

5-4-2017

Influence of Experienced and Internalized Weight Stigma and Coping on Weight Loss Outcomes among Adults

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Influence of Experienced and Internalized Weight Stigma and Coping on Weight Loss Outcomes among Adults

Erin Mary Lenz, Ph.D.
University of Connecticut, 2017

Individuals with overweight and obesity are highly stigmatized and face multiple forms of discrimination because of their weight, which leads to both psychological and physical health costs to the individual, above and beyond the effects of excessive weight itself. Developing a greater understanding of the mechanisms that may serve to interrupt or exacerbate the cycle of weight stigma and obesity is warranted. The current study sought to examine the influence of experienced spousal weight stigma (SWS), internalized weight stigma, and coping strategies used in response to SWS on longitudinal weight loss, and determine if internalized weight stigma and/or coping strategies used in response to SWS mediate the relationship between experienced SWS and percent weight loss. The primary study, from which the current study was conducted, required participants to be living with a romantic partner, both of whom had to be of at least overweight status. Participants (N=128) had their height and weight objectively measured at baseline and follow-up 6-months later; they also completed demographic and weight stigma and coping questionnaires at baseline. Overall, 89% of participants endorsed experiencing SWS. Baseline measures of experienced SWS, internalized weight stigma, and maladaptive coping with SWS significantly contributed to the variance in percent weight loss. The mediation model explained 29% of the variance in percent weight loss; both internalized weight stigma and engaging in maladaptive coping strategies in response to SWS were significant mediators of the relationship between experienced SWS and percent weight loss. These findings support the importance of assessing and addressing these variables in the design and implementation of

Erin Mary Lenz
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future weight loss interventions. Including these variables as potential predictors and/or mediators of initial and sustained weight loss success may increase the variance accounted for by treatment studies, thus clarifying our understanding of the critical mechanisms of influence on weight outcomes and informing potential targets for clinical intervention.

**Influence of Experienced and Internalized Weight Stigma and Coping on Weight Loss
Outcomes among Adults**

Erin Mary Lenz

B.A., University of Connecticut, 2009

M.A., University of Connecticut, 2013

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

2017

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Erin Mary Lenz

2017

APPROVAL PAGE

Doctor of Philosophy Dissertation

Influence of Experienced and Internalized Weight Stigma and Coping on Weight Loss Outcomes
among Adults

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Acknowledgements

It is hard to believe my time at UConn is (finally) coming to an end after 12 years. While there is no way I could express my gratitude to all of the people who impacted my life here, I would like to thank the individuals who played the most significant roles in my graduate career. To my major advisor, Dr. Amy Gorin, where do I begin? Without a doubt, you are the single most influential and inspiring mentor of my life; I am forever indebted to you. I fail to find the words to accurately convey my appreciation for your guidance, support, and encouragement over the last 10 years. Thank you for challenging me to grow in ways I never thought possible. I look forward to a lifetime of collaborating with you—you are stuck with me now! To my associate advisor, Dr. Dean Cruess, thank you for helping foster my growth as a clinical health psychologist over the last six years. You are a wonderful research and clinical supervisor; I am so grateful that I had the opportunity to work with you in both of those settings while at UConn. To Dr. Rebecca Puhl, my associate advisor, I feel incredibly fortunate to have worked with you on my dissertation project—your passion is contagious. Thank you for providing such insightful and thoughtful feedback throughout this process and sharing your expertise with me! To Dr. Diane Quinn, thank you for your support and for being such an engaging professor—taking your graduate course was hugely influential in the conceptualization and design of this study. Lastly, to Dr. Jeffrey Fisher, I am forever grateful for your unwavering support, not only professionally, but also personally. So much has changed since my first day as your RA in 2009, yet you have remained a constant source of inspiration and encouragement through it all—thank you.

Outside of my dissertation committee, I want to thank all of the faculty and staff in the psychological sciences department, my wonderful colleagues in the clinical program, my super supportive lab-mates from the Weight Management Lab, and my fellow Well-Represented Aspiring Psychologists (who are no longer In Training...we did it!). I was fortunate enough to

work with amazing teams of research assistants, without whom many research projects (including this dissertation) would be incomplete—thank you all! I do want to extend a special shout out to five research assistants in particular: Jennifer Selensky, Ashley Raynock, Melissa Windover, Kelly Romano, and Melanie Klinck. Your dedication, organization, and motivation truly made the difference between the success and failure of the projects you worked on. I am so proud of each of you for pursuing your dreams—you will forever be my RA rockstars.

To my family...Mom, Dad, Shannon, and Jamie, thank you for your unconditional love and support, not only in graduate school, but throughout my life. I could say I do not know where I would be without you guys, but I am pretty sure I would not have gone into psychology (*just kidding...*). But in all seriousness, thank you for everything—for encouraging me through my failures and celebrating my successes; for always being there when I needed to vent, or cry, or both; and perhaps most importantly, for believing in me, no matter what. I could not have gotten through the trials and tribulations of graduate school (or life, for that matter) without you. Thank you for all that you have done and continue to do for me. I love you all so very much.

And finally, to my best friend and partner-in-crime, Mike. Twelve years ago, when we first met in the NW dining hall, I never would have imagined that life would find a way to bring us back together. While difficult to appreciate then, I am grateful for all of the twists & turns that led me (back) to my soulmate. Thank you for always motivating me to be the best version of myself; for being there for me through the good, the bad, & the worst—even when I ‘decided’ to move 1000 miles away; for encouraging me to put myself and my career first; and for loving and supporting me always. There is no one I would rather have by my side, as I achieve the greatest accomplishment of my life (at *our* alma mater!), than you. I absolutely cannot wait for a lifetime of love, laughter, and adventure with you... you never cease to amaze me, babe. I love you *most*.

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Chapter 1

Introduction and Background

In the United States, almost 70% of adults over the age of 20 are overweight (body mass index (BMI) of ≥ 25 kg/m²); perhaps more striking is that obesity (BMI ≥ 30 kg/m²) levels among adults have now reached 35.9% (Ogden, Carroll, Kit, & Flegal, 2014). There are numerous medical consequences associated with obesity, as it is a risk factor for a variety of chronic conditions including diabetes, hypertension, high cholesterol, stroke, heart disease, certain cancers, sleep apnea, metabolic syndrome, reproductive issues, and arthritis (NHLBI, 2014; Malnick & Knobler, 2006). Higher grades of obesity are associated with excess mortality, primarily from cardiovascular disease, diabetes, and certain cancers (i.e., Sutin, Stephan, & Terracciano, 2015; Flegal, Kit, Orpana, & Graubard, 2013; Flegal, Graubard, Williamson, & Gail, 2007). Not surprisingly, estimates of the impact of obesity on United States health care costs are substantial, ranging from \$147—168 billion dollars per year, and on an individual level, Cawley and Meyerhoefer (2012) reported that obesity raises annual medical costs by \$2741 (in 2005 dollars). Modest weight loss reduces the risks associated with obesity-related disorders and diseases (i.e. Look AHEAD Research Group, 2010; Diabetes Prevention Program Research Group, 2009; Gorin, Wing, Jakicic, Jeffery, West et al., 2008; Vogels, Diepvens, & Westerterp-Plantenga, 2005), therefore, successful prevention and treatment of obesity is likely to result in lower incidences of these diseases and lower health-care costs (Bogers et al., 2010).

The costs of obesity are not only financial; there is mounting evidence of the psychological and social costs of excess weight at the individual, group, and systematic level—Clearly, the design and implementation of successful treatments to combat the obesity epidemic

is of critical importance. However, there remains considerable variability throughout the obesity literature regarding treatment response, with some individuals able to achieve and maintain weight losses and others showing no weight loss or even weight gain. Understanding who is likely to respond to weight loss treatment has the potential to tailor programming in such a way that maximizes treatment response. Much of the existing literature has focused on demographic (i.e., gender, ethnicity, SES, weight history), psychosocial (i.e., depression, perfectionism), and eating and exercise behaviors (e.g., Johnston, 2012; Stubbs et al., 2011; Teixeira, Going, Sardinha, & Lohman, 2005) as predictors of weight loss success with mixed findings. Most studies of pretreatment predictors have only been able to account for 20-30% of the variance in their samples, according to a comprehensive review by Stubbs and colleagues (2011).

Perhaps the reason that consistent pretreatment predictors of weight loss success have not been identified is because important variables have been neglected. Individuals with overweight and obesity are highly stigmatized because of their weight, and subsequent discrimination leads to both psychological and physical health costs to the individual, above and beyond the effects of excessive weight itself (i.e., Puhl, Quinn, Weisz, & Suh, 2017; Pearl, Wadden, Hopkins, Shaw, Hayes, Bakizada...Alamuddin, 2017; O'Brien, Latner, Puhl, Vartanian, Giles, Griva... Carter, 2016; Tomiyama, 2014; Gudzone, Bennett, Cooper, & Bleich, 2014; Roehling, Roehling, & Wagstaff, 2013; Sutin & Terracciano, 2013; Jackson, Beeken & Wardle, 2014; Puhl & Heuer, 2009; Puhl, Moss-Racusin, Schwartz, & Brownell, 2008; Brownell, Puhl, Schwartz, & Rudd, 2005; Puhl & Brownell, 2001). There is growing evidence that experiencing and internalizing weight stigma and discrimination leads to weight gain and difficulty with weight loss. As such, examining these constructs as potential pretreatment predictors of weight loss success, and

developing a greater understanding of the mechanisms that may serve to interrupt or exacerbate this cycle, is warranted.

Weight stigma is defined as negative attitudes towards individuals because of their excess body weight that affects interpersonal interaction at various levels (i.e., Pearl, Puhl, & Dovidio, 2015; Puhl & Heuer, 2009; Boyes, 2009). The literature has overwhelmingly demonstrated that stereotypes associated with excess weight go unchallenged by society, leading to stigmatization, rejection, prejudice, and pervasive discrimination towards individuals with overweight or obesity (i.e., Phelan, et al., 2015; Latner, Barile, Durso, & O'Brien, 2014; Puhl & Heuer, 2009; Puhl & Brownell, 2003). Internalized weight stigma is the extent to which individuals judge themselves negatively due to their weight and personally ascribe to stereotypical beliefs about persons with overweight and obesity. Interestingly, despite overweight and obesity becoming the norm, prevalence of weight-based discrimination (i.e., verbal, physical, relational, online) or experienced weight stigma, has increased substantially in the United States and abroad. The literature consistently reports at least a 66% increase over the past decade (i.e., Jackson, Beeken, & Wardle, 2014; Gudzone, Bennett, Cooper, & Bleich, 2014; Sutin & Terracciano, 2013; Andreyeva, Puhl, & Brownell, 2008; Carr & Friedman, 2005), and is comparable to rates of racial discrimination, especially among women (i.e., Puhl, Andreyeva, & Brownell, 2008). An examination of trends in rates of reported discrimination among adults found that ~12% of women reported discrimination based on weight compared to ~11% of women reporting discrimination based on their race; as a comparison, men reported weight-based discrimination at much lower levels than women (7% vs 12%) (Andreyeva et al., 2008).

There continues to be substantial evidence of weight stigma in the media, employment, education, health care, and most relevant for the current study, within interpersonal relationships

(i.e., Puhl & Heuer, 2009; Carels, Young, Coit, Harper, Gumble, Wagner et al., 2009; Puhl & Brownell, 2006; Carr & Friedman, 2005). Perhaps surprisingly, a consistent finding that has emerged from this research is that family members are among the most common sources of weight stigma reported by individuals with overweight or obesity, particularly among women (i.e., Puhl & Brownell, 2006; Ball, Crawford, & Kenardy, 2004). In one study of women with obesity, 72% reported being stigmatized about their weight from their spouses (Puhl & Brownell, 2006). It is easy to imagine that experiencing weight stigma from one's own romantic partner may be more harmful and hurtful than from an acquaintance or stranger, given the deeply personal nature of the relationship (i.e., Puhl et al., 2008; Puhl et al., 2007). Studies examining spousal weight bias from family, friends, and potential romantic partners have demonstrated that individuals with overweight and obesity are less likely to be seen or desired as prospective romantic partners, and this is particularly true for women (i.e., Boyes, 2009; Smith, Schmoll, Konik, & Oberlander, 2007; Puhl & Brownell, 2006; Carr & Friedman, 2005; Chen & Brown, 2005). To date, however, most studies have focused on the consequences of weight bias on dating and romantic relationship outcomes. Given the frequency with which interpersonal weight stigma is endorsed, more work is needed to understand the potential influence of experienced weight stigma beyond relationship outcomes.

The influence of experienced spousal weight stigma on health-related outcomes, such as weight loss success, has yet to be examined either prospectively or retrospectively among treatment-seeking adults in romantic relationships. Specifically, what has not yet been established is how the experience of weight stigma from one's romantic partner, internalized weight stigma, and coping with spousal weight stigma may influence longitudinal weight loss success among treatment-seeking adults, or how the relationship between experienced spousal

weight stigma and weight loss may be mediated by internalized weight stigma and/or how individuals cope with spousal weight stigma. This line of investigation will answer questions such as, if there are a high percentage of individuals who endorse weight stigma within their relationship, how does this impact the success of weight loss interventions? Or, how might this differ if the individual who is actively trying to lose weight has internalized weight bias and/or potentially maladaptive ways of coping with spousal weight stigma?

This dissertation aims to partially fill this gap by conducting a thorough exploration of the nature and influence of experienced spousal weight stigma, internalized weight stigma, and how individuals cope with spousal weight stigma on weight loss outcomes among treatment-seeking adults in romantic relationships. The primary aims of the current study were to examine the influence of experienced spousal weight stigma (SWS), internalized weight stigma, and coping strategies used in response to SWS on longitudinal weight loss outcomes, and determine if internalized weight stigma and/or coping strategies used in response to SWS mediate the relationship between experienced SWS and percent weight loss. These variables have not been collectively examined and represent a novel and important area of study. To accomplish this goal, Chapter 2 will review the relevant literature, theoretical considerations, and describe the study's conceptual model. Chapter 3 will present the study's purpose and research questions, and Chapter 4 will describe the study's methodology and data analytic plan. Finally, Chapter 5 will describe the results of the study, and Chapter 6 will discuss the results in the context of the current weight stigma and broader stigma and coping literatures, the study limitations, and important future research and clinical directions.

Chapter 2

Review of the Literature

Defining Stigma and Weight Stigma

The detrimental impact of stigma and bias on a myriad of physical and mental health outcomes has been well established (i.e., Puhl et al., 2017; Pearl et al., 2017; Phelan, Burgess, Yeazel, Hellerstedt, Griffin, & van Ryn, 2015; Latner, Barile, Durso, & O'Brien, 2014; Earnshaw & Quinn, 2012; Puhl & Heuer, 2009; Puhl & Brownell, 2003). Much of our current understanding of stigma and continued work in this area can be attributed to the seminal work of Goffman (1963), who defined stigma as “any personal attribute that is ‘deeply discrediting’ to its possessors; these attributes include ‘tribal stigmata,’ ‘abominations of the body,’ and ‘blemishes of individual character.’ The latter two criteria of Goffman’s definition appears to capture the stigma experienced by individuals with overweight and obesity (i.e., DeJong, 1980), wherein an individual’s weight status and the negative attributions associated with overweight and obesity lead to experiences of weight stigma and bias. Weight bias is defined as negative attitudes towards individuals because of their excess body weight which affects interpersonal interaction at various levels (i.e., Phelan, Burgess, Yeazel, Hellerstedt, Griffin, & van Ryn, 2015; Puhl & Heuer, 2009; Boyes, 2009; Durso & Latner, 2008).

It has been established that weight stigma is present across social contexts that adversely affect multiple domains of life for individuals with overweight and obesity; this may include being overlooked for employment or job advancement, being viewed unfavorably for housing or educational opportunities, or being treated differently by medical staff (i.e., Diedrichs & Puhl, 2016; King, 2016; Roehling, Roehling, & Wagstaff, 2013; Puhl & Heuer, 2009). This is particularly troubling, in light of the substantial evidence to suggest this discrimination is based on widely accepted negative stereotypes about individuals with overweight and obesity, and

assumptions regarding their motivation, worthiness, intelligence, and other potential physical and psychological health deficits based purely on their weight status alone (i.e., Pearl et al., 2017; Puhl, Latner, Luedicke, Danielsdottir & Foran, 2015; Puhl & Heuer, 2009).

Internalized Weight Stigma

Existing theories of stigma posit that individuals affected by stigmatized conditions (i.e., HIV+ status; visual or hearing impaired) tend to report in-group favoritism, or endorse empathy or commonality among others with similar conditions (i.e. Tomiyama, 2014; Kinsler, Wong, Sayles, Davis & Cunningham, 2007; Crocker & Major, 1989); however, research has suggested that this phenomenon is not consistently observed among individuals with overweight and obesity. Rather, an out-group bias has been demonstrated such that individuals with overweight and obesity tend to hold negative attitudes towards other overweight individuals (i.e., Carels, Burmesiter, Oehlhof, Hinman, LeRoy & Ashrafloun, 2013; Puhl, Moss-Racusin, Schwartz, & Brownell, 2008; Schwartz, Vartanian, Nosek, & Brownell, 2006; Wang, Brownell, & Wadden, 2004; Harris, Waschull, & Walters, 1990). Internalized weight stigma, or holding negative attitudes and stereotypes towards individuals with overweight and obesity including towards oneself, has been associated with decreases in overall health and well-being (i.e., Douglas & Varnado-Sullivan, 2016; O'Brien et al., 2016; Pearl & Puhl, 2016; Pearl, Puhl, & Dovidio, 2015; Ratcliffe & Ellison, 2015; Pearl, White, & Grilo, 2014; Latner, Durso, & Mond, 2013; Durso, Latner, & Hayashi, 2012). Ascribing to these beliefs may hinder an individual's interest, motivation, or commitment to make healthy lifestyle changes or engage in weight loss treatment as a result.

Research conducted to date has only found a modest, albeit significant, relationship between experiencing weight stigma and internalizing weight stigma (i.e., Pearl & Dovidio,

2015; Ratcliffe & Ellison, 2015; Pearl et al., 2014), that is, someone can report experiencing weight stigma but not endorse internalized weight stigma. Conversely, some people may experience weight stigma but only experience adverse health outcomes from internalized stigma and not experienced stigma. Ratcliffe and Ellison (2015) suggest that experiencing weight stigma leads to the internalization of weight stigma as an individual perceives his or herself as an individual with obesity—this perception is associated with emotional and behavioral consequences that maintain obesity and continued experiences of weight stigma as a result. Thus, to identify key contributors to the cyclic nature of weight stigma and obesity, it is critical to assess both experienced and internalized weight stigma, how experienced stigma may contribute to the internalization of weight stigma, and how individuals are coping with weight stigma, particularly in absence of positive group identity.

Influence of Experienced and Internalized Weight Stigma on Health Outcomes

Of concern, research demonstrates a range of consequences of weight stigma on psychological functioning and health behaviors for individuals with overweight and obesity. Considerable evidence indicates that experienced and internalized weight stigma may contribute to psychological distress (i.e., Papadopoulos & Brennan, 2015; Pearl & Dovidio, 2014; Hilbert, Pike, Goldschmidt, Wifley, Fairburn, Dohm, et al., 2014; Major, Eliezer, & Riech, 2012; Almeida, Savoy, & Boxer, 2011; Puhl & Brownell, 2006; Quinn & Crocker, 1999), depression (i.e., Fattich & Chen 2012; Stunkard, Faith, & Allison, 2003), poor self-esteem (i.e., Jackson, Grilo, & Masheb, 2000), and body image dissatisfaction (i.e., Pearl & Puhl, 2016; Pearl & Puhl, 2014; Rosenberger, Henderson, & Grilo, 2006). Research also indicates that individuals who experience weight stigma are at risk for engaging in adverse physical health behaviors, including binge-eating (i.e., Vartanian & Porter, 2016; Durso, Latner, & Hayashi, 2012; Almeida, Savoy,

& Boxer, 2011) increased food consumption (i.e., Major, Hunger, Bunyan, & Miller, 2014; Schvey, Puhl, & Brownell, 2011), and avoidance of physical activity (i.e., Pearl et al., 2017; Pearl, Puhl, & Dovidio, 2016; Vartanian & Novak, 2010), and increased risk of mortality (Sutin, Stephan, & Terracciano, 2015).

In line with this evidence, recent studies suggest that experienced weight stigma may contribute to weight gain and obesity (i.e., Tomiyama, 2014; Jackson, Beeken & Wardle, 2014; Sutin & Terracciano, 2013). Sutin and Terracciano (2013) recruited participants via the nationally representative Health and Retirement Study, a longitudinal study of Americans aged 50 and older, to test whether weight discrimination was associated with risk of becoming obese or staying obese at follow-up; follow-up assessments were conducted four years later. Researchers found that participants who experienced weight discrimination were two and a half times more likely to become obese at follow-up, and those who were obese at baseline were three times more likely to remain obese at follow-up. Another study investigated the association between perceived weight discrimination and changes in weight, weight status, and waist circumference (Jackson, Beeken, and Wardle, 2014). This study found that perceived weight discrimination was associated with relative increases in weight and waist circumference. Similar to the Sutin and Terracciano study findings, this study also found a significant association between weight discrimination and the odds of becoming obese over the follow-up period; however, they did not find an association between weight discrimination and remaining obese over time. Lastly, after a thorough review of the existing weight stigma literature, Tomiyama proposed the COBWEBS model (2014) to describe how experiencing weight stigma (defined as a stressor) leads to weight gain and/or difficulty with weight loss due to increased eating behavior and cortisol secretion. This model provides further support for the association between

weight stigma and obesity and highlights the importance of examining potential predictors and mediators of this relationship.

Despite this evidence and the implications that both experienced and internalized weight stigma may interfere with efforts to lose weight, few studies have examined the relationship between experienced or internalized weight stigma, weight loss behaviors, and weight loss outcomes. One study examining implicit weight bias and weight loss found no significant association between these variables, although greater post-treatment stereotype consistent stigma was associated with greater percent weight loss (Carels, Hinman, Hoffman, Burmeister, Borushok, Marx, & Ashrafioun, 2014). Another study examined similar variables and found that overt weight stigma (i.e., experiencing negative comments or stigmatizing attitudes from others due to overweight or obese weight status) was significantly associated with poorer weight loss treatment outcomes after 14-weeks, suggesting that experienced weight stigma may be detrimental to overweight and obese individuals' ability to lose weight (Wott & Carels, 2010). A recent cross-sectional study conducted by Gudzone and colleagues (2014) assessed the influence of perceived weight judgment from one's primary care provider (PCP) on weight loss attempts and weight loss success (defined as $\geq 10\%$) over the last 12 months. 21% of respondents (n=600) reported perceived judgment from their PCP about their weight; among patients who endorsed that their PCP discussed weight loss, 20.1% achieved $\geq 10\%$ weight loss if they did not perceive judgment by their PCP as compared to 13.5% who perceived judgment.

Lastly, Puhl and colleagues (2017) recently examined the influence of internalized and experienced weight stigma on weight loss maintenance and weight regain in a large sample of US adults. Internalized weight stigma was found to be a significant predictor of weight-loss maintenance—the odds of maintaining weight loss decreased by 28% for every one unit increase

in internalized weight stigma. Although the current study focused on weight loss (and not weight maintenance), the study by Puhl and colleagues provides new evidence of the detrimental and long-lasting impact of weight stigma on weight outcomes and highlights the need to clarify the implications of weight stigma for weight loss. Research in this area is sparse, but critically important to examine in the context of weight loss, given its demonstrated links with eating and exercise behaviors that impair or hinder weight-related health. Notably, even though weight stigma often endorsed from family members and romantic partners, no existing study has examined the impact of spousal weight stigma on obesity or weight loss outcomes.

Coping with Weight Stigma

Despite the significant evidence of the deleterious effects of weight stigma, the literature base regarding how individuals are coping with weight stigma and weight stigma is relatively limited (i.e., Tomiyama, 2014; Major, Hunger, Bunyan, & Miller, 2014; Fettich & Chen, 2012; Koball & Carels, 2011; Puhl & Brownell, 2006; Myers & Rosen, 1999). Of the research conducted, there are mixed findings regarding the utility and benefit of behavioral (i.e., dieting) and psychological (i.e., seeking social support) coping efforts in response to weight stigma. Myers and Rosen (1999) found that the most frequent coping responses employed by individuals with obesity were the use of positive self-statements, attempts to ignore negative remarks from critical others, and using faith, religion and prayer for self-consolation. Perhaps surprisingly, they found that more coping attempts were associated with more adverse mental health symptoms and more negative body image. However, the relationship between coping and psychological distress was not significant after controlling for frequency of stigmatizing situations. Myers and Rosen concluded that the relationship between coping and psychological distress, then, is a function of experiencing stigma versus the type or amount of coping endorsed.

One study that looked at specific coping strategies related to weight stigma found that 79% of women coped with experiences of weight stigma by turning to food (Puhl & Brownell, 2006). Another study found that when women who perceive themselves as overweight were exposed to weight-stigmatizing news articles, they were less able to control their eating afterwards than women who do not perceive themselves that way (Major et al., 2014). The utilization of food as a temporary coping mechanism is concerning, given the implications for weight gain and/or lack of success with weight loss. It follows that how weight stigma influences health-related behaviors and weight loss outcomes may be affected by how individuals are coping with these stigmatizing experiences. For example, does endorsement of positive (health-promoting) coping strategies (i.e., positive self-talk) related to spousal weight stigma serve as a protective factor compared to maladaptive (or health-harming) strategies (i.e., turning to food) that may interfere with weight loss efforts? Given that weight stigma is often reported from spousal sources, developing a greater understanding how coping responses to spousal weight stigma affect the relationship between experienced and internalized weight stigma and longitudinal weight loss outcomes is an important gap in the field that needs to be addressed.

Addressing Key Research Gaps

While initial evidence of the physical and psychological impact of weight stigma has been documented, clear conclusions cannot yet be established regarding the influence of experienced weight stigma on longitudinal weight loss outcomes among treatment-seeking adults with overweight and obesity. Further, internalized weight stigma and how individuals cope with spousal weight stigma have yet to be examined as potential mediators of weight loss outcomes. Moreover, the environmental context is recognized as a key determinant of behavior in

ecological and behavioral models of weight control (i.e., Tomiyama, 2014; Gorin et al., 2011), so exploring factors that could be manipulated within the individual (i.e., internalized weight stigma) and their surrounding interpersonal environment (i.e., addressing spousal weight stigma) to influence long term weight loss success is an appropriate and necessary direction of study. Thus, weight stigma and/or how individuals cope with spousal weight stigma may be key factors impacting initial weight loss success and maintenance among treatment-seeking adults. Given the pervasive impact of weight stigma on various health outcomes and general well-being, one might hypothesize that perceived or actual weight stigma between romantic partners may create a cycle of engagement in unhealthy behaviors as a response to a non-supportive, judgmental home environment. The current study provides a longitudinal context to evaluate this possibility among treatment-seeking adults with overweight and obesity in romantic relationships.

Chapter 3

Current Study

It follows that a prospective investigation of the influence of experienced spousal weight stigma, internalized weight stigma, and coping strategies utilized in response to spousal weight stigma on weight loss outcomes among married adults has the potential to inform future prevention and intervention efforts. This direction of study has implications that are relevant for both research and clinical intervention for individuals with overweight and obesity and the interventionists who develop and implement weight management programs. There is the potential to change, add, or strengthen certain aspects of existing weight loss programs for individuals who endorse and/or experience weight stigma that may increase the likelihood of his or her success in a tailored program and identify group(s) for which other programs or focus are needed (i.e., Pearl et al., 2017; Puhl et al., 2017; Carels et al., 2014; Tomiyama, 2014; Puhl & Heuer, 2009). The current study was designed to answer the following questions:

- 1) Does pretreatment endorsement of experienced spousal weight stigma, internalized weight stigma, and/or coping strategies utilized in response to spousal weight stigma significantly predict longitudinal weight loss success among married adults?
- 2) How does internalized weight stigma mediate the relationship between experienced spousal weight stigma and weight loss outcomes?
- 3) How do coping strategies associated with spousal weight stigma (i.e., positive and maladaptive) mediate the relationship between experienced spousal weight stigma and weight loss outcomes?

The hypotheses associated with research question 1 were:

(Hypothesis 1a) individuals who experienced spousal weight stigma would demonstrate

less weight loss over time than individuals who have not experienced spousal weight stigma;

(Hypothesis 1b) individuals who endorsed internalized weight stigma would demonstrate less weight loss over time than individuals who did not endorse internalized weight stigma;

(Hypothesis 1c) individuals who reported engaging in maladaptive coping strategies in response to experienced spousal weight stigma would demonstrate less weight loss over time than individuals who did not; and,

(Hypothesis 1d) individuals who reported engaging in positive coping strategies in response to experienced spousal weight stigma would demonstrate greater weight loss over time than individuals who did not.

The hypothesis associated with research question 2 was:

(Hypothesis 2a) internalized weight stigma would mediate the relationship between experienced spousal weight stigma and percent weight loss, such that individuals who endorsed internalized weight stigma would demonstrate less weight loss over time, than individuals who did not.

The hypotheses associated with research question 3 were:

(Hypothesis 3b) endorsement of maladaptive coping strategies in response to spousal weight stigma would mediate the relationship between experienced spousal weight stigma and percent weight loss, in that individuals who endorsed maladaptive coping strategies would demonstrate less weight loss over time, than individuals who did not; and,

(Hypothesis 3c) endorsement of maladaptive coping strategies in response to spousal weight stigma would mediate the relationship between experienced spousal weight stigma and percent weight loss, in that individuals who endorsed maladaptive coping strategies would demonstrate less weight loss over time, than individuals who did not.

To answer the above research questions, study participants completed multiple measures of weight stigma to assess whether they had experienced spousal weight stigma, if they had internalized weight stigma, and what kinds of strategies (i.e., positive or maladaptive) they used to cope with experiences of spousal weight stigma.

Chapter 4

Methods

Primary Study Snapshot.

The current study was a sub-study of a larger randomized controlled trial conducted at UConn (Gorin, PI) that investigated whether Weight Watchers impacted the weights and energy balance behaviors (i.e., diet and physical activity) of untreated spouses and children in the home. One hundred and thirty married couples (and any children living in the home) were randomized to receive either 6-months of access to Weight Watchers (in-person meetings and online support; WW) or 6-months of guided self-help (written dietary and exercise guidelines and a list of local resources that might support weight management; SG). Only the primary participant (included in the current study sample) in each couple or family received access to Weight Watchers, all others in the family were untreated. The specific aims of the study were: (1) Does Weight Watchers have a ripple effect on a) the weights of untreated family members b) dietary intake and physical activity in untreated family members? (2) Are any changes in weight and energy balance behaviors in untreated family members a) moderated by type of Weight Watchers usage (clinic or online), demographic variables (e.g., gender, initial BMI status), and marital/family connectedness; and b) mediated by changes in the home food and support environment? (3) Are changes in weight and energy balance behaviors correlated among family members?

Participants.

For the present study, 130 couples were recruited from the greater Storrs, CT community using advertisements seeking individuals with overweight and/or obesity who were interested in receiving free weight loss treatment. Participants were excluded from the study if they: were not

married or living with a significant other; if their spouse or significant other had a BMI < 25 kg/m²; if they were currently in a weight loss program, dieting, or taking medications that may affect weight; participated in a weight loss program in the past year; lost \geq 5% of their body weight in the past 6-months; were planning to or had undergone weight loss surgery; had any orthopedic limitations or contraindications to physical activity; were pregnant, lactating, were less than 6-months postpartum, or were planning to become pregnant in the next year; reported uncontrolled hypertension, history of coronary heart disease, stroke, or peripheral arterial disease; reported chronic gastrointestinal disease; endorsed having hepatitis B or C, cirrhosis, or HIV; had a history of cancer within the past 5 years; or reported a significant psychiatric illness that may have interfered with completion of the study. Individuals who had diabetes or other significant medical conditions were required to obtain written consent from their physician to participate in the study to ensure their safety in this unsupervised program.

Procedure.

The Institutional Review Board at the University of Connecticut approved the primary study and the present study was approved as an amendment to the primary study protocol. The study was conducted at the University of Connecticut Storrs campus at the Institute for Collaboration on Health, Intervention, and Policy (InCHIP).

Screening, informed consent, and randomization.

Participants were recruited through newspaper advertisements (i.e., Journal Inquirer), internet (i.e., Craigslist, Weight Management Lab website) and local listserv postings (e.g., UConn Daily Digest), letters to area physicians, and a direct postal mailing campaign. Advertisements sought adults 25 years and older who were interested in receiving free weight loss treatment and had a body mass index (BMI) between 27-39.9 kg/m². Individuals who

responded to the advertisement were screened for eligibility by phone. If the participant became ineligible at any point during the telephone screen, no additional information was gathered and the screening process was ended. However, de-identified aggregate data was retained from ineligible participants for inclusion in primary study analyses.

Once trained by the Project Coordinator, research assistants screened potentially eligible participants on the phone and provided a brief overview of the study. If the individual was interested in participating, they were invited with their spouse to attend an introductory session at the clinic to learn about the study in detail, provide informed consent, and complete the baseline assessment. Once the couple completed the baseline visit (described below), the participant was randomized to either Weight Watchers (WW) or the self-guided (SG) condition using a covariate adaptive randomization strategy (Taves, 1974) that accounted for gender and initial BMI status [(overweight (BMI=27.0-29.9 kg/m²) vs. obese (BMI=30.0-39.9 kg/m²)]. Covariate adaptive randomization has been recommended by many researchers as a valid alternative randomization method for clinical trials; this method allows for the examination of previous participant group assignments to make a case-by-case decision on group assignment for each individual who enrolls in the study (i.e., Kang, Ragan, & Park, 2008; Scott, McPherson, Ramsay, & Campbell, 2002).

Consent Setting. If the couple remained interested in participating after any/all of their questions were answered, they were included in the study after providing consent. There was not a separate consent form for the current study, as measures were integrated into the assessment battery of the primary study. Participants and their spouses signed written consent forms; both the participant and his or her spouse needed to provide consent for the couple to be eligible to continue in the study.

Assessments.

All participants were assessed at baseline and six months later as part of the current study (note: both members of the couple were assessed as baseline, 3- and 6-months; however, the current study did not include measures at 3-months). Participants had their height and weight objectively measured, and were asked to complete questionnaires relevant to the primary and current study. Questionnaires specifically added for the current study included measures to assess experiences of spousal weight stigma, internalized weight stigma, coping strategies used in response to spousal weight stigma. Participants received \$25 for the baseline assessment and \$50 for the 6-month assessment. Baseline and 6-month visits lasted approximately 60-75 minutes; all assessments were completed in the clinic.

Measures

Study measures. The majority of the measures selected for the primary and current study were validated and have been utilized by researchers in several obesity management and stigma and coping studies. Psychometric information is included below where available.

Anthropometrics:

Weight was measured in kilograms to the nearest 0.1 kg using a calibrated standard digital scale (Tanita BWB 800) with participants in light clothing and no shoes. Scale calibration was checked weekly with known weights. Standing height (mm) was measured in participants without shoes using a wall-mounted Harpenden stadiometer. All anthropometric measures were taken in duplicate and the mean was used for all analyses, including BMI at baseline and follow-up.

Demographics and weight history:

Basic demographic information (e.g., age, gender, race, marital status, education, income, work status, household composition) was assessed at baseline only. Weight history (e.g., highest adult weight [excluding pregnancy], perceived weight status, and weight intentions) was also assessed.

History of experienced spousal weight stigma:

Three questions that have been used in previous research to assess general history of perceived weight stigma (e.g., Puhl et al., 2017; Puhl, Moss-Racusin, Schwartz, & Brownell, 2008) were slightly modified to assess experiences of spousal weight stigma coming directly from one's romantic partner. Specifically, participants were asked to indicate whether or not their romantic partner had 1) teased them, 2) treated them unfairly, or 3) discriminated against them because of their weight. Consistent with prior research utilizing the original items, if a participant endorsed "yes" for any one of these three questions, they were classified as having experienced spousal weight stigma. A single item was created for the purposes of the analyses, wherein individuals who did not endorse spousal weight stigma were coded "0" and individuals who did endorse spousal weight stigma were coded as "1." These items were assessed at baseline.

Internalized weight stigma:

Internalized weight stigma was measured using a modified version of the 11-item Modified Weight Bias Internalization Scale (WBIS-M; Pearl & Puhl, 2014; Durso & Latner, 2008). To make the scale more accessible to individuals of diverse weight categories, the modified version of this scale replaced phrases including the word "overweight" with phrases that instead used the words "my weight." Responses were rated on a 7-point Likert scale ranging

from “Strongly Disagree” to “Strongly Agree.” Sample items include, “because of my weight, I feel that I am just as competent as anyone” and “I am less attractive than most other people because of my weight.” Updated psychometric data on this measure (i.e., Lee & Dedrick, 2016; Hilbert, Baldofski, Zenger, Löwe, Kersting, & Braehler, 2014) suggests the item-to-total correlation is improved by dropping the first item; therefore, this item was excluded and the remaining 10 items were averaged. Baseline values of internalized weight stigma were included in subsequent data analyses. Cronbach’s α in this sample was .89.

Coping with spousal weight stigma:

Twenty-four items were adapted from the modified version of the Coping Responses Inventory (i.e., Puhl, Moss-Racusin, & Schwartz, 2007; Myers & Rosen, 1999) and included to measure how individuals cope with experiences of spousal weight stigma. The instructions for this measure asked participants to consider what coping strategies they have used *specifically in response to weight stigma from their romantic partners* (see Appendix C, SRM 3 for a copy of the measure). These items, which have been used in previous research (i.e., Puhl et al., 2007), assessed both positive (12 items) and maladaptive (12 items) coping strategies that may be employed in response to spousal weight stigma. Examples of coping strategies that were selected for the positive coping subscale included: “I got support from another family member or friend” and “I treated myself to new clothes that looked good on me.” Sample coping strategies selected for the maladaptive subscale included: “I got depressed and isolated myself” and “I turned to my favorite foods to make me feel better.” Participant endorsement of coping strategies/responses were rated on a 4-point Likert scale from Never (0) to Multiple Times (3). To determine the frequency at which participants utilized either positive or maladaptive coping strategies (or both), positive and maladaptive subscales were created and items in each subscale

were summed, with higher scores indicating more frequent endorsement of coping strategies within that subscale. Cronbach's α in this sample was .82 for the positive coping subscale and .85 for the maladaptive coping subscale.

Data Analysis.

Power analysis. In order to determine the necessary sample size needed to test the hypotheses of the current study, a power analysis was conducted using G*Power 3, a statistical power analysis program (Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G, 2009; Faul, Erdfelder, Lang, & Buchner, 2007). Linear multiple regression: fixed model, R^2 deviation from zero was selected as the type of test, and an effect size of 0.15 (a moderate effect) was chosen because previous research utilizing similar stigma and coping measures have found results with moderate to large effect sizes. The alpha level was set at .05, the power was set to .80, and a total of 7 baseline predictors (experiences of spousal weight stigma; internalized weight stigma; positive coping strategies; maladaptive coping strategies; study condition; initial BMI; gender) were tested within the final model. With these parameters, G*Power 3 calculated that a total sample of 103 participants was necessary for the analyses. With a final sample of 128 patients, the necessary sample size was met to run all analyses, including multiple linear regressions and mediation analyses, with satisfactory power. However, the Preacher and Hayes (2008) bootstrapping method was utilized to increase power and confidence with concluding the presence of a significant mediation effect to report. Unlike the commonly used Sobel significance test (Sobel, 1982), this non-parametric test does not require the assumptions of normality to be met and provides point estimates and confidence intervals by which one can assess the significance or non-significance mediation effects.

Data management. Data management and cleaning was conducted throughout the course of the study, from baseline through the collection and entering of the 6-month follow-up data. The data cleaning process included: checking 25% of the data entered against the paper-based measures, re-entering completed assessment packets of data for 5% of all participants, and identifying missing data. Given the importance of managing missing data, it was determined that any participants missing more than 25% of their data would be eliminated from further analysis; however, no participants met these criteria, and all data were retained for analysis.

Descriptive statistics and correlations. The following statistical analyses were performed for this study using the Statistical Package for the Social Sciences, Release 24.0.0 (SPSS; IBM Corp., 2016 Armonk, NY, www.spss.com). The primary outcome for the current study was percent (%) weight loss from baseline to 6-months. Before conducting analyses for each of the research questions and hypotheses, descriptive statistics and correlations were examined. Descriptive statistics that were calculated included Ns and percentages for all categorical variables and means and standard deviations for all continuous variables. Due to the fact that the main analytic approach for Research Question 1 was multiple linear regression, regression diagnostics were also analyzed to determine if any assumptions of the regression framework were violated. A correlation matrix of all variables of interest and multicollinearity diagnostics between these variables, as well as correlations between the demographic (i.e., gender, initial BMI, study condition) and weight stigma variables (i.e., experiences of spousal weight stigma, positive coping strategies, maladaptive coping strategies, internalized weight stigma) and the dependent variable (% weight loss at follow up) were assessed prior to conducting any further analyses. Note that while the initial BMI variable was continuous and thus not recoded, gender was coded as 0 = female, 1 = male (in order to speak to the effect of

being male), and study condition was coded as 0 = Weight Watchers, 1 = Self-Guided. Any demographic variables found to be significantly related to percent weight loss were controlled for in all subsequent analyses. T-tests, Chi-square tests, and regression analyses were used to examine the relationships between baseline experiences of spousal weight stigma, internalized weight stigma, positive and maladaptive coping strategies associated with spousal weight stigma, and weight loss outcomes.

Influence of Experienced & Internalized Weight Stigma & Coping on % WL (RQ1)

To examine the relationship between experienced spousal weight stigma, internalized weight stigma, and/or positive or maladaptive coping strategies in response to spousal weight stigma and longitudinal weight loss outcomes, a multi-step analytical process was used. First, Pearson correlation coefficients (with continuous variables) and *t* statistics (with dichotomous variables) were calculated between demographic (control) variables of interest (i.e., gender, initial BMI, study condition), stigma and coping variables of interest (i.e., experienced spousal weight stigma, internalized weight stigma, maladaptive and positive coping strategies associated with spousal weight stigma), and percent weight loss at 6-months to determine the presence of significant correlational relationships.

Next, multiple linear regression analyses, adjusted for demographic differences, were conducted to identify whether or not experienced spousal weight stigma, internalized weight stigma, and/or coping strategies used in response to spousal weight stigma, were significant, independent predictors of weight loss at 6-months. Prior to interpreting the regression results, regression diagnostics were conducted. First, outliers or cases that may cause undue influence on the model were analyzed through a number of different mechanisms. Cook's distance, which measures if a single case has an undue influence on the model, was calculated for all participants,

and none exceeded the cutoff of 1. Mahalanobis Distance was also calculated, and no cases had a Mahalanobis distances greater than 11. Taken together, no case was considered an outlier, and all cases were retained for the analysis. Finally, multicollinearity was evaluated through VIF values, and none of the values were above the cutoff of 2.50. No changes were made to the model due to the fact that there were no significant outliers and the assumptions were not violated. The first step of the regression analysis included all demographic variables (i.e., gender, initial BMI, study condition) to control for the variance accounted for by these factors within the model. Next, experienced spousal weight stigma, internalized weight stigma, maladaptive coping strategies with SWS, and positive coping strategies with SWS were added to the model. If significantly related to 6-month weight outcomes, each weight stigma and/or variable was evaluated for its independent contribution to the model R^2 over and above the control (demographic) variables utilizing part and partial correlations, standardized beta values, and R-squared change statistics.

Internalized Weight Stigma as a Potential Mediator (RQ2)

Coping Strategies in Response to Spousal Weight Stigma as a Potential Mediator (RQ3)

The second and third research questions aimed to explore if the relationship between experienced spousal weight stigma and longitudinal weight loss outcomes was mediated by internalized weight stigma and/or coping strategies used in response to spousal weight stigma. Initial BMI, study condition, and gender were controlled for in the mediational analyses. To answer these questions, a two-step analytic process was conducted. First, Pearson correlation coefficients and t statistics were calculated for the following associations between the predictor (i.e., experienced spousal weight stigma) and proposed mediator variables (i.e., internalized weight stigma; maladaptive coping strategies associated with spousal weight stigma; positive coping strategies associated with spousal weight stigma): experienced spousal weight stigma and

internalized weight stigma; experienced spousal weight stigma and maladaptive coping strategies associated with SWS; and experienced spousal weight stigma and positive coping strategies associated with SWS. Note that correlations (i.e., Pearson coefficients or *t* statistics as appropriate) between the predictor and dependent variables (i.e., experienced spousal weight stigma and % weight loss) and between the potential mediator and dependent variables (i.e. internalized weight stigma and % weight loss; maladaptive coping strategies associated with spousal weight stigma and % weight loss; and positive coping strategies associated with spousal weight stigma and % weight loss) were previously calculated for research question 1 above.

Next, the PROCESS macro (Hayes & Preacher, 2014) was utilized to run the mediation analyses. A multiple mediator PROCESS model 4 was constructed with percent weight loss as the outcome variable, experienced spousal weight stigma as the independent variable, and internalized weight stigma, maladaptive coping strategies associated with spousal weight stigma, and positive coping strategies associated with spousal weight stigma as the mediating variables. One benefit of the PROCESS model 4 macro is the ability to simultaneously test the independent effects of each proposed mediator variable within one model, while also controlling for potentially confounding demographic variables (i.e., gender, initial BMI, and study condition). 10,000 bootstrap resamples were performed in order to compute a mean indirect effect and its accompanying 95% confidence interval for each predicted mediator (Preacher & Hayes, 2008). The bootstrapping resampling method was used to assess if internalized weight stigma, maladaptive, and/or positive coping strategies associated with spousal weight stigma reported at baseline were independent, significant mediators of the relationship between experienced spousal weight stigma and percent weight loss at 6-months.

Chapter 5

Results

A total of 130 individuals were recruited for this study; two participants dropped out of the study prior to completing their 6-month assessments, thus, 128 individuals were included in the following analyses. Demographic, weight history, weight stigma and coping variables of interest were analyzed for missing data; all data were retained and included in the following analyses.

Demographic Characteristics

Table 1 displays the demographic characteristics of the study sample. Overall, participants were an average of 53 (SD = 10.57) years old and were highly educated (90.60% attended at least some college). The sample had more women (N = 88; 68.80 %) than men (N = 40; 31.30%), and predominately identified as White (96.20%). 96.8% of study participants were married. The mean initial BMI of the sample was 33.92 kg/m² (SD = 3.66); 83.70% were classified with obesity at baseline. At 6-month follow-up, participants' mean BMI was 32.60 kg/m² (SD = 4.00) with an average of 3.80% (SD = 4.80) weight loss. Finally, *t*-tests, ANOVAs, and Pearson correlations were utilized to evaluate any significant differences in weight loss outcomes based on demographic characteristics (i.e., gender, initial BMI, study condition) in the current sample. There were significant differences in percent weight loss based on initial BMI ($F(1,126) = 4.83, p = 0.04$); individuals with a higher initial BMI demonstrated greater weight loss over time. No other demographic characteristics were significantly related to percent weight loss at 6-months. However, as is common practice in weight loss treatment studies, gender, study condition (WW vs SG), and initial BMI were treated as covariates in all regression and mediation analyses.

Descriptive Statistics of Main Study Variables

Means and standard deviations were calculated for each of the main study variables and can be found in Table 1, which also provides the frequency of experienced spousal weight stigma, internalized weight stigma, and how participants coped with receiving weight stigma from their romantic partner (i.e., with positive and/or maladaptive strategies) at baseline. Notably, 89% of the sample reported that they had experienced weight stigma from their romantic partner. Responses to the three items used to assess spousal weight stigma varied, with 82% of participants reporting their spouse has teased them because of their weight, 79% reporting their spouse has treated them unfairly as a result of their weight, and 8% reporting that their partner has discriminated against them due to their weight status—52% of the sample endorsed at least two items, and one participant endorsed all three experiences of spousal weight stigma.

The relatively high mean of the internalized weight stigma measure suggests that participants were endorsing high levels of internalized weight stigma at baseline ($M = 4.8$; $SD = 1.1$). Participants reported coping with spousal weight stigma using a combination of positive ($M = 1.4$; $SD = 0.2$) and maladaptive ($M = 2.5$; $SD = 0.8$) coping strategies. The most common positive coping strategies endorsed were: “I got support from another family member or friend” (81.7%); “I did something nice for myself to make me feel better” (72.3%); and, “I laughed it off or joked about it” (65.1%). Maladaptive coping strategies most commonly reported were: “I felt badly about myself” (91%); “I got depressed and isolated myself” (82.6%); and, “I turned to my favorite foods to make me feel better” (79.8%). Interestingly, there were no demographic differences between participants who experienced spousal weight stigma and those who did not.

Influence of Experienced & Internalized Weight Stigma & Coping on % WL (RQ1)

The first research question aimed to examine the influence of experienced spousal weight stigma, internalized weight stigma, and coping strategies associated with spousal weight stigma (both maladaptive and positive), on percent weight loss at 6-months. Bivariate correlations with continuous variables and *t*-tests with dichotomous variables were calculated prior to running the multiple linear regression to assess for significance between all control, predictor, and outcome variables of interest (see Tables 2 and 3). These analyses showed that percent weight loss did not differ significantly by gender ($t = .23, p = .42$), study condition ($t = .37, p = .22$); however, experienced spousal weight stigma was associated with less weight loss over time ($t = -.52, p < .05$). Initial BMI and percent weight loss were significantly correlated with each other ($r = .87, p < .05$), as higher initial BMI was associated with greater weight loss at 6-months. More internalized weight stigma was associated with less weight loss over time ($r = -.68, p < .05$), as was more frequent endorsement of maladaptive coping strategies associated with SWS ($r = -.37, p < .05$). Lastly, greater usage of positive coping strategies associated with SWS was associated with greater percent weight loss at 6-months ($r = .29, p < .05$).

The initial regression model, which included the demographic covariates, accounted for 15% of the variance in percent weight loss at 6-months ($R^2 = .15, p = .09$); Initial BMI ($b = -.42, SE = .20, t = -2.53, p = .01$); gender ($b = -.15, SE = .19, t = -1.85, p = .07$) and study condition ($b = .23, SE = .21, t = 1.52, p = .15$). The inclusion of the weight stigma and coping variables of interest (i.e., experienced spousal weight stigma, internalized weight stigma, maladaptive coping with SWS, and positive coping with SWS) in the second model improved the overall variance accounted for in percent weight loss at 6-months to 29% ($\Delta R^2 = .14, p = .03$) over and above the control variables (initial BMI, gender, and study condition). The results of the full regression

model are displayed in Table 4. It was hypothesized that participants who experienced spousal weight stigma and internalized weight stigma would demonstrate poorer weight loss at 6-months compared to participants who did not experience spousal weight stigma or endorse internalized weight stigma—the findings of these analyses support both Hypothesis 1a and 1b. It was also hypothesized that participants who utilized maladaptive coping strategies associated with SWS would demonstrate poorer weight loss over time than those who did not, which was also supported by the current study. The final hypothesis suggested that endorsement of positive coping strategies related to SWS would be associated with greater percent weight loss over time; the findings of these analyses trended in support of this hypothesis, but did not reach significance.

Internalized Weight Stigma and Coping with SWS as Potential Mediators (RQ 2 & 3)

The second and third research questions examined whether the relationship between experienced spousal weight stigma and longitudinal weight loss outcomes was mediated by internalized weight stigma and/or coping strategies (maladaptive or positive) associated with spousal weight stigma reported at baseline. As noted previously, gender, initial BMI, and study condition were added as covariates to increase confidence in detecting true mediation effects within the model. Hayes' PROCESS macro (2013) was used to evaluate the hypothesized indirect effects of internalized weight stigma and/or coping strategies (maladaptive or positive) associated with spousal weight stigma in a comprehensive mediation model. To minimize the risk of Type 1 error inflation, the PROCESS macro controls for the presence of the other proposed mediators and isolates the unique contribution of each independent mediator. Tolerance and VIF diagnostic indices were within acceptable limits, so there were no concerns for multicollinearity within the mediation model. 10,000 bootstrap resamples were performed to

compute a mean indirect effect and its accompanying 95% confidence interval (CI) for each predicted mediator (Preacher & Hayes, 2008). Indirect effect parameter estimates are considered significant at the $p < .05$ level when bias-corrected 95% CIs exclude zero. Beta estimates for the total and direct effects of the primary predictor variable were computed, and for all indirect effects of the mediating variables. Given that the model contained multiple mediators, standardized indirect effects were also calculated using the PROCESS macro, which also calculates 95% CIs using the bootstrap sample to aid in interpretation (note: bootstrap CIs are abbreviated as BCa CI in subsequent results).

Overall, the full mediation model explained 29% of the variance in longitudinal weight loss outcomes. Figure 3 illustrates the results of the multiple mediation model and includes standardized beta coefficients; Table 5 contains the full results of the model, including the total and direct effects of the predictor variable, and the indirect effects of all mediator variables. Table 6 contains the standardized indirect effects, and bootstrapped standard error and confidence intervals for each mediator variable; these standardized values aid in the interpretation of the unique contribution of each mediating variable by calculating the percentage of the maximum value the effect could have been within the model. The model produced significant total and direct effects of experienced spousal weight stigma on percent weight loss at 6-month follow-up. Importantly, the direct effect of experienced spousal weight stigma on percent weight loss remained significant, supporting the presence of partial mediation with the variables of interest. The full mediation model generated indirect effects of percent weight loss predicted from both experienced spousal weight stigma and each hypothesized mediator (see Table 5). Internalized weight stigma and using maladaptive coping strategies in response to experienced spousal weight stigma significantly and independently mediated the relationship

between experienced spousal weight stigma and percent weight loss at 6-months. Positive coping strategies in response to experienced spousal weight stigma did not have a significant indirect effect on the relationship between experienced spousal weight stigma and percent weight loss. Standardized indirect effects and bootstrapped confidence intervals were calculated (Table 6) to provide additional information regarding the relationship between and the effect size of each mediator variable and percent weight loss at 6-months. The bootstrapped confidence intervals for internalized weight stigma and maladaptive coping strategies associated with experienced spousal weight stigma did not contain zero, supporting the true partial mediating effects of both variables. Further, Preacher and Kelley (2011) note these standardized values can be equated to the values used for R^2 : a small effect is .01, a medium effect is around .09, and a large effect in the region of .25. Utilizing those metrics, internalized weight stigma (-.15) represents a medium effect, positive coping strategies associated with SWS (.01) represents a small effect, and maladaptive coping strategies associated with SWS (-.09) represents a medium effect on the relationship between experienced spousal weight stigma and percent weight loss at 6-months.

Chapter 6

Discussion

As the myriad evidence presented in Chapters 1 and 2 suggests, experienced and internalized weight stigma lead to psychological and physical health consequences—above and beyond the effects of excessive weight itself—that may promote weight gain and negatively affect weight control efforts. Developing a greater understanding of potential mechanisms that may disrupt or exacerbate the problematic cycle of weight stigma and obesity, particularly within the context of interpersonal relationships where weight stigma is frequently endorsed, is clearly warranted. The purpose of this study was to examine the influence of experienced spousal weight stigma (SWS), internalized weight stigma, and coping strategies used in response to SWS on longitudinal weight loss, and determine if internalized weight stigma and/or coping strategies used in response to SWS mediate the relationship between experienced SWS and percent weight loss. A striking majority of study participants endorsed experiencing spousal weight stigma from their romantic partners. In support of the hypothesized relationships, experienced spousal weight stigma, internalized weight stigma, and maladaptive coping with SWS were significantly predictive of percent weight loss at 6-months. In addition, internalized weight stigma and utilization of maladaptive coping strategies in response to SWS were both found to significantly mediate the relationship between experienced spousal weight stigma and percent weight loss, in the predicted direction. Overall, the results of this study reiterate the necessity of examining experienced spousal weight stigma, internalized weight stigma, and what coping strategies individuals are employing in response to these experiences, given their influence on weight loss outcomes and the implications for sustaining weight loss over time.

Main Study Findings

Influence of Experienced and Internalized Weight Stigma and Coping on % Weight Loss

Weight stigma is commonly endorsed by interpersonal sources, such as romantic partners (i.e., Pearl et al., 2017; Puhl et al., 2015); the consistency of these findings and the documented physical and psychological consequences of experienced and internalized weight stigma informed the development of the current study's conceptual model. The first research question aimed to examine the relationship between experienced spousal weight stigma, internalized weight stigma, coping strategies associated with spousal weight stigma (both maladaptive and positive), and percent weight loss at 6-months. It was hypothesized that individuals who experienced spousal weight stigma, internalized weight stigma, and used maladaptive coping strategies in response to spousal weight stigma would demonstrate poorer weight loss at 6-months compared to participants who did not, which was supported by the study findings. These results are consistent with the broader weight stigma and obesity literature in that individuals who experience weight stigma are less likely to succeed in weight loss treatment (i.e., Carels et al., 2014; Jackson, Beeken, & Wardle, 2014; Tomiyama, 2014; Carels et al., 2009). These findings are troublesome and highlight the necessity of examining interpersonal factors that may help or hinder individuals' weight loss efforts.

The majority of participants in the current study reported being teased, treated unfairly, and/or discriminated against by their romantic partners. The results of the current study suggested that experiencing and coping maladaptively with spousal weight stigma, as well as internalizing weight stigma, has significant implications for weight loss success. These findings are consistent with the existing literature demonstrating the detrimental impact of experienced and internalized weight stigma on weight loss outcomes (i.e., Ratcliffe & Ellison, 2015; Jackson et al., 2014; Carels et al., 2014; Tomiyama, 2014; Sutin & Terracciano, 2013; Latner, Wilson,

Jackson, & Stunkard, 2009), and weight loss maintenance (Puhl et al., 2017). However, the current findings contrast with recent evidence documenting internalized, but not experienced, weight stigma as a significant predictor of weight loss maintenance (Puhl et al., 2017).

Nevertheless, when experienced stigma was combined with internalized weight stigma and subjective weight category in the model, these three variables accounted for approximately 36% of the variance in categorization as weight-loss maintainer (versus weight re-gainer). These findings could be due, at least in part, to differences in measurement of experienced stigma and study design, but they nonetheless highlight the need for further examination of the roles of experienced versus internalized stigma on weight loss outcomes. Continuing to explore the complexities and potential mechanisms underlying the relationships between spousal weight stigma, weight loss, and subsequent weight loss maintenance, is a warranted direction of future study.

Internalized Weight Stigma and Coping with SWS as Potential Mediators

The second and third research questions examined whether the relationship between experienced spousal weight stigma and percent weight loss was mediated by internalized weight stigma and/or coping strategies (maladaptive or positive) used in response to spousal weight stigma. As illustrated in Table 5 and Figure 2, experienced spousal weight stigma continued to significantly predict percent weight loss even after the hypothesized mediators were added to the model. Internalized weight stigma and maladaptive coping strategies in response to spousal weight stigma *independently and significantly* mediated the relationship between experienced spousal weight stigma and percent weight loss at 6-months. The standardized and unstandardized bootstrapped confidence intervals of these indirect effects did not contain zero, supporting the likelihood that genuine indirect effects were found in the current study.

The full mediation model accounted for 29% of the variance in percent weight loss (a notable increase from the 15% accounted for by demographic variables alone), providing further evidence of the importance and significance of assessing these specific weight stigma and coping variables as predictors as well as mediators in future weight loss outcome research. Somewhat surprisingly, utilization of positive coping strategies related to spousal weight stigma was not found to mediate this relationship in the current study. It is conceivable that the lack of significance suggests participants were not employing positive coping strategies in response to spousal weight stigma. It is possible that the limited number of items selected for the current investigation did not adequately capture the positive coping strategies being utilized by these individuals.

Hypothesis 2a predicted that internalized weight stigma would mediate the relationship between experienced spousal weight stigma and percent weight loss, such that individuals who endorsed internalized weight stigma would demonstrate less weight loss over time, which was supported by the current study. Notably, internalized weight stigma accounted for the greatest amount of variance on percent weight loss among the proposed mediator variables as well as the predictor variable. Given the relatively high mean of internalized weight stigma in the current study, it is conceivable that these results are illustrating the health-harming consequences of internalized weight stigma (i.e., increased eating, decreased physical activity) on weight loss efforts. This finding is consistent with the increasing evidence of the unique and deleterious impact of internalized weight stigma on the psychological and physical health and well-being of individuals with overweight and obesity (i.e., Pearl et al., 2017; Pearl & Puhl, 2016; O'Brien et al., 2016; Ratcliffe & Ellison, 2015), irrespective of whether an individual reports experienced weight stigma. Furthermore, it is notable that internalized weight stigma was very highly

correlated with percent weight loss in the current sample, such that individuals who endorsed more internalized weight bias were significantly less likely to demonstrate weight loss over time.

Hypothesis 3a predicted that maladaptive coping strategies associated with spousal weight stigma would mediate the relationship between experienced spousal weight stigma and percent weight loss, in that individuals who endorsed maladaptive coping strategies would demonstrate less weight loss over time than individuals who did not, which was also supported by the current study. Interestingly, maladaptive coping strategies were endorsed with greater frequency than positive coping strategies within the current study, ($M=2.5$ versus $M=1.4$), respectively, suggesting that participants endorsed frequent, if not daily, utilization of maladaptive coping strategies compared to limited or infrequent use of positive coping strategies. It is not surprising that maladaptive coping strategies significantly mediated this relationship considering the most frequently endorsed strategies are directly related to behavioral and emotional responses that are counter to and negatively impact weight loss efforts (i.e., eating to cope; isolation; depression).

It was also predicted that positive coping strategies associated with spousal weight stigma would mediate the relationship between experienced spousal weight stigma and percent weight loss, in that individuals who endorsed positive coping strategies would demonstrate greater weight loss over time than individuals who did not—this hypothesis was only marginally supported by the current study. Although the indirect effect did not reach significance, the association between positive coping strategies and percent weight loss was in the predicted direction. If positive coping strategies had significantly mediated the relationship between experiencing spousal weight stigma and percent weight loss in this sample, individuals who endorsed greater utilization of positive coping strategies would have also demonstrated greater

weight loss over time. Future work in this area should consider a wider array of positive coping strategies that may be employed in response to spousal weight stigma in order to understand these relationships further. Specifically, it would be important to assess strategies in response to spousal weight stigma that promote mental and physical well-being (i.e., going for a walk; practicing meditation or mindfulness; engaging in positive self-talk). Given the limited research and mixed success of studies designed to reduce weight stigma, if specific clusters of positive coping strategies (i.e., emotional, behavioral, combination) were found to be predictive of weight loss success and/or protective against weight regain, weight stigma theories and interventions designed to improve weight loss efforts would certainly benefit.

Lastly, the significant correlations between internalized weight stigma and coping style (both maladaptive and positive) suggest that potentially harmful behaviors cluster together and may set the stage for future weight management problems. Individuals who reported higher levels of internalized weight stigma also endorsed greater utilization of maladaptive coping strategies. Conversely, higher levels of internalized weight stigma were associated with less endorsement of positive coping strategies that could potentially buffer individuals from the negative effects of spousal weight stigma. It will be important to examine whether these patterns continue over time to negatively impact weight loss or weight loss maintenance efforts, thus continuing the vicious cycle of weight stigma and obesity. Including these variables as potential predictors and/or mediators of initial and sustained weight loss success may increase the variance accounted for by treatment studies, thus clarifying our understanding of the critical mechanisms of influence on weight outcomes and informing potential targets for clinical intervention.

Limitations

While the current findings add to the growing literature examining weight stigma, coping, and weight loss outcomes, the conclusions of the current study should be interpreted in light of its limitations. First, limited racial and ethnic diversity in adult, weight loss treatment-seeking samples is common; the current study was no exception, despite efforts to recruit a more diverse sample. However, the demographics in this sample were consistent with the existing literature; most weight loss treatment samples remain predominately white, which should be cause for significant concern given the higher prevalence of overweight and obesity among minority groups. Studies that have been successful in recruiting more diverse samples continue to find distinct differences between whites and ethnic minority groups on a variety of dimensions that not only limits the generalizability of the majority of existing literature, but may in fact be detrimental to those in ethnic minority groups who do or do not seek treatment for weight loss (i.e., Grilo, Lozano, & Masheb, 2005). Despite the scant research in this area, there is some evidence to suggest that weight stigma is experienced, internalized, and coped with differently by ethnic minority populations, potentially as a result of racial/cultural differences in weight perception, preference, and acceptance, when compared to white participants (i.e., Fettich & Chen, 2012; Roehling, Roehling, & Pichler, 2007; Latner, Stunkard, & Wilson, 2005; Hebl & Heatherton, 1998). These findings provide further evidence of the importance of recruiting more diverse samples in future work to conceptualize and implement interventions for reducing weight stigma and improving weight loss outcomes that are more responsive to the unique needs of *all* individuals affected by overweight and obesity.

Second, while there is clear evidence of out-group bias among individuals with overweight and obesity (i.e., Tomiyama, 2014; Carels et al., 2013), both members of the dyad

were required to have a BMI in the overweight range to be included in the primary study, and participants were required to have a partner/spouse who was willing to attend the baseline and follow-up assessments with them, which implies some level of support within the couples included in the current study. It is possible that the relationships between spousal weight stigma and weight loss outcomes may be even more pronounced in less supportive marriages, suggesting a potential limitation may be a fruitful and informative future direction of study. While these potential confounds limit the generalizability of the current study findings to dyads that include individuals who are: 1) either of normal weight status or those with BMIs greater than 39.9 kg/m² (the upper limit for inclusion), and/or, 2) in unsupportive romantic relationships, it also highlights the importance of conducting similar research with a greater diversity of participants. Furthermore, the couples included in this study almost exclusively identified as heterosexual—exploring these variables among sexual minority dyads is an important future direction of study, as research on weight stigma and weight loss with sexual minorities is even more limited than with racial/ethnic minority populations.

Third, although bootstrap sampling was utilized to increase power, another limitation of the current study was the relatively small sample size. Lastly, while the coping items that were used in this study to create maladaptive and positive coping subscales are part of a widely-used stigma and coping measure, the specific subscales used for this study and the modification of items to specifically assess how these coping strategies were used in response to spousal weight stigma was unique to this study and may be considered a potential limitation.

Conclusions and Future Directions

It is evident that more work is needed to elucidate the mechanisms that serve to perpetuate or interrupt the cycle of weight stigma and obesity, as well as the interpersonal

context in which this relationship occurs, to develop more appropriate and effective weight loss interventions. The current study was the first to examine the potential mediating influences of internalized weight stigma and coping strategies on the relationship between experienced spousal weight stigma and longitudinal weight loss outcomes. Both internalized weight stigma and engaging in maladaptive coping strategies related to spousal weight stigma were significant mediators of the relationship between experienced spousal weight stigma and percent weight loss. Results also suggested that both experienced and internalized weight stigma significantly and independently influence weight outcomes. These findings support the importance in assessing and addressing experienced and internalized weight stigma and coping variables in the design and implementation of future weight loss interventions.

Given the pervasiveness and commonality of individuals reporting weight stigma from interpersonal sources (i.e., partners or family members), it is imperative to consider the influence of spousal weight stigma, the internalized weight stigma, and the ways in which individuals are coping with experiences of weight stigma, not only in studies targeting couples or families, but in all weight loss treatment studies. To gain a more accurate picture of experienced spousal weight stigma and how romantic partners are coping with these experiences, future work in this area should include data from the partner/spouse regarding whether they direct weight stigma towards their partner, and/or how they report that their partner copes with spousal weight stigma. This line of investigation may illuminate dyadic-specific factors, such as differences in perception and/or communication between partners, that may also impact weight loss efforts and warrant consideration with intervention design. Although the current study assessed an individuals' *perception* of experiencing weight stigma from their romantic partner, there is growing evidence to suggest that perception is an important and relevant construct to consider as

it influences a wide variety of health- and weight-related behaviors that may impact weight loss efforts (i.e., Puhl et al., 2017; Robinson, Hunger, & Daly, 2015; Major et al., 2014; Yaemsiri, Slining, & Agarwal, 2011).

Continued exploration of experienced weight stigma, internalized weight stigma, and coping with spousal weight stigma may provide support for specific coping strategies and weight stigma-related information to incorporate and promote at both the intervention- and individual-level of weight management. Weight loss treatments need to develop a more individualized approach that is sensitive to patients' needs and individual differences, which requires measuring and predicting patterns of intra-individual behavior variations and interpersonal factors associated with weight loss and its maintenance (i.e., Ratcliffe & Ellison, 2015; Stubbs et al., 2011). The results of the current study provide further evidence that individuals with overweight and obesity seeking weight loss treatment may experience spousal weight stigma, may internalize weight stigma, and may engage in ways of coping with these experiences that is either helpful or harmful to their weight loss efforts. As such, interventions that include romantic partners or family members in treatment might yield greater weight losses over time if they are designed to address and reduce spousal weight stigma and teach more adaptive/positive ways of coping with these experiences. While the literature in this area is limited, preliminary findings support the benefit of incorporating adaptive coping with weight stigma strategies in weight loss interventions to increase potential for success (i.e., Ratcliffe & Ellison, 2015; Carels et al., 2014; Lillis, Hayes, Bunting, & Masuda, 2009), which is consistent with the results of the current study.

While essential, important questions remain regarding the most effective ways to promote initial weight loss success and prevent weight regain among individuals with overweight and

obesity. Gaining a better understanding of interpersonal factors that may exacerbate or interrupt the cycle of weight stigma and obesity and continuing this timely work, has the potential to assist with the assignment of individuals with weight loss goals into more appropriate treatment settings (i.e., an individual standard behavioral program versus a weight loss program that requires partner participation) that are likely to yield greater weight loss outcomes over time. Continuing to explore individual (i.e., internalized weight stigma) and interpersonal (i.e., experiencing and coping with spousal weight stigma) variables that predict and/or mediate weight loss outcomes has the potential to inform more targeted, and thus potentially more effective, weight loss and weight maintenance interventions in the future.

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Appendix A: Tables

Table 1.

Descriptive statistics of main study variables, Mean (SD), %

Demographic & Weight-Related Variables	(N=128)
Gender (% female)	68.80
Race/Ethnicity (% Caucasian)	96.20
Age (years)	53.42 (10.57)
Education (% some college or higher)	90.60
Weight at baseline (kg)	93.70 (15.50)
BMI at baseline (kg/m ²)	33.92 (3.60)
BMI status at baseline (% obese)	83.70
Weight at 6-month follow-up (kg)	89.90 (15.20)
BMI at 6-month follow-up (kg/m ²)	32.60 (4.0)
% weight loss at 6-months	-3.80 (4.80)
Pre-treatment Stigma & Coping Variables	
1. Experienced spousal weight stigma (SWS; %)	89.00
2. Internalized weight stigma	4.80 (1.10)
3. Maladaptive SWS coping strategies	2.50 (0.80)
4. Positive SWS coping strategies	1.40 (0.20)

Table 2.
Correlation Matrix of Continuous Study Variables (N=128)

Variable	1.	2.	3.	4.
1. % weight loss at follow-up	--			
2. Internalized weight stigma	-.68*	--		
3. Positive SWS coping strategies	.29*	-.12	--	
4. Maladaptive SWS coping strategies	-.37*	.16	.05	--

Note: ** $p < 0.01$, * $p < 0.05$

Table 3.
Categorical demographic and weight stigma variables and their association with percent weight loss (N=128)

Variable	<i>t</i>	<i>p</i>
Initial BMI	.87	.04*
Gender	.23	.42
Study condition (WW vs SG)	.37	.22
Experienced spousal weight stigma	-.52	.03*

Note: * $p < 0.05$; WW: Weight Watchers; SG: Self-Guided

Table 4.

Multiple linear regression with percent weight loss as the dependent variable, 95% confidence intervals reported in parentheses (N=128)

	B	SE B	<i>t</i>	<i>p</i>
Model 1¹				
Constant	14.80 (3.53, 21.02)	.32	22.87	<i>p</i> <.001
Initial BMI	-0.42 (-1.28, -0.03)	.20	-2.53	.10
Study condition	0.23 (0.07, 0.89)	.21	1.52	.15
Gender	-0.15 (-0.39, -0.02)	.19	-1.85	.09
Model 2²				
Constant	14.80 (3.53, 21.02)	.71	19.53	<i>p</i> <.001
Initial BMI	-0.38 (-0.24, 0.09)	.41	-2.31	.14
Study condition	0.16 (-0.02, 0.21)	.38	1.29	.18
Gender	-0.09 (-0.10, 0.05)	.27	-1.79	.11
Experienced spousal weight stigma	-0.52 (-0.69, -0.45)	.17	-2.47	.04*
Internalized weight stigma	-0.59 (-0.65, -0.51)	.19	-3.67	.03*
Maladaptive SWS coping strategies	-0.37 (-0.50, -0.29)	.31	-4.01	.04*
Positive SWS coping strategies	0.21 (0.04, 0.33)	.11	1.79	.08

Note: $R^2 = .15$ for Model 1 ($p = .09$); $R^2 = .29$ for Model 2 ($p = .03$); * $p < .05$

Table 5.

PROCESS Mediation model 4 with percent weight loss as the dependent variable (N=128)

	<i>b</i>	SE	t	<i>p</i>
Total Effect of SWS on % WL	-0.91 (-.98, -.53)	.23	-3.14	.03*
Direct Effect of SWS on % WL	-0.52 (-0.69, -0.45)	.17	-2.47	.04*
	<i>b</i>	BCa SE	BCa LLCI	BCa ULCI
Indirect Effect of SWS on % WL via IWS	-0.21	.09	-.37	-.10
Indirect Effect of SWS on % WL via MCS	-0.09	.21	-.25	-.03
Indirect Effect of SWS on % WL via PCS	0.04	.17	-.01	.19

Note: * $p < .05$; Standard errors and CIs for all indirect effects are bootstrapped CIs based on 10000 samples

Key: SWS = experienced spousal weight stigma (predictor variable); % WL = percent weight loss

IWS= internalized weight stigma; MCS = maladaptive coping strategies; PCS = positive coping strategies

Table 6.

Standardized indirect effects of the PROCESS Mediation model 4 with percent weight loss as the dependent variable (N=128)

	<i>B</i>	BCa SE	BCa LLCI	BCa UPCI
Indirect Effect of SWS on % WL via IWS	-.15	.04	-.28	-.10
Direct Effect of SWS on % WL via MCS	-.09	.15	-.33	-.03
Direct Effect of SWS on % WL via PCS	.01	.21	-.12	.17

Key: SWS = experienced spousal weight stigma (predictor variable); % WL = percent weight loss

IWS = internalized weight stigma; MCS = maladaptive coping strategies; PCS = positive coping strategies

Note: Standard errors and confidence intervals for all indirect effects are bootstrapped CIs based on 10000 samples

Appendix B. Figures

Figure 1. Study Conceptual Model (RQ1)

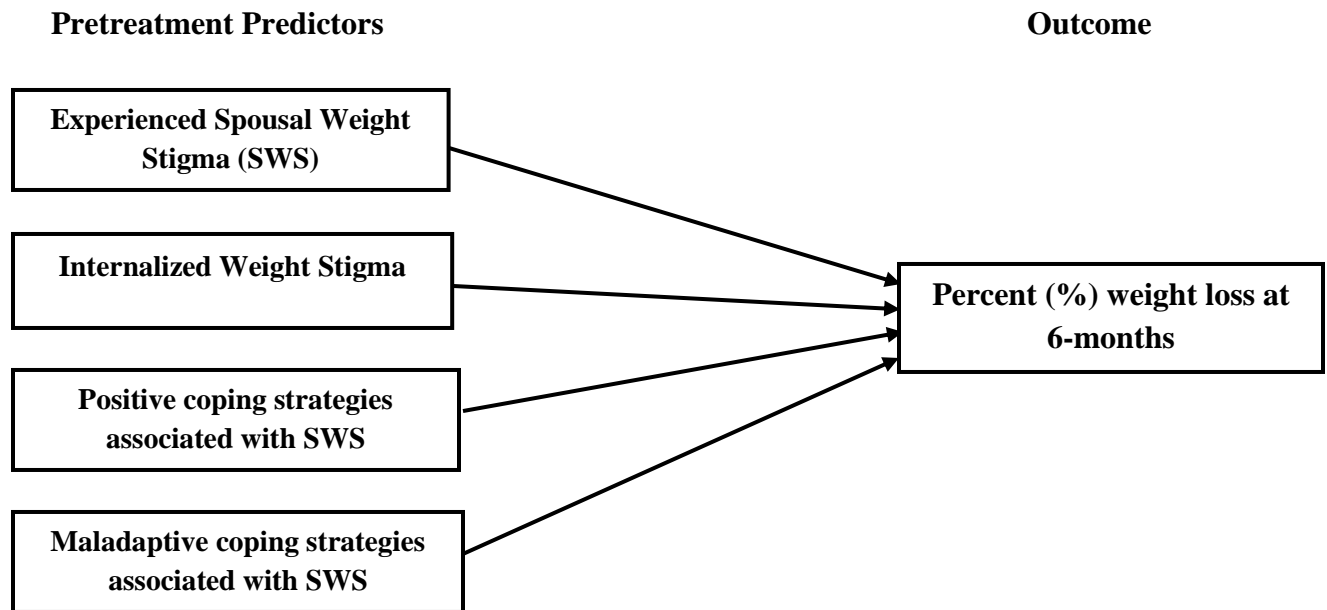


Figure 2. Multiple mediation model (RQ2 & 3)

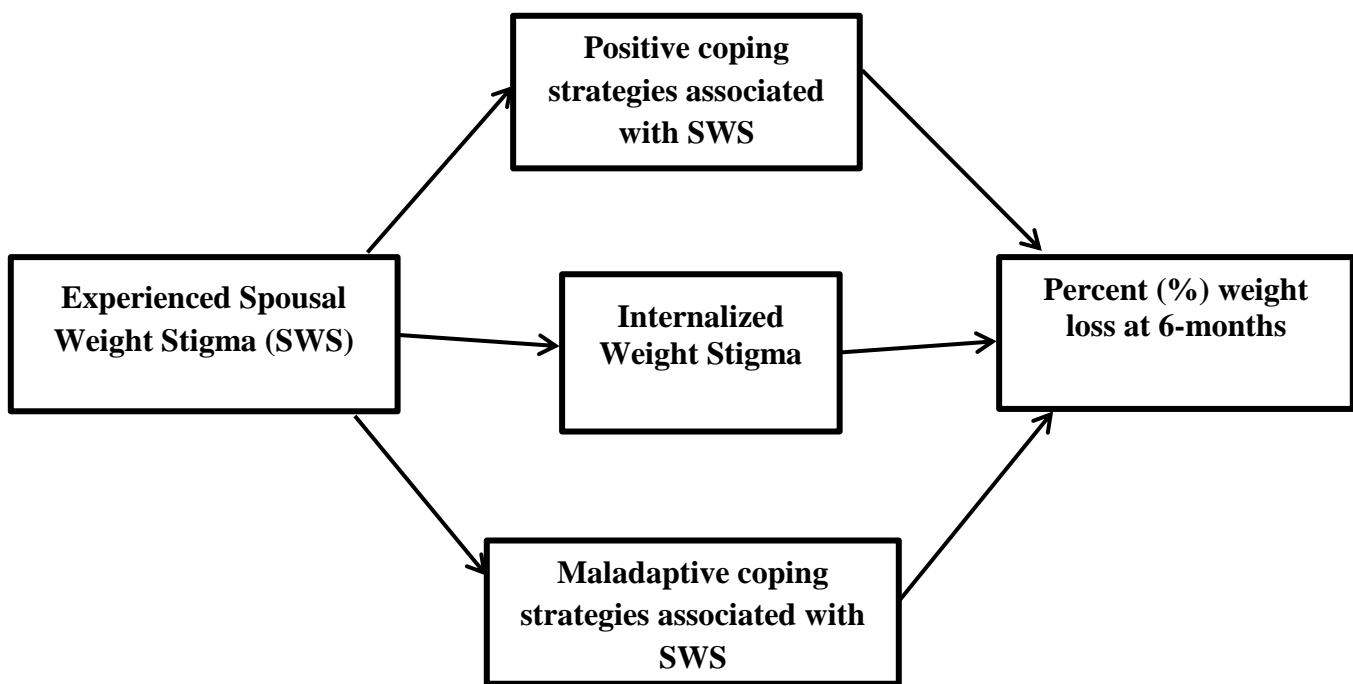
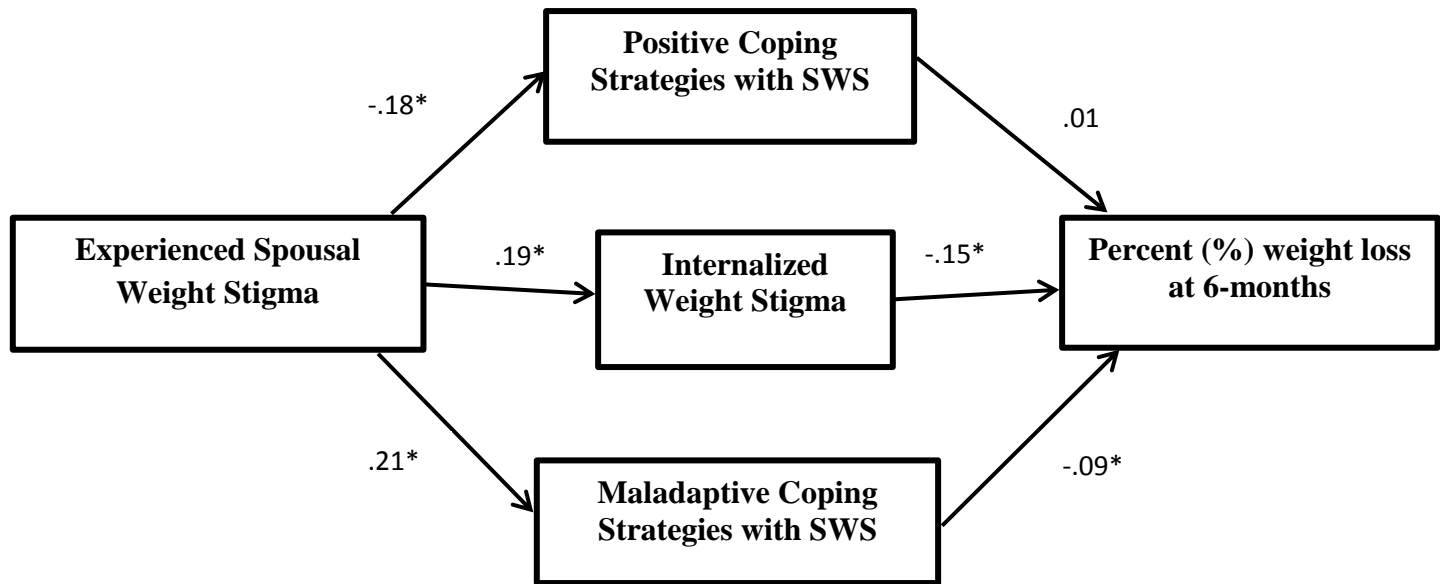


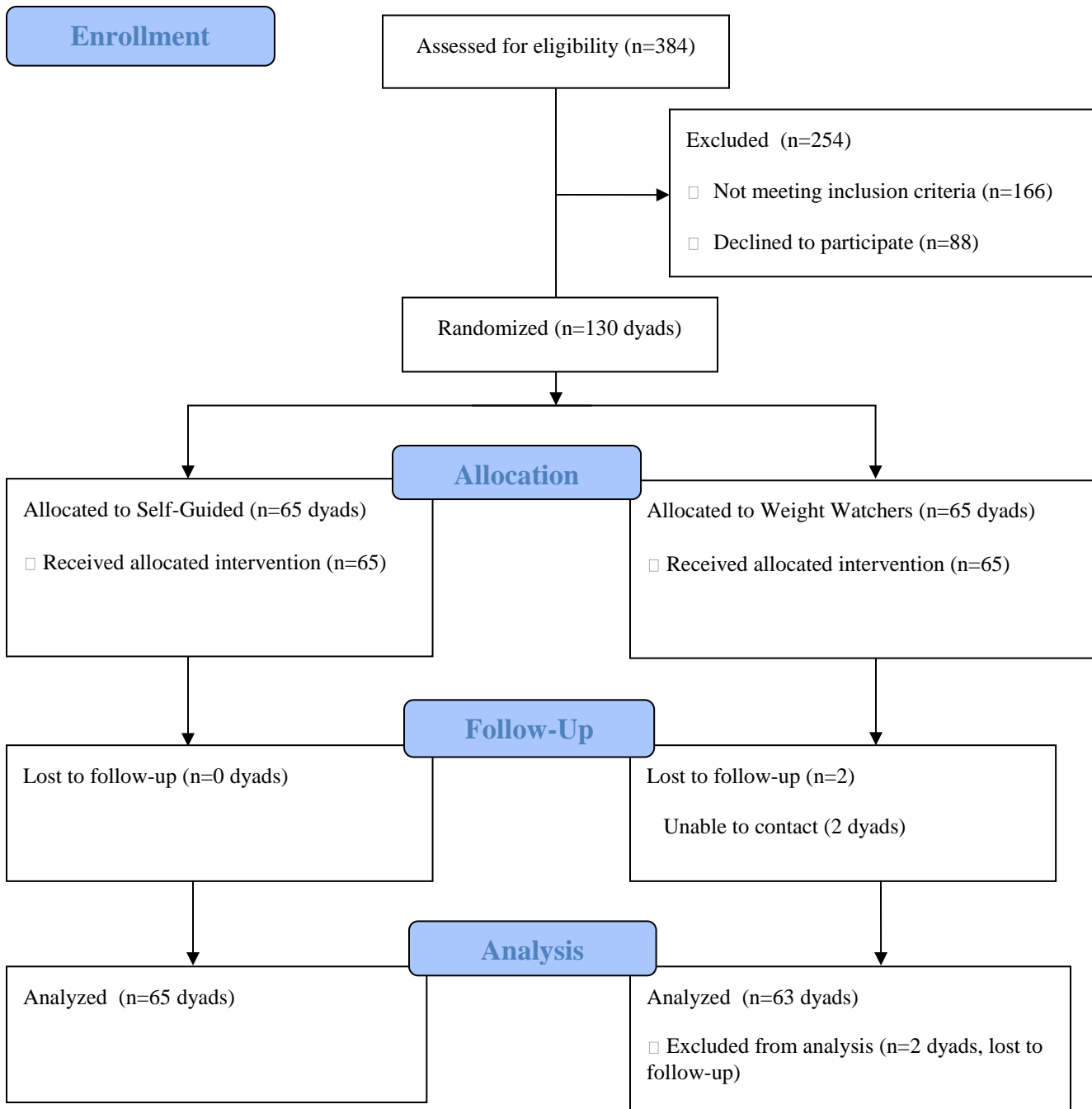
Figure 3. Results of the PROCESS Multiple Mediation Model



Direct effect, $b = -.52, p = .04$
 Indirect effect (IWS), $b = -.21$, BCa CI [-.37, -.10]
 Indirect effect (MCS), $b = -.09$, BCa CI [-.25, -.03]
 Indirect effect (PCS), $b = .04$, BCa CI [-.01, .19]

Note: * $p < .05$; IWS = internalized weight stigma; MCS = maladaptive coping strategies; PCS = positive coping strategies

Figure 4. Participant Flow in Study



Appendix C: Study-Related Materials (SRM)

SRM 1. Recruitment ad

Recruitment Ads for Weight Watchers and Families

PI: Dr. Amy Gorin

Ad #1:

Want to lose weight? Interested in trying a weight loss program for FREE?

If you are at least 25 years old, interested in losing weight, and you live with a spouse/significant other who is also overweight, this study may be for you!

Please contact the Weight Management Lab at (860) 486-3868 or email erin.lenz@uconn.edu and provide your name & a preferred phone number to reach you at so you can be screened for eligibility.

Ad #2:

Want to get healthy in the new year? Is 2015 the year you will focus on your health?

If you are at least 25 years old, interested in losing weight, and you live with a spouse/significant other who is also overweight, this study may be for you!

Please contact the Weight Management Lab at (860) 486-3868 or email erin.lenz@uconn.edu and provide your name & a preferred phone number to reach you at so you can be screened for eligibility.

UConn IRB	
Approved On	12/2/14
Approved Until	10/14/15
Approved By	JCH/12

SRM 2: Participant Informed Consent

Consent Form for Participation in a Research Study



Principal Investigator: Amy A. Gorin, Ph.D.

Study Title: Weight Watchers and Families – Participant

Sponsor: Weight Watchers

Introduction

You are invited to participate in a research study that is examining the impact of Weight Watchers on the weights and dietary and physical activity habits of untreated family members. You are being asked to participate because you are an overweight or obese individual who is at least 25 years old and you are interested in receiving free weight loss treatment.

Why is this study being done?

The purpose of this study is to better understand what happens to the weights and dietary and physical activity habits of untreated family members (i.e., spouses, children) when one member of a household joins a commercially available weight loss program.

What are the study procedures? What will I be asked to do?

If you choose to participate in this study, you will be invited to come to the University of Connecticut to complete a baseline assessment visit with your spouse and any children in your home. Your height and weight will be obtained by study staff, and you will be asked to complete questionnaires regarding your dietary choices, physical activity, weight management strategies, and relationship with your family. You will be asked to return to UConn to provide additional height and weight data and to complete similar questionnaires at 3 months and again at 6-months from your initial visit. Upon completion of the baseline questionnaires, you will be randomized to either a Weight Watchers program or to a self-help control group. If you are randomized to the self-help control group, at the end of the 6-month study, you will be given a 6-month membership to Weight Watchers.

What are the risks or inconveniences of the study?

There are minimal risks associated with study participation. There is a risk of some mild psychological discomfort in completing some of the measures including questions about your relationship with your family.

What are the benefits of the study?

You may not benefit from participation; however, all participants will receive free access to Weight Watchers for six months, although those randomized to the control group will receive that benefit after the study is completed. As a result, the dietary and physical activity habits of you and your family may improve. This study may provide important information about the reach of weight loss treatment that might have implications for insurers and other decision makers who regulate reimbursement of weight management interventions.

Will I receive payment for participation? Are there costs to participate?

You will receive \$25 for the baseline and 3-month assessment and \$50 for the 6-month assessment. Your family's entire visit will take approximately 60-75 minutes at baseline and 45-60 minutes at 3 and 6-months.

How will my personal information be protected?

Every effort will be made to ensure your confidentiality. You will be assigned a four-digit number for identification purposes and only these identification numbers will appear on your questionnaires and data collection documents. A master key matching your name to your identification number will be

maintained in a locked secure location at UConn's Center for Health, Intervention, and Prevention. Only research staff will have access to the information or be able to associate identification codes with individuals. All raw data collected in paper form will be stored in locked filing cabinets. All data will be reported in aggregate form only, in order to protect your identity. Individual participants will not be identified in any reports, papers, presentations or other media.

You and your family will have the option of completing surveys online. Online surveys will be administered using Qualtrics, a well-established service that is committed to keeping all participant data secure and confidential. All data is stored in a password protected database at a web hosting site that provides top of the line virtual and physical security. The web hosting facilities make use of firewalls, real-time security alerting using intrusion detection scanners, and 24-hour monitoring from their network operations center. The website itself is safeguarded against common hacker tricks. Physical security of database servers includes perimeter fencing, green field space, card access, biometric entries, and mantraps, 24-hour security guards and continuous camera surveillance inside and outside the facility's buildings. To prevent the possibility that data will be intercepted as it travels the internet, all data is encrypted in transmission, both when survey participants fill out surveys and when survey creators download their data. All electronic files will be password protected to protect the information from unauthorized access.

You should also know that the UConn Institutional Review Board (IRB) and the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

Can I stop being in the study and what are my rights?

Your participation in this study is completely voluntary. You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

Whom do I contact if I have questions about the study?

Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the principal investigator, Dr. Amy Gorin at 860-486-5670 or the project coordinator Erin Lenz at 860-486-3868. If you have any questions concerning your rights as a research subject, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802.

Documentation of Consent:

I have read this form and decided that I will participate in the project described above. Its general purposes, the particulars of involvement and possible hazards and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

Participant Signature:

Print Name:

Date:

Signature of Person
Obtaining Consent

Print Name:

Date:

SRM 3. Weight Stigma & Coping Measures

Experiences

Please think about your experiences and indicate your response to the following items by circling yes or no.

(1) Have you ever been teased by your partner because of your weight?	Yes or No
(2) Have you ever been treated unfairly by your partner because of your weight?	Yes or No
(3) Have you ever been discriminated against by your partner because of your weight?	Yes or No

Internalization

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

Note: Item 1 was excluded from analyses due to updated psychometrics of this measure (see methods)

The following are some strategies people use in order to deal with negative situations with their spouses related to their weight. For example, if your partner/spouse makes a mean comment about your appearance, you may try to make yourself feel better by insulting your spouse back. Using the scale below, please indicate whether, and how often, you have used each of the following strategies to cope with these situations.

	Never	Once	Multiple Times	Daily
1. I challenged negative thoughts that I have about myself. +	0	1	2	3
2. I cried about it, then got over it. +	0	1	2	3
3. I said something critical back to my spouse. -	0	1	2	3
4. I turned to my favorite foods to make me feel better. -	0	1	2	3
5. If my spouse said something to make me feel badly about my weight, I just wanted to eat more. -	0	1	2	3
6. I did something nice for myself to make me feel better. +	0	1	2	3
7. I didn't pay any attention to negativity from my spouse. +	0	1	2	3
8. I felt badly about myself. -	0	1	2	3
9. I got depressed and isolated myself. -	0	1	2	3
10. I got support from another family member or friend. +	0	1	2	3
11. I ignored the situation because I didn't want to confront my spouse. -	0	1	2	3
12. I laughed it off or joked about it. +	0	1	2	3
13. I told my spouse that my feelings were hurt. +	0	1	2	3
14. I pretended I did not hear the remark and walked away. +	0	1	2	3
15. It made me feel depressed, so I just ended up eating more. -	0	1	2	3
16. I thought to myself, "I can't lose weight, and so I won't try." -	0	1	2	3
17. I reminded myself that I have not done anything wrong; my size is not my fault. +	0	1	2	3
18. I avoided looking in the mirror so that I didn't have to think about my weight. -	0	1	2	3
19. If my spouse/partner was being critical, I asked him/her, "Then why don't you leave?" -	0	1	2	3
20. I avoided going out in public because I was afraid my spouse would make comments about my size. -	0	1	2	3
21. I treated myself to new clothes that looked good on me. +	0	1	2	3
22. If my spouse has a problem with how I look, I see it as their problem, not mine. +	0	1	2	3
23. I talked to supportive, understanding friends. +	0	1	2	3
24. I went on a diet in order to reduce or avoid discrimination/stigma based on my weight. -	0	1	2	3

Note: signs after items were included in this document to indicate subscale (+; positive) or (-; maladaptive)