flexibility).

It must also be considered that some may consider BWLPs and tools (e.g., weighing and scales) used within the current study to be stigmatizing themselves. If true, this is quite counter to the aim of the entire study. The Health at Every Size (HAES) movement has challenged conventional narratives around the growing rates of obesity within the United States, and has questioned whether weight altogether is truly a healthy focus for intervention. HAES calls attention to the harmful impact of weight stigma and IWB, and suggests that BWLPs are problematic as they are overly focused on weight as an outcome (Penney & Kirk, 2015). Alternatively, HAES argues that the sole focus should be on increased physical activity and health food intake, without emphasis or measurement using weight.

These are indeed important considerations. However, BWLPs do have established success and credibility, as outlined throughout the Introduction. Moreover, BWLPs are associated with improved health (DPP Research Group, 2002b). Though IWB is widespread and prevalent, not all people seeking weight loss or BWLP have concerning levels of IWB (Pearl et

al., 2021). Therefore, we feel it is premature to disregard stand-alone BWLPs. In fact, the current study demonstrates that adaptations can be made to reduce IWB and in a manner that is not stigmatizing. Indeed, results did suggest IWB can be lowered despite participation in a BWLP. Further, individuals with high IWB are likely to desire weight loss (Koball et al., 2018), this may be one of the most effective ways to find people with IWB and offer services and improved quality of life. It is unknown as to whether individuals with high IWB who are interested in losing weight would seek an IWB-lowering program in itself.

Still, it may be beneficial to illicit more specific feedback from patients as to whether they noted emotional reactions to the BWLP and IWB intervention. Participants did rate the program overall favorably. However, data collected in this regard was overall general, more specific treatment-specific feedback focusing on what participants found most beneficial could have directly informed future directions. This is especially considering that participants suggested they encountered more stigmatizing situations over the course of the study. While this could have been due to increased awareness around weight stigma and IWB, an alternate explanation would be that the BWLP itself did stir up some feelings of stigmatization. Thus, more minute concerns may be present that an overall program evaluation would not capture. Collecting qualitative feedback may be an important future step for this intervention. Also, utilizing an ecological momentary assessment (EMA) approach may especially be helpful in assisting participants note day to day emotional impact of participating in the program, as IWB may occur at any given time. This could help pinpoint the most stigmatizing aspects that might need to be intervened upon.

The current author does agree that weight and BMI are not an ideal measure of health, and is a more health-adjacent measure, and accordingly, that it should not be the only health-

based outcome measure or deemphasized with greater emphasis given to physical activity, diet quality, and quality of life. Sadly, more accurate measures of health such as blood pressure, cholesterol, or A1c levels were beyond reasonable to collect for this project. If possible, future implementations of this intervention should use more direct health measures.

Future Directions

As previously mentioned, future renditions of this intervention could focus on using a larger sample size, using a RCT with a BWLP only control group, increased diversity among the sample, more direct measures of health, and illicit more feedback from participants regarding the intervention. More and more, researchers are “leaving the ivory research tower” to connect more with the actual participants that interventions are trying to serve (Collins et al., 2018). If willing, participants could also serve as consultants for the project. As previously discussed, this could be crucial, as the HAES movement suggests concern over BWLP and weight stigmatization.

One piece of informal feedback expressed by participants in the current study involved self-compassion. This appeared to be a common favorite section among participants. As previously mentioned, self-compassion has gained significant attention within the context of weight loss and maintenance (Brenton-Peters et al., 2021) and IWB interventions (Palmeira, Cunha, & Pinto-Gouveia, 2017; Palmeira, Pinto-Gouveia, & Cunha, 2017; Forbes et al., 2020). Pearl et al. (2020) also included self-compassion in the Weight BIAS program, though participant reaction to self-compassion was not reported. This feedback perhaps suggests that this popular component could even be expanded upon within the current intervention, with multiple sections regarding self-compassion rather than just one.

The current study also utilized the DPP as it has been widely established as an effective BWLP. However, the DPP does include some CBT strategies that had to be adapted for the

current intervention so as not to confuse participants. A possible future direction may be to examine the current ACT-based intervention in conjunction with an ACT-based weight loss program. ACT weight loss programs (or acceptance based behavioral treatments) have been found to be effective in producing weight loss (Forman et al., 2015; Forman et al., 2009) and use the same skills within the current IWB Intervention. Emphasizing these skills throughout the entire program may be helpful for consistency and ACT skill mastery among participants.

From a public health and clinical practice perspective, it is clear that IWB is widespread and associated with a myriad of concerning, unhealthy outcomes. While more data is needed to examine the most effective and realistic approach to lowering IWB, it is recommended that BWLPs begin to consider implementing and incorporating intervention for IWB as the current study does demonstrate IWB can be lowered in conjunction with weight.

Conclusion

The current IWB Intervention was relatively successful and demonstrated improvement in terms of IWB, weight bias, depressive symptoms, self-esteem, restrained eating, emotional eating, psychological flexibility, self-compassion, mindfulness, and reduced self-judgement and overidentification, along with weight loss. To my knowledge, this is one of the first interventions combining treatment for IWB using third-wave skills (including ACT, self-compassion, and DEARMAN skill of DBT) in conjunction with a BWLP. In addition, this is the first IWB intervention implemented within a virtual format. The current study demonstrates that IWB can be reduced using third-wave skills among individuals who are specifically seeking weight loss interventions.

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Appendix A

Weight Bias Internalization Scale

Please rate the following items as they relate to yourself. Please use the following scale:

1-strongly disagree	2-disagree	3-somewhat disagree	4-neither agree nor disagree	5-somewhat agree	6-agree	7-strongly agree
------------------------	------------	------------------------	---------------------------------	---------------------	---------	---------------------

- _____ 1). As an overweight person, I feel that I am just as competent as anyone.
- _____ 2). I am less attractive than most other people because of my weight.
- _____ 3). I feel anxious about being overweight because of what people might think of me.
- _____ 4). I wish I could drastically change my weight.
- _____ 5). Whenever I think a lot about being overweight, I feel depressed.
- _____ 6). I hate myself for being overweight.
- _____ 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, as long as I'm overweight.
- _____ 9). I am OK being the weight that I am.
- _____ 10). Because I'm overweight, I don't feel like my true self.
- _____ 11). Because of my weight, I don't understand how anyone attractive would want to date me.

Appendix B

Weight Self-Stigma Questionnaire

Question	Completely Disagree			Completely Agree	
I'll always go back to being overweight.	1	2	3	4	5
I caused my weight problems.	1	2	3	4	5
I feel guilty because of my weight problems.	1	2	3	4	5
I became overweight because I am a weak person.	1	2	3	4	5
I would never have any problems with weight if I was stronger.	1	2	3	4	5
I don't have enough self-control to maintain a healthy weight.	1	2	3	4	5
I feel insecure about others' opinions of me.	1	2	3	4	5
People discriminate against me because I've had weight problems.	1	2	3	4	5
It's difficult for people who haven't had weight problems to relate to me.	1	2	3	4	5
Others will think I lack self-control because of my weight problems.	1	2	3	4	5
People think that I am to blame for my weight problems.	1	2	3	4	5
Others are ashamed to be around me because of my weight.	1	2	3	4	5

Appendix C

Brief Stigmatizing Situations Inventory

Below is a list of situations that people encounter because of their weight. Indicate whether, and how often, each of these situations happened to you. Use the scale below:

0-----1-----2-----3-----4-----5-----6-----7-----8-----9
Never Once in Several times About Several About once Several About Several Daily
your life in your life once/yr. times/yr. a month times/mo. once/wk. times/wk.

1. Being glared at or harassed by bus passengers for the amount of room you are taking up.
2. Being singled out as a child by a teacher, school nurse, etc. because of your weight.
3. Being stared at in public.
4. Children loudly making comments about your weight to others.
5. Having a doctor recommend a diet, even if you did not come in to discuss weight issues.
6. Having a romantic partner exploit you, because s/he assumed you were desperate and would put up with it.
7. Having family members feel embarrassed by you or ashamed of you.
8. Having people make assumptions about your eating habits because of your weight.
9. Not being hired because of your weight.
10. Overhearing other people making rude remarks about you in public.

Appendix D

Universal Measure of Bias (UMB-FAT).

Please answer all of the following questions, using this scale:

1	2	3	4	5	6	7
strongly agree	moderately agree	slightly agree	neither agree nor disagree	slightly disagree	moderately disagree	strongly disagree

- _____ 1. Special effort should be taken to make sure that fat people have the same rights and privileges as other people.
- _____ 2. I would be comfortable having a fat person in my group of friends.
- _____ 3. I find fat people attractive.
- _____ 4. Fat people make good romantic partners.
- _____ 5. Fat people have bad hygiene.*
- _____ 6. I find fat people to be sexy.
- _____ 7. Fat people tend towards bad behavior.*
- _____ 8. I would not want to have a fat person as a roommate.*
- _____ 9. Fat people are a turn-off.*
- _____ 10. I find fat people pleasant to look at.
- _____ 11. Special effort should be taken to make sure that fat people have the same salaries as other people.
- _____ 12. Sometimes I think that fat people are dishonest.*
- _____ 13. I try to understand the perspective of fat people.
- _____ 14. Special effort should be taken to make sure that fat people have the same educational opportunities as other people.
- _____ 15. In general, fat people don't think about the needs of other people.*
- _____ 16. Fat people are sloppy.*
- _____ 17. I like fat people.
- _____ 18. Special effort should be taken to make sure that fat people have the same housing opportunities as other people.
- _____ 19. I don't enjoy having a conversation with a fat person.*
- _____ 20. I would like having a fat person at my place of worship or community center.

*Reverse coded (so that higher scores indicate greater stigma)

Factors:

- I. Items 5,7,12,15,16 (~adverse judgment)
- II. Items 2,8,17,19,20 (~social distance)
- III. Items 3,4,6,9,10 (~attraction)
- IV. Items 1,11,13,14,18 (~equal rights)

Appendix E

Diet History Questionnaire III (DHQ III)

While you are answering the questionnaire...

This is an interactive questionnaire that is displayed in your Web browser. However, **you cannot use the browser buttons to move from one page to another**. Please do not use your browser's Back button while you are taking the questionnaire.

To complete the questionnaire...

Each question will be displayed in the main section of the screen, on the right side. The system will step you through each question. Simply click Continue to move from one question to another.

If you need to change an answer to a previous question...

As you take the questionnaire, you may review or change answers at any time. To see a previously answered question, click that question's link on the left side of the screen.

What beverages did you drink?

What fruits have you eaten?

What vegetables, potatoes, and beans did you eat?

What soups, chili, tacos, burritos, tortillas, etc. have you eaten?

What rice, pasta or pizza have you eaten?

What cereal, pancakes, and breads have you eaten?

What cold cuts, luncheon meats, and hot dogs have you eaten?

What meat, poultry, and fish have you eaten?

What eggs and meat alternatives have you eaten?

What chips, pretzels, and other snacks have you eaten?

What yogurt and cheese have you eaten?

What sweets, baked goods, or desserts have you eaten?

What spreads and dressings have you eaten?

Appendix F

Revised Morgestern Physical Activity Questionnaire (PAQ-M)

On average, how many hours per week do you spend in each of the following types of recreational activities and exercises?

[illegible]

4. Work - either work for pay, or volunteer work
If "None", SKIP TO QUESTION 5

4a. If you work for pay or as a volunteer, which one of the following categories best describes the type of physical activity required on your job? If you have more than one job, refer to one in which you spend the most time.

- ☐ Mainly sitting with slight arm or foot movements: e.g., desk work, watch repair, seated assembly-line work, taxi or bus driver
- ☐ Sitting or standing with some walking: e.g., store salesperson, clerk, cashier, bartender, patient care, lab technician, standing assembly-line work, security guard, machine operator
- ☐ Walking and light manual work: e.g., mail carrier, waiter, gardener, light construction or repair work, service installation, light farm work
- ☐ Walking and heavy manual work: e.g., stone or concrete mason, heavy farm work, lumberjack, loading/unloading trucks, moving furniture, heavy construction work

5. **Housework** e.g.,
cleaning, vacuuming,
dusting, cooking,
serving food, washing
dishes, laundry,
ironing, making beds,
washing floors or
windows

6. Home repairs and maintenance e.g., carpentry, painting, wallpapering, plumbing or electrical work, refinishing furniture, cleaning gutters or garage, washing car	☐	☐	☐	☐	☐	☐	☐	☐
7. Yardwork e.g., gardening, planting, mowing the lawn, raking, digging, chopping, wood, shoveling snow or dirt	☐	☐	☐	☐	☐	☐	☐	☐
8. Shopping and errands (excluding sitting while traveling): e.g., grocery or clothes shopping, going to the bank or store	☐	☐	☐	☐	☐	☐	☐	☐
9. Taking care of others (exclude inactive sitting): e.g., playing with children; pushing a wheelchair or stroller; lifting, carrying, bathing, or dressing persons	☐	☐	☐	☐	☐	☐	☐	☐
10. Sitting pastimes (exclude watching TV and reading): e.g., needlework, sewing, crafts, coin or stamp collecting, computer activities, playing a musical instrument, cards, or board games	☐	☐	☐	☐	☐	☐	☐	☐
11. On average, how many days per week do you accumulate 30 minutes or more of moderate or vigorous physical activity, including recreational activity, exercise, heavy work or home activity, and chores?								

_____ days per week

Appendix G

Three Factor Eating Questionnaire-R18 (TFEQ-18)

Please read each statement and select from the multiple choice options the answer that indicates the frequency with which you find yourself feeling or experiencing what is being described in the statements below.

1. When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

2. I deliberately take small helpings as a means of controlling my weight.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

3. When I feel anxious, I find myself eating.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

4. Sometimes when I start eating, I just can't seem to stop.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

5. Being with someone who is eating often makes me hungry enough to eat also.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

6. When I feel blue, I often overeat.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

7. When I see a real delicacy, I often get so hungry that I have to eat right away.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

8. I get so hungry that my stomach often seems like a bottomless pit.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

9. I am always hungry so it is hard for me to stop eating before I finish the food on my plate.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

10. When I feel lonely, I console myself by eating.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

11. I consciously hold back at meals in order not to weight gain.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

12. I do not eat some foods because they make me fat.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

13. I am always hungry enough to eat at any time.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

14. How often do you feel hungry?

Only at meal times (1)/ sometimes between meals (2)/ often between meals (3)/almost always (4)

15. How frequently do you avoid “stocking up” on tempting foods?

Almost never (1)/ seldom (2)/ moderately likely (3)/ almost always (4)

16. How likely are you to consciously eat less than you want?

Unlikely (1)/ slightly likely (2)/ moderately likely (3)/ very likely (4)

17. Do you go on eating binges though you are not hungry?

Never (1)/ rarely (2)/ sometimes (3)/ at least once a week (4)

18. On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself?

Appendix H

Depression Anxiety and Stress Scale – 21 Items (DASS-21)

DASS21

Name:

Date:

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree or a good part of time
- 3 Applied to me very much or most of the time

1 (s)	I found it hard to wind down	0	1	2	3
2 (a)	I was aware of dryness of my mouth	0	1	2	3
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4 (a)	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3
6 (s)	I tended to over-react to situations	0	1	2	3
7 (a)	I experienced trembling (e.g. in the hands)	0	1	2	3
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 (d)	I felt that I had nothing to look forward to	0	1	2	3
11 (s)	I found myself getting agitated	0	1	2	3
12 (s)	I found it difficult to relax	0	1	2	3
13 (d)	I felt down-hearted and blue	0	1	2	3
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 (a)	I felt I was close to panic	0	1	2	3
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3
17 (d)	I felt I wasn't worth much as a person	0	1	2	3
18 (s)	I felt that I was rather touchy	0	1	2	3
19 (a)	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20 (a)	I felt scared without any good reason	0	1	2	3
21 (d)	I felt that life was meaningless	0	1	2	3

Appendix I

Ruminative Response Scale - Short Form

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do.

1 almost never

2 sometimes

3 often

4 almost always

1. think "Why do I have problems other people don't have?"
2. think "Why can't I handle things better?"
3. think "Why do I always react this way?"
4. think "What am I doing to deserve this?"
5. think about a recent situation, wishing it had gone better
6. go away by yourself and think about why you feel this way
7. analyze recent events to try to understand why you are depressed
8. go someplace alone to think about your feelings
9. analyze your personality to try to understand why you are depressed

Appendix J

Rosenberg Self-Esteem Scale

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

1. On the whole, I am satisfied with myself.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

2. At times I think I am no good at all.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

3. I feel that I have a number of good qualities.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

4. I am able to do things as well as most other people.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

5. I feel I do not have much to be proud of.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

6. I certainly feel useless at times.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

7. I feel that I'm a person of worth, at least on an equal plane with others.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

8. I wish I could have more respect for myself.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

9. All in all, I am inclined to feel that I am a failure.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

10. I take a positive attitude toward myself.

Strongly Agree	Agree	Disagree	Strongly Disagree
----------------	-------	----------	-------------------

Scoring:

Items 2, 5, 6, 8, 9 are reverse scored. Give "Strongly Disagree" 1 point, "Disagree" 2 points, "Agree" 3 points, and "Strongly Agree" 4 points. Sum scores for all ten items. Keep scores on a continuous scale. Higher scores indicate higher self-esteem.

Appendix K

The Acceptance and Action Questionnaire – Second Edition (AAQ-II)

AAQ-2

Below you will find a list of statements. Please rate how true each statement is for you by selecting a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

- | | | | | | | | | |
|----|---|---|---|---|---|---|---|---|
| 1. | My painful experiences and memories make it difficult for me to live a life that I would value. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. | I'm afraid of my feelings. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. | I worry about not being able to control my worries and feelings. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. | My painful memories prevent me from having a fulfilling life. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. | Emotions cause problems in my life. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. | It seems like most people are handling their lives better than I am. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. | Worries get in the way of my success. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Appendix L

The Self-Compassion Scale – Short Form (SCS-SF)

1. When I fail at something important to me I become consumed by feelings of inadequacy.
2. I try to be understanding and patient towards those aspects of my personality I don't like.
3. When something painful happens I try to take a balanced view of the situation.
4. When I'm feeling down, I tend to feel like most other people are probably happier than I am.
5. I try to see my failings as part of the human condition.
6. When I'm going through a very hard time, I give myself the caring and tenderness I need.
7. When something upsets me I try to keep my emotions in balance.
8. When I fail at something that's important to me, I tend to feel alone in my failure.
9. When I'm feeling down I tend to obsess and fixate on everything that's wrong.
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
11. I'm disapproving and judgmental about my own flaws and inadequacies.
12. I'm intolerant and impatient towards those aspects of my personality I don't like.

Appendix M

The Satisfaction With Therapy and Therapist Scale—Revised (STTS–R)

Please circle the number that best describes your opinion of your satisfaction with the therapy and therapists in the group CBT treatment attended/completed by you recently.

Strongly agree	Disagree	Neutral	Agree	Strongly agree		
1	2	3	4	5		
1. I am satisfied with the quality of the therapy I received		1	2	3	4	5
2. The therapist listened to what I was trying to get across		1	2	3	4	5
3. My needs were met by the program		1	2	3	4	5
4. The therapist provided an adequate explanation regarding my therapy		1	2	3	4	5
5. I would recommend the program to a friend		1	2	3	4	5
6. The therapist was not negative or critical towards me		1	2	3	4	5
7. I would return to the clinic if I needed help		1	2	3	4	5
8. The therapist was friendly and warm towards me		1	2	3	4	5
9. I am now able to deal more effectively with my problems		1	2	3	4	5
10. I felt free to express myself		1	2	3	4	5
11. I was able to focus on what was of real concern to me		1	2	3	4	5
12. The therapist seemed to understand what I was thinking and feeling		1	2	3	4	5
<i>Outcome Variable:</i>						
		Made things a lot better	1			
		Made things somewhat better	2			
13. How much did this treatment help with the specific problem that led you to therapy?		Made no difference	3			
		Made things somewhat worse	4			
		Made things a lot worse	5			

Scoring Key

Sum the scores of all even number items to obtain the patient's level of Satisfaction With Therapy (ST).

Sum the scores of all odd number items (excluding Item 13) to obtain the patient's level of Satisfaction With Therapist (SWT). The higher the score, the greater the level of patient satisfaction.

Item 13 is a patient-rated measure of global improvement.

Appendix N



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Notification of Exempt Certification

From: Social/Behavioral IRB
To: [Julia Caroline Miller](#)
CC: [Robert Carels](#)
Date: 8/11/2022
Re: [UMCIRB 22-001438](#)
Virtual Third-Wave Intervention for Internalized Weight Bias Combined with a Weight Loss Program

I am pleased to inform you that your research submission has been certified as exempt on 8/11/2022. This study is eligible for Exempt Certification under category # 2c.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

Document	Description
Demographics.docx(0.01)	Surveys and Questionnaires
Informed Consent Dissertation.doc(0.02)	Consent Forms
Measures List.docx(0.01)	Surveys and Questionnaires
Miller Dissertation Proposal(0.01)	Study Protocol or Grant Application
OPTS.pdf(0.01)	Surveys and Questionnaires
Phone and Email Screener.docx(0.03)	Recruitment Documents/Scripts
Recruitment Advertisement1 (1).ppt(0.02)	Recruitment Documents/Scripts
Recruitment%20Flyer2.ppt(0.02)	Recruitment Documents/Scripts

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

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