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Weight Stigma and Health: The Mediating Role of Coping Responses

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Objective: Considerable evidence has documented links between weight stigma and poor health, independent of weight. However, little research has assessed how individuals cope with weight stigma, and how stigma-specific coping responses contribute to health. The present study examined multiple stigma-specific coping responses as mediators of the relationship between experienced weight stigma and health. ***Method:*** A diverse national sample of 912 adults (53.9% female, M_{age} = 40.33, SD = 15.58) reporting experiences of weight stigma completed questionnaires about stigma, stigma-specific coping responses (i.e., coping with weight stigma via negative affect, maladaptive eating behavior, healthy lifestyle behavior, and exercise avoidance), and health indices including depressive symptoms, physical health, psychological wellbeing, dieting frequency, and self-esteem. ***Results:*** Stigma-specific coping responses mediated the relationship between experienced weight stigma and all health indices, though indirect effects of weight stigma on health varied by coping strategy. Weight stigma was indirectly associated with greater frequency of depressive symptoms, lower scores on psychological wellbeing, self-esteem and physical health through coping via negative affect. Weight stigma indirectly contributed to greater frequency of depressive symptoms and dieting, as well as lower self-esteem and poorer physical health through coping via maladaptive eating. Weight stigma was associated with less frequent depressive symptoms, more frequent dieting, better psychological wellbeing, better self-esteem, and better physical health through coping with healthy lifestyle behaviors. ***Conclusions:*** These findings suggest that it may be useful to address weight stigma and coping in the context of weight management and obesity treatment programs, to help protect individuals from negative health effects of experiencing weight stigma.

Keywords: weight stigma, coping, physical health, psychological health, prejudice

Weight stigma, stereotyping, and devaluation on the basis of excess body weight, is a prevalent and pernicious problem (Puhl et al., 2015; Sabin, Marini, & Nosek, 2012). Experiences of weight stigma undermine physical and psychological health. A large and methodologically diverse literature links exposure to weight stigma to a range of poor health outcomes including obesity (Sutin & Terracciano, 2013), weight gain (Jackson, Beeken, & Wardle, 2014; Nolan & Eshleman, 2016), metabolic syndrome (Pearl et al., 2017), physical activity avoidance (Vartanian & Novak, 2011), heart disease (Sutin, Stephan, Carretta, & Terracciano, 2014), stress (Himmelstein, Incollingo Belsky, & Tomiyama, 2015; Tomiyama et al., 2014), and depression (Friedman, Ashmore, & Applegate, 2008; Hatzenbuehler, Keyes, & Hasin, 2009; Puhl & Brownell, 2006; Puhl & Heuer, 2010).

Collectively, this evidence suggests that weight stigma may create significant barriers to effective obesity prevention and treatment. For example, adults experiencing weight stigma report (a) worse subjective health that declines over time, (b) increased weight gain over time (Jackson et al., 2014; Sutin et al., 2014), and (c) increased difficulty maintaining weight loss compared with adults who do not experience weight stigma (Puhl, Quinn, Weisz, & Suh, 2017), even after accounting for Body Mass Index (BMI). Weight stigma may exacerbate weight gain because it is causally linked with overeating and increased caloric consumption (Major, Hunger, Bunyan, & Miller, 2014; Puhl, Moss-Racusin, & Schwartz, 2007; Schvey, Puhl, & Brownell, 2011; Vartanian & Porter, 2016). Weight stigma is also associated with cortisol reactivity (Himmelstein et al., 2015), which is linked with abdominal adiposity (Incollingo Rodriguez et al., 2015). Further, weight stigma is associated with depleted dietary self-efficacy among overweight women (Major et al., 2014) and binge-eating (Durso, Latner, & Hayashi, 2012; Puhl et al., 2007). Weight stigma is consistently tied to poor psychological health indices including depression, anxiety, low self-esteem, eating related psychopathology, and body dissatisfaction independent of sociodemographic characteristics and other forms of stigma (Benas & Gibb, 2008; Friedman et al., 2008; Hatzenbuehler et al., 2009; Puhl, Andreyeva, & Brownell, 2008; Puhl & Brownell, 2006; Puhl & Heuer, 2010; Salwen, Hymowitz, Bannon, & O'Leary, 2015).

Despite considerable evidence of the relationship between experienced weight stigma and subsequent poor health, comparatively fewer studies have focused on how individuals cope with weight stigma and how stigma-specific coping responses (i.e., positive and negative approaches used to cope with the distressing

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experience of stigma) might contribute to health. Understanding the role of coping in the stigma-health relationship is essential to inform strategies to help reduce poor health outcomes resulting from experienced stigma, particularly if coping responses reinforce a health problem, as may be the case for obesity (Tomiyama, 2014). The limited evidence that exists suggests that coping responses could play an important role in reducing or exacerbating health consequences of weight stigma. Evidence from the broader literature on stress and coping shows that disengagement coping responses (e.g., avoidance) are related to increased psychological distress, maladjustment, and physical symptoms (Miller & Kaiser, 2001), while coping responses like distraction, cognitive restructuring, and acceptance tend to be adaptive, particularly when a stressor is uncontrollable. While the literature on health consequences of weight stigma has grown exponentially over the past several decades, there has been little synthesis in the area of coping with weight stigma (Hayward, Vartanian, & Pinkus, 2017). An early review (Puhl & Brownell, 2003) on coping in response to weight stigma provided some initial insights by identifying several strategies that individuals use when faced with weight stigma including confirming negative perceptions of oneself, attributing negative feedback to others while focusing on personal strengths, compensatory action, denying responsibility, negotiation of identity, confrontation, activism, avoidance, and weight loss.

The few studies that have considered the role of coping in the relationship between weight stigma and health have focused almost exclusively on the outcomes of psychological functioning and depression (Fettich & Chen, 2012; Myers & Rosen, 1999; Puhl & Brownell, 2006; Puhl & Luedicke, 2012). This research has found that disengagement or coping involving self-blame (e.g., negative self-talk, crying, isolation, and avoidance) in response to weight stigma is generally associated with poor psychological functioning (Fettich & Chen, 2012; Myers & Rosen, 1999; Puhl & Brownell, 2006). Acceptance-based coping responses (e.g., positive self-talk, attributing stigma as problem with the other person, self-love) are not associated with better scores on psychosocial measures (Myers & Rosen, 1999) or are associated with better scores on psychosocial measures only for women (Puhl & Brownell, 2006). Specific to depression, positive self-talk, social interaction, and seeking therapy after stigma have been found to mediate the relationship between experiencing weight stigma and depression (Koball & Carels, 2011). Weight-based teasing in childhood is associated with the development of a cognitive style in which individuals make global and stable attributions about negative situations, which increases vulnerability to depression (Benas & Gibb, 2008). Developing this cognitive style mediates the relationship between weight-based teasing in childhood and depression in young adulthood (Benas & Gibb, 2008). Of concern for obesity, one of the first studies examining coping with weight stigma found that 79% of individuals reported coping with stigmatizing situations by eating more food (Puhl & Brownell, 2006). While not specific to coping, Salwen and colleagues (2015) found that the perceived emotional impact of weight-based abuse mediated the relationship between weight stigma and symptoms of disordered eating.

Few studies examine coping as it relates to weight stigma and physical health. In one exception, Lillis and colleagues (2011) found that, among individuals seeking treatment for obesity, the relationship between obesity and health-related quality of life was partially accounted for by weight stigma experiences and coping via experiential avoidance (i.e., avoidance or suppression of thoughts and emotions despite these efforts causing harm to the individual; Lillis et al., 2011). Notably, no studies have examined coping responses as mediators between experienced weight stigma and physical health outcomes, self-esteem, or dieting behavior. Further, no studies have examined weight stigma-specific coping responses and their associations with behavioral or physical health.

This study addresses notable gaps in the literature by (a) examining an understudied mechanism (coping responses) that may explain the relationship between weight stigma and health; (b) investigating the relationships between coping responses and multiple health outcomes (dieting frequency, depressive symptoms, psychological wellbeing, physical health, and self-esteem); and (c) assessing stigma-specific coping (i.e., coping strategies used in response to weight stigma) rather than more general coping (i.e., nonstigma specific) responses to stressors. Because individuals do not tend to cope in a single way, but rather typically use several different strategies in response to stressors (Folkman & Lazarus, 1985; Lazarus & Folkman, 1984), the present study considered the simultaneous effects of coping responses as contributors to health indices. It was hypothesized that weight stigma would be directly and indirectly (via coping) associated with all health indices. Specifically, it was predicted that coping by engaging in healthy lifestyle behaviors (exercise, healthy eating) would be associated with better health indices, while coping with stigma via negative emotion, maladaptive eating, or exercise avoidance would be associated with poorer health indices.

Method

Participants

In total, 3,036 Americans were drawn from a national survey panel administered by Survey Sampling International, which includes over 2 million active research respondents (Lorch, Cavallaro, & van Ossenbruggen, 2014). Panelists were aged ≥18 years, and quotas were established for sex, income groups, and race, to approximate U.S. Census characteristics. Participants were excluded for failing to answer or providing implausible responses (e.g., height reporting of 0′0” or 1′4”) to any of the following variables: gender, height, weight, race/ethnicity, income, or education (n = 608). Questions on stigma-specific coping responses were only asked of participants who reported prior experience with weight stigma, so individuals who did not report weight stigma were excluded (n = 1,443). Further, because weight stigma was operationalized as it relates to excess body weight (rather than underweight) in this analysis, individuals with an underweight BMI (i.e., BMI <18.5, n = 73) were excluded, leaving a total sample of 912.

Participants had a mean age of 40.33 (SD = 15.58) and a mean BMI of 28.66 (SD = 6.03). Approximately equal thirds of the sample reported a BMI consistent with normal weight (BMI: 18.5–24.9), overweight (BMI: 25–29.9), or obese (BMI: >30). About half (53.90%) of participants were women. Individuals identified as White (64.9%), Hispanic/Latino (15.8%), Black (13%), Asian (4.4%), or other (1.9%). Sample characteristics are presented in Table 1.

Table 1
Sample Characteristics

Characteristic	*M*	*SD*
Age	40.33	15.58
BMI	28.66	6.03
	N	%
Sex		
Female	492	53.90
Male	420	46.10
Race/ethnicity		
White, non-Hispanic, non-Latino	592	64.9
Hispanic/Latino	144	15.8
Black or African American	119	13
Asian or Pacific Islander	40	4.4
Other	17	1.9
Income		
Under $25,000	166	18.20
$25,000–$49,999	244	26.80
$50,000–$74,499	186	20.40
$75,000–$99,999	148	16.20
$100,000–$124,999	69	7.60
$125,000 or more	99	10.90
Education		
Less than high school or GED	10	1.10
High school or GED	125	13.70
Vocational/technical school (2 years)	41	4.50
Some college	268	29.40
College graduate	325	35.60
Postgraduate degree or higher	143	15.70
BMI category		
Normal weight	299	32.8
Overweight	264	28.9
Obese	349	38.3
Weight Stigma		
Teased	811	88.9
Treated unfairly	512	56.1
Discriminated against	393	43.1

Note. BMI = Body Mass Index.

Procedure

After providing informed consent, participants completed a demographics questionnaire, information on prior weight stigmatizing experiences, stigma-specific coping responses, health behaviors, and psychological and physical health status (i.e., depressive symptoms, dieting frequency, physical health, psychological well-being, or self-esteem). The study protocol was approved by the Institutional Review Board of the University of Connecticut.

Measures

Table 2 provides a summary of means, *SD*s, and reliability estimates for the primary measures.

Demographics. Participants reported their age, sex, race/ethnicity, education, income, height, and weight. Self-reported height and weight were used to calculate each participant's BMI (kg/m^2). While continuous BMI was used in all analyses, BMI status was stratified into weight categories according to clinical guidelines from the Centers for Disease Control (as presented in Table 1; Centers for Disease Control, 2012).

Weight stigma. History of experienced weight stigma was measured using three (*yes*/*no*) questions in which participants indicated experience with teasing, discrimination, or unfair treatment because of their weight (Puhl, Heuer, & Sarda, 2011). Affirmative responses were coded as 1, while "no" was coded as 0. Only individuals who reported experiencing weight stigma (i.e., answered yes to at least one of the three questions) were included in this analysis. The stigma variable represents the sum of the three items, where each "yes" response reflects an increase of one on the weight stigma variable (range = 1–3, $M = 1.88$, $SD = 0.87$). Although these items do not represent a psychometric scale, the items have been used in a range of published studies with large and diverse samples (Himmelstein, Puhl, & Quinn, 2017; Puhl et al., 2011, 2017). See Table 1 for percentages of participants who reported experiencing each of the three forms of weight stigma.

Weight stigma specific coping responses. Participants who reported prior experiences with weight stigma responded to 18 questions regarding how often participants used different coping responses to weight stigma on a scale ranging from 1 (*never*) to 5 (*very often*) (Himmelstein, Puhl, & Quinn, 2017; Puhl & Brownell, 2006; Puhl & Luedicke, 2012). These items do not represent a psychometric scale. Following the factors presented in Puhl and Luedicke (2012), weight stigma-specific coping responses were divided into four subscales: negative affect, maladaptive eating

Table 2
Key Variables

				Male		Female				
Variable	*M*	*SD*	*a*	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*
Experienced stigma (independent variable)	1.88	.87		1.79	.86	1.96	.88	910	−2.84	.005
Coping responses (mediators)										
Negative affect	3.18	.95	.86	2.95	.94	3.38	.92	900	−6.90	<.001
Maladaptive eating behaviors	2.47	1.01	.87	2.31	1.00	2.61	1.00	899	−4.47	<.001
Health lifestyle behaviors	3.32	1.04	.63	3.24	1.05	3.38	1.03	899	−2.09	.037
Exercise avoidance	2.76	1.24	.87	2.64	1.23	2.87	1.24	899	−2.77	.006
Dependent variables										
Depressive symptoms	2.10	.70	.90	2.01	.68	2.17	.72	872	−3.32	.001
Dieting frequency	2.29	1.19		2.19	1.20	2.37	1.18	908	−2.25	.025
Physical health	63.69	19.32	.81	3.61	.68	3.49	.84	868	2.22	.027
Psychological wellbeing	57.95	19.52	.84	3.42	.74	3.23	.81	857	3.59	<.001
Self-esteem	4.67	1.21	.90	4.79	1.18	4.56	1.23	869	2.74	.006

Note. $p < .000$ is displayed where p could not be exactly expressed within three decimal points.

behaviors, healthy lifestyle behaviors, and exercise avoidance. Negative affect included 7 items (α = .86) which measured responding to weight stigma with negative emotions (e.g., feeling sad, depressed, angry, or badly about one's body). Maladaptive eating behaviors included 7 items (α = .87) that measured coping with weight stigma by engaging in unhealthy eating-related behaviors (e.g., binge/overeat, using diet pills, starving self, or vomiting to try to lose weight). Healthy lifestyle behaviors included two items (α = .63) that involved coping with weight stigma by engaging in healthy behaviors (e.g., eating healthy foods, exercising). Exercise avoidance included three items (α = .87) that assessed coping with weight stigma by avoiding exercise (e.g., avoidance of the gym and physical activity).

Depressive symptoms. Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CESD), in which participants responded to 11 questions about the frequency of experiencing symptoms associated with depression during the past week on a scale of 1 (*rarely or none of the time*) to 4 (*most or all of the time*) (Radloff, 1977). The depressive symptoms score represents the mean of all CESD items (α = .90) with higher scores representing greater frequency of depressive symptoms.

Physical health. Physical health was measured using the World Health Organization Quality of Life Scale, Brief (WHOQOL-BREF; The WHOQOL Group, 1998). The physical health subscale (α = .81) included 7 items (e.g., "How satisfied are you with your ability to perform your daily living activities" and "To what extent do you feel that physical pain prevents you from doing what you need to do?") that were rated on a scale of 1 (*not at all*) to 5 (*an extreme amount/completely*). Following scoring instructions (The WHOQOL Group, 1998), the physical health scale score was transformed to represent a health value ranging from 0–100, where higher scores represent better physical health.

Psychological wellbeing. Psychological wellbeing was measured using the WHOQOL-BREF (The WHOQOL Group, 1998). The psychological wellbeing subscale (α = .84) included 6 items (e.g., "How well are you able to concentrate?" and "How much do you enjoy life?") that were rated on a scale of 1 (*not at all*) to 5 (*an extreme amount/completely*). Following scoring instructions (The WHOQOL Group, 1998), the psychological wellbeing scale score was transformed to represent a wellbeing value ranging from 0–100, where higher scores represent better psychological wellbeing.

Self-esteem. Participants completed 10 items measuring self-esteem on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*) using the Rosenberg Self-Esteem Scale (α = .90; Rosenberg, 1979). Items were averaged with higher scores indicating greater self-esteem.

Dieting frequency. Dieting frequency consisted of a single item in which participants provided a frequency of dieting in the past year with the goal of weight loss (Venditti, Wing, Jakicic, Butler, & Marcus, 1996). Given restrictive dieting predicts long term weight gain (Mann et al., 2007), which may lead to increased stigmatization (Tomiyama, 2014) dieting was included as a health measure.

Statistical Analysis

Analyses were performed using SPSS version 22. All analyses adjusted for BMI, socioeconomic status (SES: education, income), race, and sex. Mediation was tested via bootstrapping with 5,000 sampling replications to construct a 95% confidence interval (CI) for the indirect effect via the process macro for SPSS developed by Hayes (2012). All coping responses were considered simultaneously as mediators of the relationship between experienced weight stigma and health with separate mediation models conducted for each health variable (i.e., depressive symptoms, physical health, psychological wellbeing, dieting frequency, and self-esteem). A 95% CI that does not include zero indicates a significant indirect effect (i.e., mediation) of the relationship between stigma and health. Figure 1 demonstrates a graphical demonstration of the planned mediation models.

Results

Most participants indicated teasing because of their weight (88.9%), whereas 56.1% indicated unfair treatment and 43.1% indicated discrimination based on weight. Participants engaged in

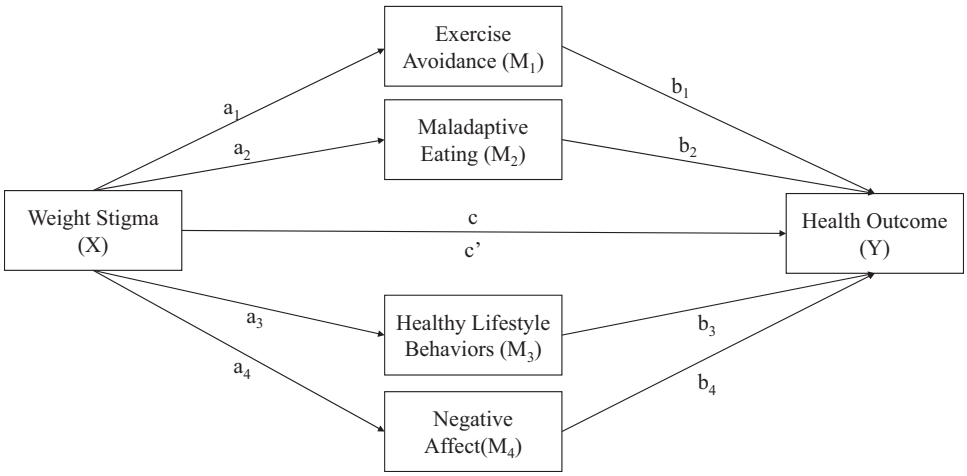

Figure 1. Multiple mediator model of health outcomes.

a variety of stigma-specific coping responses, though the strategy with the highest average engagement for coping with weight stigma in this sample was engaging in healthy lifestyle behaviors ($M = 3.32$, $SD = 1.04$) followed by responding with negative affect ($M = 3.18$, $SD = 0.95$), and avoiding exercise ($M = 2.76$, $SD = 0.87$). Coping with weight stigma by engaging in maladaptive eating behaviors was the least common strategy endorsed on average ($M = 2.47$, $SD = 1.01$). Relative to women, men self-reported better health (i.e., lower frequency of depressive symptoms, fewer dieting attempts in the past year, higher self-esteem, higher physical health scores, and higher psychological wellbeing scores) and lower engagement in all coping strategies (see Table 2).

Table 3 displays correlations among weight stigma, coping responses, and each health indicator. Table 4 displays unstandardized coefficients for each path of the mediation model (see Figure 1), and Table 5 displays the indirect effect and bootstrapped CIs for each mediator.

Depressive Symptoms

The total effect of weight stigma (adjusting for BMI, SES, race, and sex) was associated with greater depressive symptoms (path c: $B = 0.25$, $p < .001$), but the direct effect of weight stigma on depressive symptoms was no longer significant when coping responses were included as mediators in the model (c': $B = .04$, $p = .104$). Weight stigma was indirectly associated with greater frequency of depressive symptoms through coping with weight stigma via negative affect ($B = 0.11$, Bootstrapped CI [0.08, 0.14]) and engaging in maladaptive eating behaviors ($B = 0.11$, Bootstrapped CI [0.08, 0.14]). Weight stigma was indirectly associated with lower frequency of depressive symptoms through coping by engaging in healthy lifestyle behaviors ($B = -0.01$, Bootstrapped CI [−.02, −.004]). The mediation model including weight stigma, all coping responses, and controls (i.e., BMI, sex, race, income, and education) accounted for 43% of the variance in depressive symptoms scores: $F(10, 862) = 66.20$, $p < .001$, $f^2 = 0.77$.

Physical Health

The total effect of weight stigma (adjusting for BMI, SES, race, and sex) was associated with lower physical health scores (path c: $B = -4.14$, $p < .001$), but the direct effect of weight stigma on physical health was no longer significant when coping responses were included as mediators in the model (c': $B = -1.35$, $p = .077$). Weight stigma was indirectly associated with lower physical health scores through coping via negative affect ($B = -1.43$, Bootstrapped CI [−2.394, −0.548]) and engaging in maladaptive-eating behaviors ($B = -1.88$, Bootstrapped CI [−2.807, −1.042]). Weight stigma was indirectly associated with higher physical health scores through coping by engaging in healthy lifestyle behaviors ($B = 0.63$, Bootstrapped CI [0.288, 1.072]). The mediation model including weight stigma, all coping responses, and controls accounted for 21% of the variance in physical health scores: $F(10, 858) = 23.39$, $p < .001$, $f^2 = 0.27$.

Psychological Wellbeing

The total effect of weight stigma (adjusting for BMI, SES, race, and sex) was associated with lower psychological wellbeing (path c: $B = -4.31$, $p < .001$), but the direct effect of weight stigma on psychological wellbeing was no longer significant when coping responses were included as mediators in the model (c': $B = 0.36$, $p = .622$). Weight stigma was indirectly associated with lower psychological wellbeing scores through coping with weight stigma via negative affect ($B = -4.86$, Bootstrapped CI [−6.061, −3.827]), whereas weight stigma was indirectly associated with higher psychological wellbeing scores through engaging in healthy lifestyle behaviors ($B = 0.49$, Bootstrapped CI [0.213, 0.871]). The mediation model including weight stigma, all coping responses, and controls accounted for 30% of the variance in psychological wellbeing scores $F(10, 847) = 35.77$, $p < .001$, $f^2 = 0.42$.

Dieting Frequency

The total effect of weight stigma (adjusting for BMI, SES, race, and sex) was associated with a higher number of diets during the past year (path c: $B = 0.13$, $p = .006$), but the direct effect of weight stigma on dieting frequency was no longer significant when coping responses were included as mediators in the model (c': $B = 0.01$, $p = .712$). Weight stigma was indirectly associated with a larger number of restrictive diets in the past year through coping by engaging in maladaptive eating behaviors ($B = 0.08$ Bootstrapped CI [0.022, 0.135]) and through coping via healthy lifestyle behaviors ($B = .002$, Bootstrapped CI [0.006, 0.043]). The mediation model including weight stigma, all coping responses, and controls accounted for 9% of the variance in number of diets over the past year $F(10, 888) = 9.10$, $p < .001$, $f^2 = 0.10$.

Table 3
Correlations Among Weight Stigma, Coping Responses, and Health Outcomes (N = 912)

Measure	1	2	3	4	5	6	7	8	9
1. Weight stigma	—								
2. Negative affect	.43***	—							
3. Maladaptive eating	.39***	.72***	—						
4. Healthy lifestyle behaviors	.12***	.31***	.38***	—					
5. Exercise avoidance	.34***	.56***	.61***	.11***	—				
6. Depressive symptoms	.32***	.57***	.58***	.12***	.42***	—			
7. Physical health	−.22***	−.30***	−.29***	.11***	−.26***	−.55***	—		
8. Psychological wellbeing	−.22***	−.50***	−.34***	.02	−.32***	−.66***	.61***	—	
9. Dieting frequency	.11**	.20***	.23***	.18***	.16***	.13***	−.03	−.09**	—
10. Self-esteem	−.24***	−.51***	−.45***	−.04	−.37***	−.68***	.53***	.75***	−.08**

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

Table 4
Mediation Models

Path in mediation model	Depressive symptoms			Self-esteem		
	B	*SE*	*p*	*B*	*SE*	*p*
Negative affect (X → M1, path a1)	.44	.03	<.001	.44	.03	<.001
Maladaptive eating (X → M2, path a2)	.44	.04	<.001	.44	.04	<.001
Healthy lifestyle (X → M3, path a3)	.14	.04	<.001	.14	.04	<.001
Exercise avoidance (X → M4, path a3)	.46	.05	<.001	.46	.05	<.001
Total effect, weight stigma (X → Y, path c)	.25	.03	<.001	−.32	.05	<.001
Direct effect, weight stigma (XM → Y, path c')	.04	.02	.104	.01	.04	.892
Negative affect (M1 → Y, path b1)	.24	.03	<.001	−.51	.06	<.001
Maladaptive eating (M2 → Y, path b2)	.24	.03	<.001	−.23	.05	<.001
Healthy lifestyle (M3 → Y, path b3)	−.07	.02	<.001	.17	.04	<.001
Exercise avoidance (M4 → Y, path b3)	.02	.02	.386	−.05	.04	.155
	Physical health			Psychological wellbeing		
Negative affect (X → M1, path a1)	.44	.03	<.001	.44	.03	<.001
Maladaptive eating (X → M2, path a2)	.44	.04	<.001	.44	.04	<.001
Healthy lifestyle (X → M3, path a3)	.14	.04	<.001	.14	.04	<.001
Exercise avoidance (X → M4, path a3)	.46	.05	<.001	.46	.05	<.001
Total effect, weight stigma (X → Y, path c)	−4.14	.72	<.001	−4.31	.75	<.001
Direct effect, weight stigma (XM → Y, path c')	−1.35	.76	.077	.36	.73	.622
Negative affect (M1 → Y, path b1)	−3.19	.96	.001	−10.76	.93	<.001
Maladaptive eating (M2 → Y, path b2)	−4.23	.94	<.001	.12	.9	.898
Healthy lifestyle (M3 → Y, path b3)	4.41	.62	<.001	3.36	.6	<.001
Exercise avoidance (M4 → Y, path b3)	−.33	.62	.592	−.76	.6	.203
	Dieting frequency					
Negative affect (X → M1, path a1)	.44	.03	<.000			
Maladaptive eating (X → M2, path a2)	.44	.04	<.000			
Healthy lifestyle (X → M3, path a3)	.14	.04	<.000			
Exercise avoidance (X → M4, path a3)	.46	.05	<.000			
Total effect, weight stigma (X → Y, path c)	.13	.05	.006			
Direct effect, weight stigma (XM → Y, path c')	.02	.05	.712			
Negative affect (M1 → Y, path b1)	.01	.06	.874			
Maladaptive eating (M2 → Y, path b2)	.17	.06	.006			
Healthy lifestyle (M3 → Y, path b3)	.13	.04	.001			
Exercise avoidance (M4 → Y, path b3)	.03	.04	.524			

Note. All models adjust for Body Mass Index (BMI), socioeconomic status (SES; education, income), race, and sex. $p < .000$ is displayed where p could not be exactly expressed within three decimal points. B = unstandardized regression coefficient.

Self-Esteem

The total effect of weight stigma (adjusting for BMI, SES, race, and sex) was associated with lower self-esteem scores (path c: $B = -0.32$, $p < .001$), but the direct effect of weight stigma on self-esteem was no longer significant when coping responses were included as mediators in the model (c': $B = 0.01$, $p = .892$). Weight stigma was indirectly associated with lower self-esteem scores through coping with weight stigma via negative affect ($B = -0.23$, Bootstrapped CI [−0.296, −0.167]) and through coping with weight stigma by engaging in maladaptive eating behaviors ($B = -0.10$, Bootstrapped CI [−0.153, −0.052]). Weight stigma was indirectly associated with lower self-esteem scores through coping with weight stigma by engaging in healthy lifestyle behaviors ($B = 0.02$, Bootstrapped CI [0.01, 0.044]). The mediation model including weight stigma, all coping responses, and controls accounted for 33% of the variance in self-esteem, $F(10, 859) = 42.13$, $p < .001$, $f^2 = 0.49$.

Discussion

Using a large and diverse national sample, this study found that coping responses to weight stigma explained the direct relationship between experienced weight stigma and health indices (including depressive symptoms, physical health, psychological wellbeing, dieting frequency, and self-esteem). In general, coping via healthy lifestyle behaviors was associated with better health (less frequent depressive symptoms, greater self-esteem, higher physical health scores, and higher psychological wellbeing scores), with the exception of dieting. Responding to weight stigma with negative affect and maladaptive eating behaviors was associated with worse health (i.e., greater frequency of depressive symptoms and dieting, lower physical health scores, poorer psychological wellbeing, lower self-esteem; effects varied by type of coping strategy). Coping by avoiding exercise did not mediate the relationship between weight stigma and any health variable.

Similar to prior research (Koball & Carels, 2011; Myers & Rosen, 1999; Puhl & Brownell, 2006), this study found that some coping responses contributed to poor psychological functioning and depressive symptom frequency. Specifically, responding to weight stigma via negative affect and maladaptive eating behaviors (e.g., overeating, starving) explained the relationship between weight stigma and depressive symptoms, as well as the relationship between weight stigma and lower scores on psychological

Table 5
Indirect Effects and Bootstrapped Confidence Intervals

Indirect effect of coping	Depressive symptoms				Self-esteem			
	B	Bootstrapped *SE*	Bootstrapped 95% CI		*B*	Bootstrapped *SE*	Bootstrapped 95% CI	
Indirect effect negative affect	.11	.02	.080	.143	−.23	.03	−.296	−.167
Indirect effect maladaptive eating	.11	.02	.077	.139	−.10	.03	−.153	−.052
Indirect effect healthy lifestyle	−.01	.00	−.021	−.004	.02	.01	.01	.044
Indirect effect exercise avoidance	.01	.01	−.011	.027	−.02	.02	−.061	.012
	Physical health				Psychological wellbeing			
Indirect effect negative affect	−1.43	.45	−2.394	−.548	−4.86	.57	−6.061	−3.827
Indirect effect maladaptive eating	−1.88	.44	−2.807	−1.042	.05	.44	−.788	.892
Indirect effect healthy lifestyle	.63	.20	.288	1.072	.49	.16	.213	.871
Indirect effect exercise avoidance	−.15	.31	−.764	.441	−.35	.30	−.964	.203
	Dieting frequency							
Indirect effect negative affect	.00	.03	−.050	.058				
Indirect effect maladaptive eating	.08	.03	.022	.135				
Indirect effect healthy lifestyle	.02	.01	.006	.043				
Indirect effect exercise avoidance	.01	.02	−.025	.051				

Note. *B* = unstandardized indirect effect; CI = confidence interval.

wellbeing, physical health, and self-esteem. Coping via maladaptive eating behaviors and healthy lifestyle behaviors explained the relationship between weight stigma and dieting frequency. While lifestyle modifications might be viewed by some to be a desirable health behavior for individuals with excess body weight, this variable assessed the number of restrictive diets participants engaged in over the past year to lose weight. While some diets can lead to short term weight loss, most individuals regain weight over time (Dombrowski, Avenell, & Sniehott, 2010; Simpson, Shaw, & McNamara, 2011). This weight cycling contributes to poor cardiometabolic health (Montani, Schutz, & Dulloo, 2015).

Coping with stigma by engaging in healthy lifestyle behaviors (exercise and healthy eating) explained the relationship between experiencing stigma and all health indices. Further, coping via healthy lifestyle behaviors was associated with less frequent depressive symptoms, and higher scores on self-esteem, physical health, and psychological wellbeing. These findings highlight the need for additional research to identify potential mechanisms underlying the negative effects of weight stigma on health behaviors, so that these mechanisms can be targeted in intervention. Furthermore, these findings suggest that one way to help buffer against the negative consequences of weight stigma may be to support individuals to engage in healthy lifestyle behaviors to help reduce some of the distress resulting from stigmatizing experiences. Conventional weight loss treatments and obesity interventions rarely address weight stigma (Puhl & Kyle, 2014), let alone ways to cope with these distressing experiences. The present findings suggest that coping responses to weight stigma may be an important factor to assess before beginning an obesity or weight management invention, to identify potential coping responses that could interfere with effective treatment. Further, coping with stigma-related distress could also be integrated as a clinical component throughout treatment, as a way for clinicians to help patients adopt adaptive coping responses when confronting stigmatizing situations related to their body weight. Given that societal weight stigma remains prevalent in multiple settings, it is important to find ways to help individuals engage in coping strategies that help reduce the negative consequences incurred by stigma.

Similar to other research in the general coping literature (Miller & Kaiser, 2001) and the stigma coping literature (Lillis et al., 2011; Myers & Rosen, 1999; Puhl & Brownell, 2006), the present study found a relationship between experienced weight stigma and exercise avoidance. However, there were no effects of exercise avoidance on any health measure and no indirect effect of stigma on health via exercise avoidance. This finding may suggest that avoiding situations in which individuals anticipate repeated weight stigma (e.g., gym or exercise settings) may not be detrimental to health. It should be noted, however, that avoidance coping did not confer health benefits. More research examining a broader range of avoidance behaviors and responses could help clarify this pattern of results.

Several limitations of the present study should be noted. First, this study was cross-sectional and correlational in nature. Although a theoretical case for direction of causality can be made based on the literature, this study cannot conclude that coping responses or weight stigma cause any of the health indices assessed. As Tomiyama (2014) theorizes, it is likely that weight stigma, coping, and health outcomes (e.g., obesity) operate in a feedback loop. A critical next step is for longitudinal research to assess whether coping responses to stigma predict weight-related health outcomes over time, and whether integrating coping-related support or education as part of interventions can improve treatment outcomes. More work is needed to better understand how different eating behaviors are used as stigma-specific coping strategies. For example, it is important to understand what leads some people to cope with weight stigma by restricting intake or engaging in strict dieting versus turning to food with increased food intake or binge eating. While this study examined multiple coping responses simultaneously, the majority of coping responses were maladaptive. Future studies should examine a wider variety of both positive and negative coping responses that people may use in response to weight stigma. Although the coping subscale for healthy lifestyle

behaviors had a lower α value, αs below the 0.7 marker for acceptability may be lower among scales with fewer items (Hulin et al., 2001). Likewise, these items could potentially be viewed as compensatory behaviors (e.g., extreme exercise as a form of purging) or overindulging in healthy foods. However, given that these items were associated with better health outcomes (e.g., lower frequency of depressive symptoms, better physical health scores) it is likely that these items indicate healthy lifestyle behaviors in response to stigma. Still, no causal conclusions can be made despite these associations. Individuals who did not report prior experiences with weight stigma were excluded, which allowed the examination of stigma-specific coping; however, it precludes drawing conclusions about general coping and health among those not experiencing weight stigma. This study focused on experienced stigma rather than internalized stigma, so an important direction for future research will be examining how individuals cope with internalized stigma and how these responses are associated with health. Relatedly, the self-report measure of experienced weight stigma was limited to three items, and it will be important for future research to use more comprehensive measures of stigma in the examination of coping responses. Finally, underweight individuals who reported experiencing weight stigma were excluded, because weight stigma was defined in the context of higher body weight. Examining stigma experienced by underweight individuals would be informative to obtain a more comprehensive understanding of weight stigma across diverse body weights, which should be examined in future research. Despite these limitations this study has several key strengths (including the size, diversity, and use of a national sample) and offers novel insights on coping with weight stigma that has been neglected in the literature.

In summary, the present study findings indicate that coping responses explain the relationship between experienced weight stigma and health indices. These findings imply that the effectiveness of weight management and obesity-related interventions could be hindered if weight stigma and resulting coping responses remain neglected issues. A key next step for research in this area will be to determine whether adverse health consequences of weight stigma can be prevented or buffered by helping individuals adopt coping responses aimed at improving their health and well-being.

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