The relationship between weight stigma and eating behavior is explained by weight bias internalization and psychological distress

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ABSTRACT

Weight stigma is associated with a range of negative outcomes, including disordered eating, but the psychological mechanisms underlying these associations are not well understood. The present study tested whether the association between weight stigma experiences and disordered eating behaviors (emotional eating, uncontrolled eating, and loss-of-control eating) are mediated by weight bias internalization and psychological distress. Six-hundred and thirty-four undergraduate university students completed an online survey assessing weight stigma, weight bias internalization, psychological distress, disordered eating, along with demographic characteristics (i.e., age, gender, weight status). Statistical analyses found that weight stigma was significantly associated with all measures of disordered eating, and with weight bias internalization and psychological distress. In regression and mediation analyses accounting for age, gender and weight status, weight bias internalization and psychological distress mediated the relationship between weight stigma and disordered eating behavior. Thus, weight bias internalization and psychological distress appear to be important factors underpinning the relationship between weight stigma and disordered eating behaviors, and could be targets for interventions, such as, psychological acceptance and mindfulness therapy, which have been shown to reduce the impact of weight stigma. The evidence for the health consequences resulting from weight stigma is becoming clear. It is important that health and social policy makers are informed of this literature and encouraged develop anti-weight stigma policies for school, work, and medical settings.

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1. Introduction

The past two decades have seen rapid growth in research detailing the extent and nature of prejudice and discrimination based on weight (Puhl & Heuer, 2009). Much of this work has focused on antipathy toward, and negative stereotyping of, overweight and obesity, which appears to have increased over time (Danielsdottir, O'Brien, & Ciao, 2010; Latner, Ebneter, & O'Brien, 2012; Latner & Stunkard, 2003; O'Brien et al., 2013). There have also been a number of studies documenting the extent of weight-related teasing and bullying, particularly among young people (Bucchianeri, Eisenberg, Wall, Piran, & Neumark-Sztainer, 2014; King, Puhl, Luedicke, & Peterson, 2013). Although weight stigma is more prevalent among individuals with overweight or obesity, there is evidence that weight stigma occurs across most weight categories (Puhl, Peterson, & Luedicke, 2013; Vartanian & Shaprow, 2008). For example, Puhl and Luedicke (2012) found that 29% of adolescents reported weight victimization, of which a substantial proportion (65%) had a body mass index (BMI) in the normal-weight range.

Experiences of weight stigma are associated with a range of negative behavioral and psychological consequences, such as binge eating, emotional eating, and psychological distress (Ashmore, Friedman, Reichmann, & Musante, 2008; Papadopoulos & Brennan, 2015; Puhl & Suh, 2015; Salwen, Hymowitz, Bannon, & O'Leary, 2015; Schvey, Puhl, & Brownell, 2011). Furthermore,

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weight bias internalization, or the tendency to accept and blame oneself for negative weight-based stereotypes and commentary (e.g., teasing) from others, has also been found to be associated with increased psychological distress, including stress, depression, anxiety, and disordered eating behaviors (Durso & Latner, 2008; Pearl & Puhl, 2014; Pearl, White, & Grilo, 2014; Schvey & White, 2015). Although there is a good evidence base linking weight stigma to a host of negative psychological and behavioral consequences, the evidence is less clear on who is most affected by weight stigma, and through what mechanisms weight stigma exerts its negative consequences.

Research is mixed on whether the rates and consequences (e.g., psychological distress, disordered eating behaviors) of weight-based stigma differ by gender (Gan, MohdNasir, Zalilah, & Hazizi, 2011; Puhl & Luedicke, 2012; Salwen et al., 2015; Vartanian, 2015). For example, Salwen et al. (2015) found no significant gender differences in weight-related abuse, binge eating, night eating, or unhealthy weight control. Vartanian (2015) also found no gender differences in rates of weight-stigma experiences, or in the associations between those stigma experiences and bulimic symptoms for men and women. In contrast, Puhl and Luedicke (2012) found that frequency and location (i.e., class vs. gym) of weight-based teaching affected girls and boys differently; boys were only affected by classroom-based teasing, whereas girls were affected by teasing in the classroom and the gym. Despite increasing evidence and concern about the extent and negative impact of weight stigma, particularly in populations with higher BMI's, there is a noted paucity of empirical research examining the relationships between weight stigma, weight bias internalization, psychological distress, and eating behavior (Papadopoulos & Brennan, 2015; Ratcliffe & Ellison, 2015).

Tomiyama (2014) recently proposed a Cyclic Obesity/Weight-Based Stigma (COBWEBS) model for explaining the link between weight stigma and eating behavior. The COBWEBS model proposes that weight stigma produces stress and accompanying responses (i.e., emotional, cognitive and physiological), which in turn lead to increased emotional eating and weight gain/obesity, which in turn increases vulnerability to weight stigma. Three studies lend tentative support to the COBWEBS model. Ashmore et al. (2008) found that weight stigma, disordered eating behavior, and psychological distress were all strongly correlated, and in particular noted that the relationship between weight stigma and disordered eating behavior was mediated by the amount of psychological distress resulting from the stigma. Similarly, Salwen et al. (2015) found that emotional responses to weight stigma fully mediated the relationships between weight stigma and disordered eating behaviors, which included emotional eating, binge eating, and night eating. Finally, Gan et al. (2011) examined the relationships between weight teasing, psychological distress and disordered eating, and found that weight teasing had a significant direct and indirect (through psychological distress) relationship with disordered eating for both males and females.

The COBWEBS model did not specifically include weight bias internalization, but internalization may also be important to consider in understanding the negative effects of weight stigma. Ratcliffe and Ellison (2015) proposed that the weight stigmatizing environment leads to and maintains internalized weight stigma. Weight bias internalization may in turn be associated with psychological distress (i.e., anxiety, depression, mood), eating and weight-related behaviors, and other social and attitudinal outcomes. There is some research in support of Ratcliffe and Ellison (2015) model (e.g., Hilbert, Braehler, Haeuser, & Zenger, 2014; Pearl et al., 2014; Carels et al., 2010). For example, Durso and Latner (2008) found that weight bias internalization was strongly associated with psychological distress and frequency of binge eating in the past 3 and 6 months. To our knowledge, no published research has empirically assessed the relationships among weight stigma, weight bias internalization, psychological distress and disordered eating behavior. Understanding the impact of stigma and its inter-relationships with psychological and physical health is important for the development of social policy aimed at preventing stigma; and/or the development of interventions for building resilience and thus reducing the impact of weight-stigma on psychological and physical health.

The present study seeks to address an important gap in the literature by examining relationships among weight stigma, eating behavior, weight bias internalization, and psychological distress. In doing so, we build on previous evidence by combining and testing posited mechanisms from two newly proposed models (Ratcliffe & Ellison, 2015; Tomiyama, 2014). Based on previous research in individuals across the weight-spectrum, it was hypothesized that weight stigma, weight bias internalization, and psychological distress would be related to disordered eating behavior. Further, we hypothesized that the relationship between weight stigma and eating behaviors would be explained by weight bias internalization and psychological distress (see Fig. 1), after accounting for other confounds (e.g., weight status, gender).

2. Material and methods

2.1. Participants

Undergraduate university students from Monash University in Australia were invited to participate in this study in exchange for course credit. Monash University is the largest university in Australia with an overall enrollment of approximately 62,000. Data collection took place across the months of March and April 2015. Of 695 students invited to participate in the study, 634 gave consent and subsequently provided answers to an online questionnaire hosted by Qualtrics.com (response rate = 91.2%; 168 males, 26.6%). The mean age was 19.7 years (SD = 3.07), and mean BMI, based on self-reported height and weight, was 22.4 kg/m^2 (SD = 4.14). For BMI categories, 9.1% were underweight (BMI < 18.5), 71.9% were normal weight (BMI 18.5—24.9), 14% overweight (BMI 25—29.9), and 4.1% obese (BMI ≥ 30; Center of Disease Control). Three participants did not provide height and/or weight information. Sixty percent of the participants identified as White, 37% were Asian or Pacific Islander, and 3% identified as Black. This study was approved by the university's ethics committee.

2.2. Measures

To assess weight stigma, we used five modified items from the weight teasing subscale of the Perception of Teasing Scale (POTS), a reliable and valid measure of weight-related teasing experiences (Thompson, Cattarin, Fowler, & Fisher, 1995). The POTS has two components that assess 1) the frequency of weight stigma, and 2) the extent to which stigmatising events upset the individual. We slightly modified the weight stigma frequency items to be relevant to participants across weight categories, rather than to overweight or heaviness specifically (e.g., 'People made fun of you because of your weight' was used instead of 'People made fun of you because you were heavy'). Additionally, we took two items related to sibling and parent teasing, respectively, and created a single item assessing family weight stigma (i.e., A family member (sibling or parent) makes fun of your weight). Participants indicated the frequency with which they experience stigma events using a scale ranging from 1 = never to 5 = very often; and, if they had experienced such events, how upset that made them (upset scoring ranged from 0 = never teased so no upset to 5 = very upset). Cronbach's alpha for the stigma
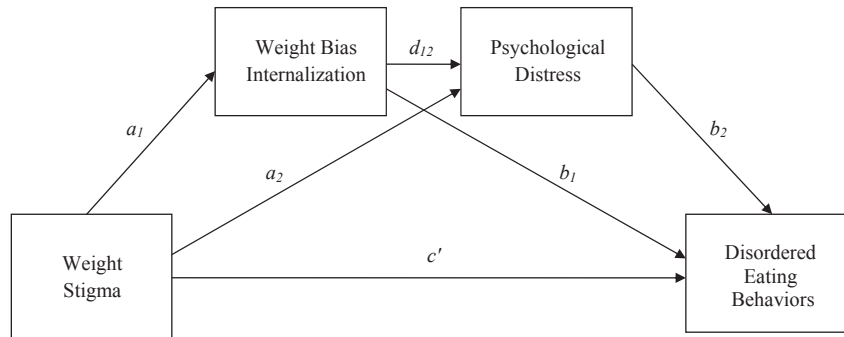
Fig. 1. Conceptual model.

frequency and upset items were .80 and .89, respectively. Preliminary analysis showed that the two components were highly correlated $r = .69$. For parsimony and to reduce familywise error, we created a stigma-total score by calculating a mean from both the stigma frequency and upset scale scores. Cronbach's alpha for the stigma-total score was .81. Stigma-total scores ranged from 2.5 to 15, with higher scores representing greater weight stigmatization.

The 11-item Weight Bias Internalization Scale-Modified (WBIS-M; Pearl & Puhl, 2014) is a reliable and valid measure of the degree to which individuals accept and internalize negative weight-related stereotypes, attitudes, and commentary. Participants responded to each item (e.g., *I hate myself because of my weight*) using a 7-point scale ranging from 1 = strongly disagree to 7 = strongly agree. Cronbach's alpha for this measure was .93. Higher scores indicate greater internalization of weight bias.

Psychological distress was assessed using the 21-item Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 has been shown to be reliable in Australian, UK, US, and Asian populations (Oei, Sawang, Goh, & Mukhtar, 2013) and has three 7-item subscales (depression, anxiety, and stress). Participants respond to items (e.g., *I felt down-hearted and blue*; *I felt scared without any good reason*; *I tend to over-react to situations*) using a 4-point scale ranging from 0 = never to 3 = almost always. Scores for items in their respective subscales are summed, ranging from 0 to 21. In addition, a composite depression, anxiety, and stress score representing general psychological distress (DASS-total) can be calculated (range 0—63). Cronbach's alphas for the depression, anxiety and stress subscales were .88, .82 and .85, respectively, and .92 for the DASS-total. Higher scores represent more psychological distress. In the current study we examined the DASS-total score only. It is worth noting the correlations between the depression, anxiety, and stress subscales were high ($r \geq .60$), and all were strongly related to the DASS-total score (all $rs > .85$).

The Three Factor Eating Questionnaire (TFEQ-R18; de Lauzon et al., 2004) and Loss of Control of Eating Scale (LOCES; Latner, Mond, Kelly, Haynes, & Hay, 2014) were used to assess disordered eating behaviors. The TFEQ-R18 has three subscales assessing emotional eating (e.g., *When I feel down, I often overeat*), uncontrolled eating (e.g., *Sometimes when I start eating, I just can't seem to stop*), and cognitive restraint (not examined in this study as it was not considered a behavioral eating disturbance). Participants indicate how true or false statements are regarding their own eating behavior (e.g., *I felt like the craving to eat overpowered me*; 1 = definitely false to 4 = definitely true). Consistent with de Lauzon et al. (2004), raw scale scores were transformed to a scale ranging from 0 to 100 [(raw score−lowest possible raw score)/ possible raw score range) × 100]. Cronbach's alpha's for emotional eating and uncontrolled eating were .86, and .87, respectively. The LOCES (Latner et al., 2014) is a reliable and validated 24-item

measure that assesses diverse aspects of loss of eating control (i.e., behavioral, cognitive/dissociative, and euphoric). In the present study we used the brief 7-item LOCES (LOCES-B), which is highly correlated with the full LOCES ($r = .96$). Both the LOCES and LOCES-B have been found to be associated with a range of measures related to poorer psychological functioning and disordered eating behavior (Latner et al., 2014). Items are scored on a 5-point scale (1 = never to 5 = always), with higher score indicating greater loss of control of eating. Cronbach's alpha in the present study was .90.

2.3. Analysis

Participants were categorized into two weight categories based on BMI (non-overweight BMI < 25, and overweight BMI ≥ 25). T-tests were conducted to examine differences between non-overweight and overweight groups on the variables of interest. Pearson's correlation coefficients were calculated, and the co-efficients for variables are reported separately for non-overweight and overweight participants. Hierarchical linear regression models utilizing the whole sample examined predictors of emotional eating, uncontrolled eating, and the LOCES-B. Demographic variables (i.e., age, weight status, gender) were entered in the first step. Stigma-total, WBIS, and DASS-21, were entered in a second, third, and fourth step, respectively. We report unstandardized coefficients, standard errors, standardized coefficients, and adjusted R^2's for models. Finally, we conducted serial mediation analyses using *PROCESS* (Hayes & Preacher, 2014) to establish whether weight stigma had a significant indirect effect on eating behaviors through the WBIS and DASS-21 (i.e., the a_1-d_{21}-b_2 path) after controlling for age, weight status, and gender. We report the coefficients for each of the paths outlined in Fig. 1. While not reported here, we conducted an exploratory moderated mediation analysis with gender and continuous BMI as moderators. The pattern of results did not vary as a function of gender or BMI.

3. Results

Eighty-one percent of overweight participants and 68% of non-overweight participants reported at least one incident of weight stigma. As can be seen in Table 1, overweight participants reported significantly higher levels of weight stigma (stigma-total), weight bias internalization (WBIS-M), emotional and uncontrolled eating, and loss of control over eating (LOCES-B), compared to non-overweight participants. There was no significant difference in DASS-21 scores for overweight and non-overweight participants.

3.1. Bivariate analyses

There were a number of significant correlations between the

Table 1
Mean (SD) participant ratings for overweight and non-overweight groups on each of the variables along with T-values, significance levels, and effect size's for group differences.

Variables	Non-overweight (N = 514)	Overweight (N = 117)	T value	p value	Effect size[a] d'
Age	19.51 (2.33)	20.43 (5.36)	2.93	.004	.30
BMI	20.96 (2.07)	28.96 (4.65)	28.52	.0001	1.93
Gender	.74 (.44)	.69 (.47)	−1.21	.227	.11
Stigma total	4.28 (1.72)	5.65 (2.47)	7.10	.0001	.70
WBIS	2.77 (1.29)	3.91 (1.65)	7.99	.0001	.80
DASS-21	28.28 (20.91)	30.75 (25.15)	1.11	.267	.11
Emotional eating	24.69 (19.91)	31.09 (23.34)	3.06	.002	.31
Uncontrolled eating	30.02 (14.33)	33.25 (16.71)	2.28	.033	.22
LOCES-B	1.84 (.79)	2.29 (1.02)	5.32	.0001	.53

Note.
[a] Cohen's d', small effect ≈ .2 moderate effect ≈ .5, large effect ≈ .8+. Stigma Total = M of stigma frequency and harms combined, WBIS = Weight Bias Internalization Scale, DASS-21 = Total score of Depression, Anxiety and Stress combined, LOCES-B = Loss of Control of Eating-Brief.

Table 2
Pearson's product moment correlations between all variables. Correlations for overweight participants (N = 117) are displayed above the diagonal, and non-overweight participants (N = 514) are displayed below the diagonal.

	1	2	3	4	5	6	7	8	9
1.Age	–	.09	-.03	.01	−.18	−.11	−.01	−.19*	−.20*
2.BMI	.09*	–	.12	.29**	.29**	.16	.07	.03	.05
3.Gender	−.20***	−.22***	–	.27**	.37***	.17	.41***	.17	.31**
4.Stigma-total	−.07	.02	.18***	–	.62***	.43***	.44***	.36***	.44***
5. WBIS	−.04	.15**	.23***	.56***	–	.51***	.52***	.47***	.65***
6. DASS-21	.10*	−.09	.10*	.33***	.42***	–	.37***	.29**	.47***
7. Emotional Eating	−.08	.07	.33***	.24***	.35***	.21***	–	.67***	.72***
8. Uncontrolled Eating	−.05	.08	.17***	.24***	.30***	.22***	.60***	–	.78***
9. LOCES- B	−.00	.13**	.22***	.30***	.49***	.34***	.49***	.66***	–

*$p < .05$, **$p < .001$, ***$p < .0001$.

predictor variables and the eating measures (see Table 2), with the magnitude of these correlations larger, but not significantly larger ($ps > .05$), for overweight participants than for non-overweight participants. For overweight participants, stigma-total was strongly correlated with the WBIS-M, DASS-21, and the three eating measures. In particular, there was a large correlation between stigma-total and the WBIS-M. Similarly, the WBIS-M was strongly related to the DASS-21, and the three eating measures ($rs = .47$ to .65). DASS-21 scores were also strongly related to the eating measures ($rs = .29$ to .47).

For non-overweight participants (see Table 2), stigma-total was also correlated with the WBIS-M, DASS-21, and the three eating measures. WBIS-M and DASS-21 scores were also related to eating measures, however, the correlation coefficients were smaller ($rs = .21$ to .49) than those observed for overweight participants.

3.2. Regression models

Table 3 displays the results of the hierarchical regression analyses for the whole sample where each of the three eating measures was regressed onto the predictor variables. All models were significant (all $ps < .001$), and all exhibited significant changes in the R^2 across steps (all $ps < .01$). Across all regression analyses, the relationship between stigma-total and eating behavior decreased following the entry of WBIS-M and DASS-21 in models. For emotional eating, the initial model containing age, weight status, and gender accounted for 13% of the variance, with overweight and female status emerging as significant predictors of emotional eating. In the second model, stigma-total was a significant predictor of emotional eating and accounted for another 5.5% of variance in eating scores; however, overweight was no longer a significant predictor. The entry of WBIS-M accounted for an additional 5% variance. The entry of DASS-21 in a final model accounted for

another .8% of the variance. In the final model, stigma-total was no longer a significant predictor, however, female status, WBIS-M and DASS-21 scores were all significant predictors of emotional eating.

A similar pattern of results was observed for uncontrolled eating. However, the predictor variables accounted for significantly less variance in uncontrolled eating scores, with the full model (Model 4) explaining 15% of the variance. Age, overweight, and being female accounted for 4% of the variance in uncontrolled eating scores. Again, the association between overweight and uncontrolled eating became non-significant following the entry of stigma-total. Stigma-total accounted for an additional 6% of the variance in uncontrolled eating scores. The association between stigma-total and uncontrolled eating was reduced following the entry of WBIS-M and DASS-21 scores. The WBIS-M and DASS-21 accounted for an additional 5% and 1% of the variance in uncontrolled eating, respectively. However, while the coefficient for stigma-total was reduced following the entry of WBIS-M and DASS-21, it remained a significant predictor in the final model.

Age, overweight, and being female accounted for 10% of the variance in LOCES-B scores in the initial model, with the entry of stigma-total accounting for an additional 9% of the variance. Stigma-total was not a significant predictor after accounting for the WBIS-M, which explained an additional 14% of the variance in LOCES-B scores. The DASS-21 was also a significant predictor in the final model, accounting for an additional 2% of the variance.

3.3. Mediation analysis

In serial mediation analyses controlling for age, gender, and weight-status, the indirect path from stigma-total to disordered eating behavior through WBIS-M and DASS-21 was significant for all three eating outcomes (see Table 4 for all path coefficients). For emotional eating, the indirect effect coefficient was .23, $SE = .10$,

Table 3
Regression models reporting unstandardized (B) and standardized beta's (β) and standard errors (SE) for predictors of the respective eating measures.

Emotional Eating

Variables	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Emotional Eating												
Age	−.01	.26	−.00	.00	.25	.00	.10	.24	.02	.07	.24	.01
Overweight (ref non-overweight)	6.73	2.06	.13**	2.98	2.08	.06	.22	2.07	.00	.91	2.08	.02
Gender	16.63	1.80	.36***	14.32	1.78	.31***	12.33	1.75	.27**	12.40	1.75	.27**
Stigma Total		—		2.62	.42	.25**	1.02	.48	.10*	.87	.48	.08
WBIS		—			—		4.18	.67	.29***	3.58	.71	.25**
DASS-21	—		—	—						.10	.04	.10*
R^2			.13***			.19***			.24***			.24***
Uncontrolled Eating												
Age	−.34	.19	−.07	−.33	.19	−.07	−.26	.18	−.06	−.29	.18	−.06
Overweight (ref non-overweight)	4.04	1.55	.11*	1.20	1.57	.03	−.63	1.57	−.01	−.07	1.57	−.00
Gender	5.34	1.35	.16**	3.59	1.34	.11*	2.27	1.33	.07*	2.32	1.32	.07*
Stigma Total		—		−1.98	.31	.26**	.92	.36	.12*	.80	.36	.11*
WBIS		—			—		2.78	.51	.27**	2.29	.54	.22**
DASS-21		—			—			—		.08	.03	.12*
R^2			.04**			.10**			.14**			.15**
LOCES-B												
Age	−.01	.01	−.05	−.01	.01	−.04	−.01	.01	−.02	−.01	.01	−.03
Overweight (ref non-overweight)	.49	.09	.22**	.29	.09	.13**	.10	.08	.04	.15	.08	.07
Gender	.46	.08	.24**	.34	.07	.18**	.20	.07	.10*	.20	.07	.10*
Stigma Total		—		.14	.02	.32**	.02	.02	.06	.01	.02	.03
WBIS		—			—		.30	.03	.50***	.26	.03	.43***
DASS-21		—			—			—		.01	.00	.18**
R^2			.10**			.19***			.33***			.35***

*$p < .05$, **$p < .001$, ***$p < .0001$ Note: All VIF's were below 2.0.

Table 4
Regression coefficients and standard errors for the serial mediation model presented in Fig. 1. All models account for age, weight status and gender.

Antecedent	Consequent											
	WBIS				DASS-21				Emotional eating		
	Coeff.	SE	p		Coeff.	SE	p		Coeff.	SE	p
Stigma total	a_1	.38	.02	<.001	a_2	1.55	.51	.003	c'	.87	.48	.07
WBIS		—	—	—	d_{12}	6.12	.72	<.001	b_1	3.58	.71	<.001
DASS		—	—	—		—	—	—	b_2	.10	.04	.01
Antecedent		WBIS				DASS-21				Uncontrolled eating		
		Coeff.	SE	p		Coeff.	SE	p		Coeff.	SE	p
Stigma Total	a_1	.38	.02	<.001	a_2	1.55	.51	.003	c'	.80	.36	.03
WBIS		—	—	—	d_{12}	6.12	.72	<.001	b_1	2.29	.54	<.001
DASS		—	—	—		—	—	—	b_2	.08	.03	.01
Antecedent		WBIS				DASS-21				LOCES-B		
		Coeff.	SE	p		Coeff.	SE	p		Coeff.	SE	p
Stigma Total	a_1	.44	.02	<.001	a_2	1.49	.50	.003	c'	.01	.02	.47
WBIS		—	—	—	d_{12}	5.53	.69	<.001	b_1	.26	.03	<.001
DASS		—	—	—		—	—	—	b_2	.01	.002	<.001

95% CI = .04, .44; for uncontrolled eating, the indirect effect coefficient was .19, SE = .08, 95% CI = .03, .37; and for LOCES-B, the indirect effect coefficient was .02, SE = .005, 95% CI = .01, .03.

4. Discussion

A growing body of evidence indicates that weight stigma can have negative consequences for psychological functioning and behavioral outcomes such as disordered eating behaviors. However, the mechanisms underpinning the relationship between weight stigma and disordered eating behavior have not been adequately investigated (Papadopoulos & Brennan, 2015; Ratcliffe & Ellison, 2015; Tomiyama, 2014). The present study tested models in which the relationship between weight stigma experiences and disordered eating behavior were mediated by weight bias internalization and psychological distress. We found that weight stigma was associated with greater emotional eating,

uncontrolled eating, and loss-of-control eating. Furthermore, we found that these associations were mediated by both weight bias internalization and psychological distress. Specifically, weight stigma was associated with greater weight bias internalization, which was associated with greater psychological distress, and greater psychological distress was associated with greater disordered eating behavior. These findings add to the extant literature by suggesting a chain of processes involved in the negative effects of stigma.

These results are in line with previous research showing that weight stigma is associated with psychological distress and disordered eating behaviors (Ashmore et al. 2008; Gan et al., 2011; Puhl & Suh, 2015; Salwen et al., 2015). However, it is noteworthy that the present findings documented an identical pattern of associations for both overweight and non-overweight participants, even though participants who were overweight experienced higher levels of weight stigma than non-overweight participants, and even though

the magnitude of the association between weight stigma and the psychological and behavioral outcomes was somewhat greater for overweight participants. Accordingly, the findings are also consistent with other work (Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006) indicating that even individuals who are not classified overweight or obese by BMI standards can still experience weight stigma and its associated negative consequences.

The relationship between weight bias internalization, psychological distress and disordered eating behavior outcomes needs clarification. Taken at face value, the results appear to suggest that weight bias internalization is a more important factor than psychological distress in understanding the relationship between weight stigma and disordered eating behavior. However, it is important to note that two of the 11 items within the weight bias internalization measure (WBIS-M) may also capture elements of psychological distress (e.g., *Whenever I think a lot about my weight, I feel depressed, and I feel anxious about my weight because of what people might think of me*). Similarly, one item in the WBIS-M appears to capture body dissatisfaction (e.g., *I am less attractive than most other people because of my weight*). Thus, while clearly capturing internalized stigma, the WBIS-M also appears to capture aspects of psychological distress and body dissatisfaction. This may explain why it has such a strong relationship with both psychological distress and disordered eating behaviors. Thus, it would be useful for future research to distinguish more clearly between the role of internalized weight bias, psychological distress, and perhaps body dissatisfaction, in explaining the association between weight stigma and disordered eating behavior.

The study findings suggest that assessment of perceived weight stigma and weight bias internalization may be important in clinical settings, and particularly in clients seeking treatment and help for eating-related problems (e.g., bulimia nervosa and anorexia nervosa) or obesity. Because weight stigma is common and has few legal protections (Puhl & Suh, 2015), early identification of weight stigma and weight bias internalization would allow health professionals to provide psychological interventions and coping strategies, such as psychological acceptance and mindfulness therapy (Lillis, Hayes, Bunting, & Masuda, 2009), to help reduce the impact of weight stigma, while engaged in treatment. Initial research on such weight stigma coping interventions is promising, and suggests that such interventions may be effective in reducing the psychological distress and weight-related outcomes arising from weight stigma (Lillis et al., 2009).

There are limitations to the present study. Although not germane to this study's primary aims, race and ethnicity may be important variables to explore to better understand the relationship between weight stigma and eating. Given that approximately one third of our sample identified as Asian or Pacific Islander, we conducted simple between ethnicity comparisons, but found no significant difference between ethnicities on any of the measures in this study. However, it will be important to examine potential racial and ethnic differences in future work. Similarly, although the sample is of reasonable size, only 26% were men. Given that gender was a significant predictor in all models, larger samples of men would be beneficial to examine the relative magnitude of the effects observed here for men versus women. Furthermore, while the present sample may have contained individuals with clinical relevant psychopathology and eating behaviors, the effects observed here may be considerably larger in clinical populations with body image and eating-related problems. Finally, while the results are consistent with similar research (Ashmore et al., 2008; Puhl & Suh, 2015; Salwen et al., 2015) the cross-sectional design does not allow for causal inferences to be made. While the pattern of relationships tested here are theoretically sound, it is possible that the sequence of mediators could be reversed, with weight bias internalization mediating the relationship between psychological distress and eating behaviors.

Notwithstanding these limitations, the present results suggest that the well-established relationship between weight stigma and disordered eating behaviors is explained by participants' weight bias internalization and their psychological distress. Longitudinal research is needed to better clarify the nature and progression of the relationships between weight stigma, weight bias internalization, psychological distress and disordered eating behaviors. Interventions aimed at reducing the development of weight bias internalization and psychological distress following weight stigma appear seem warranted. Such interventions would also help further clarify pathways between weight stigma and eating behavior, along with other negative health consequences of stigma. Finally, it is important that health and social policy makers are made aware of the relationship between weight stigma and the host of negative consequences so they can consider the value in developing anti-weight stigma policies for school, work, and medical settings.

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