REGULAR ARTICLE

Weight Stigma and Weight-Related Health: Associations of Self-Report Measures Among Adults in Weight Management

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Abstract

Background Weight stigma impairs health. Few studies have disentangled the associations of experienced versus internalized stigma with weight-related outcomes.

Purpose To examine weight and health variables associated with weight stigma experiences and internalization in the largest-to-date sample of adults in weight management.

Methods WW (formerly Weight Watchers) members ($N = 18,769$, 94.6% female, 91.1% white) completed an online survey from 2017 to 2018. Participants reported whether they had experienced weight stigma and, if so, the onset, past-year frequency and distress, and interpersonal sources of stigma. Participants completed the Modified Weight Bias Internalization Scale (WBIS-M) and self-reported: past-year weight and lifetime weight cycles; current self-monitoring behaviors; eating self-efficacy; physical activity; perceived stress; eating to cope; body image; and mental and physical health-related quality-of-life (HRQOL). Participants reported their demographic characteristics, including height and weight to compute body mass index.

Results In logistic and linear regression analyses (controlling for participant characteristics), WBIS-M scores were negatively associated with weight loss, self-monitoring, eating self-efficacy, body image, and mental HRQOL and positively associated with weight gain, weight cycling, perceived stress, and eating to cope ($p < .001$). Experiencing weight stigma was associated with greater weight loss and less weight gain, although associations with other variables had small effect sizes (absolute β values < 0.10). WBIS-M scores remained significantly associated with all variables when including stigma onset, frequency/distress, and sources.

Conclusions Internalized, but not experienced, weight stigma was consistently associated with adverse weight and health factors. Developing and testing interventions targeting internalized stigma in the context of weight management should be a research priority.

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Introduction

People with overweight and obesity are subject to societal prejudice, often rooted in common stereotypes that they are lazy, unattractive, incompetent, and lack self-control [1]. This *weight bias* contributes to social rejection of people with higher body weight—or *weight stigma*—which may include teasing or bullying, interpersonal avoidance, employment discrimination, or other forms of mistreatment due to weight [2]. Approximately 20%–40% of persons with obesity report experiencing weight discrimination [3]. Some individuals with overweight/obesity also internalize society's negative

messages about weight and "self-stigmatize" [4]. *Weight bias internalization* (WBI) is reported in over 40% of adults with overweight/obesity in the general population, with one in five adults showing elevated levels of WBI [5]. The effects of WBI may be independent from those of weight-stigmatizing experiences. Not everyone who experiences weight stigma internalizes it, and some people may internalize negative weight attitudes indirectly (e.g., through media) without having personal encounters with weight stigma [6]. Both weight stigma and WBI are associated with increased suffering and warrant greater attention and intervention [7].

Weight stigma, like other forms of stigma, is considered a form of chronic stress that may contribute to weight gain and poorer management of weight-related health comorbidities (e.g., type 2 diabetes) [8–10]. Several prospective, epidemiological studies support this hypothesis, showing that people who report weight-based teasing and discrimination, compared to those who do not, gain more weight 4–15 years later [11–13]. These studies controlled for body mass index (BMI) and other factors that could affect weight-related health, highlighting that the observed effects were attributable specifically to stigma. Experiences and internalization of weight stigma are also associated with having a higher BMI, more binge eating (in part as a coping behavior), reduced health-related quality of life (HRQOL), greater body dissatisfaction and orientation toward appearance, increased cardiovascular disease risk factors, and even heightened risk of mortality [2, 6, 7, 14, 15].

Weight Stigma and Weight Management

Little is known about the associations among weight stigma, weight change, and related health factors among people who are actively trying to manage their weight. Three recent studies found that people with higher levels of WBI, compared to individuals with low WBI, had worse long-term weight loss and maintenance outcomes [16–18]. In addition, a recent clinical trial that combined data from weight-loss and weight-neutral interventions ($N = 80$) suggested that patients with higher levels of WBI showed reduced improvements in their eating and physical activity compared to patients with lower levels of WBI [19, 20].

These recent data—some of which were from relatively small, clinical trials—provide emerging evidence that people with higher levels of WBI may have worse weight management outcomes. From a behavioral perspective, people who have internalized negative weight stereotypes (e.g., that they are lazy or lack willpower) may have lower self-efficacy, or less confidence in their ability to pursue and achieve weight management goals [21, 22]. As a result, these individuals may be less likely to

persevere through the challenges inherent to long-term weight management. Self-efficacy is a consistent predictor of weight loss and maintenance [23–25], so reductions in self-efficacy associated with WBI may impair weight management behaviors and outcomes [6].

Evidence of the effects of weight stigma *experiences* on weight management is less consistent than effects of WBI. For example, one small clinical trial ($N = 55$) found that interpersonal experiences of weight stigma was associated with less weight loss in a short-term intervention [26], while another study of 185 adults with obesity found that greater frequency of weight-stigmatizing experiences were cross-sectionally associated with *greater* weight loss and maintenance [27]. These divergences in effects of weight stigma experiences and internalization suggest that the effects of WBI may be independent from those of weight-stigmatizing experiences. A few studies have suggested that the effects of WBI on health may be stronger than those of experiences alone [22, 28–30]. WBI may moderate the effects of weight stigma experiences on health [29, 30], and certain aspects of weight-stigmatizing experiences (e.g., the interpersonal source of stigma) may increase risk for WBI [31]. Still, WBI's effects on weight-related health warrant examination separately from weight-stigmatizing experiences.

Present Research

Evidence of the relationship between weight stigma and weight management from treatment-seeking populations is lacking, and studies that have used clinical samples have relied on relatively small sample sizes. Weight stigma is rarely addressed in most weight management programs, despite its potentially high prevalence in treatment-seeking populations [19, 30, 32, 33] and interest from patients to discuss weight stigma with health care professionals [34]. The current study aimed to address this gap by surveying a large sample of adults enrolled in the commercial weight management program WW (the new Weight Watchers). Millions of Americans participate in commercial weight management programs each year [35], and WW is more accessible to the general public than many clinical treatments for obesity. Thus, findings from this sample may apply to a significant portion of adults engaged in weight management, who may not be represented in smaller, tightly controlled clinical trials.

Aims and hypotheses

The primary aim of this study was to determine the independent and potentially interacting effects of experienced and internalized weight stigma on weight management behaviors and related health variables. Based on prior evidence [16–18], it was predicted that greater current WBI would be associated with less weight loss and

more weight gain in the past year. It was also predicted that weight-stigmatizing experiences would be associated with less weight loss, though to a lesser degree than WBI due to past mixed findings [13, 18, 26, 27]. Additionally, it was predicted that the effects of WBI on health would be largely independent from those of weight stigma experiences [22, 28]. A secondary, exploratory aim of the study was to examine, among people who reported experiences of weight stigma, whether certain aspects of these experiences were associated with weight and health variables.

Methods

Participants in this study were WW members residing in the USA who were ≥18 years old and had been enrolled in WW for at least 3 months. WW is an empirically validated, commercial, behavioral weight management program that encourages healthy habits related to food, activity, and mindset [35]. Sampling and recruitment procedures have been described previously [36]. A random sample of members was recruited via email from WW from September 2017 through August 2018.

Procedures

The random sample of WW members received an email describing a survey about "experiences related to body weight and health, and challenges that come with these experiences such as stress, self-confidence, and stigma." Email invitations were sent to "Digital + Studio" WW members, whose membership included weekly in-person workshops (i.e., studio) and access to the WW app and online tools (i.e., digital), as well as to "Digital" members who did not attend workshops but had access to tools such as a barcode scanner, database of restaurants and recipes, audio workouts, and a rewards program. If interested, participants could click an anonymous link to the survey (managed by the study researchers and hosted by Qualtrics) and complete the informed consent form before entering the survey. The survey measures presented in this paper were part of a larger study. This study received institutional review board approval.

Measures

Weight bias internalization

Participants completed the 10-item version of the Modified Weight Bias Internalization Scale (WBIS-M), which is a psychometrically sound measure for assessing WBI in people of all weight statuses [4, 37, 38]. WBIS-M scores are computed by averaging the 10 items (rated

on a 1–7 scale), and higher scores signify greater WBI (Cronbach's α *in* current sample = .91).

Weight stigma experiences

Participants responded to three yes/no items asking if they had ever been teased, treated unfairly, or discriminated against because of their weight [39]. This variable was coded dichotomously to indicate whether or not participants endorsed any of these three items (i.e., had or had not experienced weight stigma).

Weight Stigma Time of Life Questionnaire

The Weight Stigma Time of Life Questionnaire was developed for this study and administered only to participants who reported an experience of weight stigma. Participants indicated the time period in which they *first* experienced weight stigma (i.e., onset): never (in case any participants erroneously endorsed one of the prior three items); childhood (ages ≤10 years); adolescence (11–19 years); young adulthood (20–39 years); middle adulthood (40–59 years); or older adulthood (≥60 years old). This variable was coded from 1 to 6, with higher values indicating later onset. In order to examine associations between current health variables and recent and/ or ongoing experiences of weight stigma, participants also rated (1–7) the frequency ("never" to "extremely often") and distress ("not at all upset" to "extremely upset") of their weight-stigmatizing experiences during the past year.

Interpersonal sources of weight stigma

The Interpersonal Sources of Stigma Scale assesses the frequency (never, once in your life, more than once in your life, or multiple times) participants had experienced weight stigma from 25 potential people [31, 40]. Individual sources were grouped into categories of family, friends, work, school, health care, and community. Source categories were coded dichotomously as "yes" if participants reported experiencing weight stigma once in their life from any of the individual source items.

Weight change

Participants indicated how much they weighed (in pounds) 1 year ago from the date of completing the survey (regardless of whether or not they were a WW member 1 year ago) [41, 42]. Percentage of body weight lost or gained was calculated based on participants' current weight and their reported weight 1 year ago. This variable was converted into a categorical variable based on commonly used clinically significant cutoffs [43, 44]: ≥5% weight loss; ≥10% weight loss; ≥15% weight loss; ≥5% weight gain; and ≥10% weight gain in the last year

(weight gain of 15% or more was not included due to the small number of participants who fit this category).

Weight management behaviors

Weight cycling was assessed with the question "How many times (approximately) have you lost 10 pounds or more when you weren't sick and then gained it back?" with response options of never, once or twice, three or four times, or five times or more [41, 45, 46]. Self-monitoring of weight (recommended in the WW program at a frequency of at least once per week and no more than once per day) was assessed with a single item asking participants how often they weigh themselves, ranging from 1 (several times per day) to 6 (less than once per month) [47]. Frequency of tracking food (and beverage) intake and physical activity in the past week (also encouraged in WW) were assessed with two respective items ranging from 1 (0 days) to 5 (everyday) [48]. Self-efficacy to control eating was measured with the eight-item version of the Weight Efficacy Lifestyle (WEL) Questionnaire [49]. Participants rated their confidence (0–10) in their ability to overcome challenges to resist overeating, and higher summed scores indicate greater self-efficacy (α = .90). The extent to which participants use eating to cope with life stress was assessed with the Coping subscale of the Motivations to Eat Scale [50]. Five items were rated from 1 (almost never or never) to 5 (almost always or always), with higher average scores indicating greater use of eating to cope (α = .90). Physical activity was assessed with the Godin Leisure-Time Exercise Questionnaire (GL-TEQ) [51]. Three items assess the frequency (1 [never] to 4 [≥5 times]) of strenuous, moderate, and mild exercise obtained in a typical week, and responses are weighted based on exercise intensity to produce a total exercise score (higher scores indicate more exercise).

Other psychosocial factors

Stress, quality of life, and appearance evaluation and orientation were assessed to replicate, in this unique sample, previously observed associations between these factors and weight stigma experiences and internalization [6, 8, 13, 30]. Perceived stress was measured with a brief version of the Perceived Stress Scale (PSS-4; items rated 1–5 and averaged; α = .75), with higher scores indicating greater stress [52]. The Short Form Health Survey-12 (SF-12) assessed mental and physical HRQOL. Component scores were computed for mental and physical health based on population norms [53]. Scores could range from 0 to 100, with 50 representing the population mean and higher scores signifying better HRQOL. Body image (distinguished from WBI by its focus on appearance satisfaction and investment rather than broader self-devaluation due to weight) was assessed with the Appearance Evaluation (AE; 7 items) and Orientation

(AO; 12 items) subscales of the Multidimensional Body Self-Relations Questionnaire (MBSRQ) (T. Cash, unpublished data, 2000). Both subscales range from 1 to 5; higher scores on the AE subscale indicate more positive appearance evaluation (α = .88), while higher scores on the AO subscale indicate greater orientation toward or investment in appearance (α = .86).

Participant characteristics

Participants reported their sex, race/ethnicity, age, marital status, and highest level of education. BMI was computed from self-reported height and weight, and participants were divided into weight status categories based on BMI. Participants reported their age of overweight onset, duration of their WW membership (3–6 months, 6–12 months, 1–5 years, and ≥6 years), and WW membership type (Digital + Studio vs. Digital).

Statistical Analyses

For the primary analyses, logistic regression tested the effects of WBI, weight stigma experiences, and their interaction on categorical weight change (≥5%, 10%, and 15% weight loss and ≥5% and 10% weight gain) in the past year. In a sensitivity analysis, linear regression was used to test the independent and interacting effects of WBI and weight stigma experiences on percent weight change as a continuous variable. All participant characteristics were controlled for in all analyses (including type and duration of WW membership) due to their potential impact on past year weight change and related behaviors [54–58] (Effects of participant characteristics and unadjusted models for the primary analyses can be found in Supplemental Tables S1–S4.). Linear regression tested the effects of WBI, weight stigma experiences, and their interaction on all weight management behaviors and psychosocial variables, controlling for participant characteristics. Significant interactions were probed with simple slopes analyses.

Secondary analyses examined associations between the onset, frequency/distress, and sources of weight-stigmatizing experiences with all weight and health variables among participants who reported experiencing weight stigma, controlling for all covariates. Logistic regression examined the associations of each weight stigma variable (as well as WBI) with categorical weight change, and linear regression tested the associations of the weight stigma variables (and WBI) with all continuous health variables. Due to the number of analyses and large sample size, results were considered significant at the level of $p ≤ .001$. Small effect sizes (absolute β values <0.10) were interpreted with caution [59, 60].

Results

A total of 25,967 individuals entered the survey website. Of those, 2,535 WW members were ineligible for not consenting or meeting study criteria and 4,663 were excluded for completing less than 50% of the survey or missing key data. The final sample consisted of 18,769 participants. Table 1 displays key participant characteristics,

Table 1. Participant characteristics, $N = 18,769$

	M	SD
Age	52.2	12.9
BMI	31.9	7.0
Age of overweight onset	22.4	12.6
	n	%
Sex		
Male	1,006	5.4
Female	17,763	94.6
Race/ethnicity		
White	17,095	91.1
Black	592	3.2
Asian	117	0.6
Hispanic/Latino	641	3.4
Other	324	1.7
Education		
High school or less	1,263	6.7
Some college or vocational	4,479	23.9
College graduate	6,849	36.5
Postgraduate	6,178	32.9
Marital status		
Married	13,242	70.6
Divorced	1,938	10.3
Separated	132	0.7
Widowed	723	3.9
Never married	2,710	14.4
BMI category		
≤18.5 kg/m^2	26	0.1
18.5–24.9 kg/m^2	2,418	12.9
25–29.9 kg/m^2	6,283	33.5
≥30 kg/m^2	10,042	53.5
WW membership plan		
Digital	8,163	43.5
Digital + Studio	10,606	56.5
Duration of WW membership		
3–6 months	3,086	16.4
6–12 months	5,729	30.5
1–5 years	7,833	41.7
6+ years	2,121	11.3

BMI body mass index; *SD* standard deviation.

which were similar to prior WW samples [35]. Mean WBIS-M scores were 4.26 ± 1.43, which is higher than typically found in community samples and some recent clinical trials but comparable to average scores in other treatment-seeking samples [16, 19, 61, 62]. In total, 63.5% of participants reported an experience of weight stigma. Table 2 presents mean scores for all continuous dependent measures.

Primary Analyses

Mean weight change in this sample was a weight loss of 5.59 ± 10.71% body weight in the past year. Approximately half of the participants (50.1%) reported losing ≥5% of their initial weight from 1 year ago; 31.7% reported losing ≥10% of their weight in the past year; and 17.1% reported a weight loss of ≥15%. Additionally, 13.3% of participants reported gaining ≥5% of their weight from 1 year ago, and 4.8% gained ≥10% of their weight.

Controlling for all covariates, higher WBI was associated with lower odds of achieving all categorical weight losses during the past year: ≥5% odds ratio (OR) = 0.83, 95% confidence interval (CI) = 0.80–0.87, $p < .001$; ≥10% OR = 0.84, CI = 0.80–0.88, $p < .001$; ≥15% OR = 0.85, CI = 0.80–0.90, $p < .001$. In addition, higher WBI was associated with greater odds of gaining ≥5% (OR = 1.39, CI = 1.31–1.48, $p < .001$) and ≥10% (OR = 1.56, CI = 1.41–1.73, $p < .001$) of initial body weight from 1 year ago. On the contrary, any experience of weight stigma was associated with *greater* odds of weight loss (≥5% OR = 1.47, CI = 1.36–1.59, $p < .001$; ≥10% OR = 1.67, CI = 1.53–1.82, $p < .001$; ≥15% OR = 1.76, CI = 1.58–1.96, $p < .001$) and lower odds of gaining ≥5% of weight (OR = 0.77, CI = 0.69–0.86, $p < .001$). The interaction between WBI and weight stigma experiences was not significant at $p ≤ .001$ for any category of weight loss/gain. Sensitivity analysis with percent weight change as a continuous variable yielded the same pattern of results, with WBIS-M scores associated with greater weight gain (β = 0.14, $p < .001$) and weight stigma experiences associated with greater weight loss (β = −0.10, $p < .001$).

Weight management behaviors and psychosocial outcomes

WBIS-M scores were significantly associated with all weight management and psychosocial variables except for frequency of self-weighing (Table 3). Specifically, higher WBIS-M scores were associated with lower reports of: self-monitoring of food intake; eating self-efficacy; mental HRQOL; and appearance evaluation. Higher WBIS-M scores were associated with greater weight cycling, eating to cope, perceived stress, and appearance orientation. Other significant correlates of WBIS-M scores with

Table 2. Mean scores for continuous outcome measures

Variable	$M \pm SD$
Weight cycling	3.17 ± 0.91
Monitoring activity	3.18 ± 1.73
Monitoring food intake	3.42 ± 1.46
Monitoring weight	3.20 ± 1.08
Weight Efficacy Lifestyle Questionnaire	42.54 ± 17.34
Eating to Cope Scale	2.81 ± 0.97
Godin Leisure-Time Exercise Questionnaire	34.75 ± 12.03
Perceived Stress Scale	2.54 ± 0.82
SF-12: Mental Health	43.32 ± 10.47
SF-12: Physical Health	49.54 ± 9.20
MBSRQ—Appearance Evaluation	2.57 ± 0.87
MBSRQ—Appearance Orientation	3.60 ± 0.66

Weight cycling and monitoring items were rated on the following scales: Weight cycling 1 (never), 2 (once or twice), 3 (three of four times), and 4 (five or more times); Monitoring activity and food intake 1 (0 days), 2 (1–2 days), 3 (3–4 days), 4 (5–6 days), and 5 (every day); Monitoring weight 1 (several times per day), 2 (once per day), 3 (several times per week [less than daily]), 4 (once per week), 5 (less than once per week [but at least monthly]), and 6 (less than once per month).

MBSRQ Multidimensional Body Self-Relations Questionnaire; *SD* standard deviation; *SF-12* = Short Form Health Survey-12.

absolute β values <0.10 are listed in Table 3. Weight stigma experiences had some statistically significant associations with behavioral and psychosocial variables, but these associations had effect sizes <0.10 (see Table 3).

The associations between WBI and weight stigma experiences and eating to cope and mental HRQOL were qualified by a significant interaction term, although effect sizes were <0.10. Simple slopes analyses showed that the significance and direction of the effects of WBI on these outcomes did not differ depending on whether participants reported weight stigma experiences, although effect sizes were slightly larger among participants who did report such experiences (Eating to Cope: no weight stigma experience WBI β = 0.52, *p* < .001, any weight stigma experience WBI β = 0.53, *p* < .001; SF-12 Mental Health: no weight stigma experience WBI β = −0.38, *p* < .001, any weight stigma experience WBI β = −0.44, *p* < .001).

Secondary Analyses

Among participants who reported experiencing weight stigma, achieving a ≥5% and ≥10% weight loss in the past year was associated with greater frequency of weight stigma experiences in the past year (Table 4). Experiencing weight stigma from sources at work, health

Table 3. Linear regression results for primary analyses

Variable	Weight bias internalization			Weight stigma experiences			Internalization × Experiences		
	B	SE	β	B	SE	β	B	SE	β
Weight cycling	0.10	0.01	**0.15***	0.12	0.02	0.06***	−0.02	0.01	−0.03
Monitoring activity	−0.09	0.02	−0.08***	0.26	0.03	0.07***	−0.003	0.02	−0.002
Monitoring food intake	−0.12	0.01	**−0.12***	0.28	0.03	0.09***	0.01	0.02	0.01
Monitoring weight	−0.01	0.01	−0.02	0.01	0.02	0.003	0.01	0.01	0.01
WEL Questionnaire	−5.10	0.15	**−0.42***	2.56	0.29	0.07***	0.20	0.18	0.01
Eating to Cope Scale	0.33	0.01	**0.49***	0.07	0.01	0.04***	0.05	0.01	0.06***
GL-TEQ	−0.78	0.12	−0.09***	1.98	0.22	0.08***	−0.25	0.14	−0.02
Perceived Stress Scale	0.24	0.01	**0.42***	0.04	0.01	0.02	0.03	0.01	0.04
SF-12: Mental Health	−2.73	0.09	**−0.37***	−1.09	0.17	−0.05***	−0.67	0.11	−0.07***
SF-12: Physical Health	−0.35	0.08	−0.05***	−1.03	0.15	−0.05***	−0.10	0.01	−0.01
MBSRQ—AE	−0.40	0.01	**−0.65***	0.00	0.01	0.00	0.02	0.01	0.02
MBSRQ—AO	0.08	0.01	**0.17***	0.03	0.01	0.02	−0.01	0.01	−0.02

All analyses control for: age, sex, race/ethnicity, education, marital status, body mass index, age of overweight onset, and WW membership type and duration. Absolute β values ≥0.10 are in bold.

AE Appearance Evaluation; *AO* Appearance Orientation; *GL-TEQ* Godin Leisure-Time Exercise Questionnaire; *MBSRQ* Multidimensional Body Self-Relations Questionnaire; *SF-12* Short Form Health Survey-12; *WEL* Weight Efficacy Lifestyle Questionnaire.

***p < .001.

Table 4. Logistic regression results for secondary analyses among participants: odds ratios (95% confidence intervals)

Variable	WBIS-M	Onset	Frequency	Distress	Family	Friends	School	Work	Health care	Community
≥15% loss	0.80*** (0.76–0.85)	1.13 (1.02–1.25)	1.09 (1.03–1.15)	0.99 (0.94–1.03)	0.64 (0.48–0.84)	0.95 (0.80–1.13)	1.03 (0.82–1.29)	1.38*** (1.16–1.65)	1.15 (0.96–1.37)	1.71*** (1.37–2.12)
≥10% loss	0.81*** (0.77–0.85)	1.03 (0.95–1.12)	1.09*** (1.04–1.15)	0.99 (0.95–1.03)	0.71 (0.56–0.90)	0.98 (0.85–1.13)	0.91 (0.75–1.09)	1.16 (1.00–1.34)	1.24 (1.07–1.44)	1.47*** (1.24–1.75)
≥5% loss	0.80*** (0.76–0.83)	1.03 (0.96–1.12)	1.08*** (1.04–1.13)	0.97 (0.93–1.00)	0.76 (0.60–0.95)	1.01 (0.88–1.15)	1.05 (0.88–1.24)	1.21 (1.06–1.39)	1.32*** (1.15–1.52)	1.22 (1.04–1.43)
≥5% gain	1.33*** (1.25–1.42)	1.08 (0.98–1.20)	1.00 (0.94–1.05)	1.05 (1.00–1.10)	1.16 (0.85–1.58)	0.93 (0.78–1.12)	1.14 (0.91–1.43)	0.97 (0.81–1.16)	0.81 (0.68–0.97)	0.84 (0.68–1.04)
≥10% gain	1.46*** (1.33–1.61)	1.07 (0.93–1.24)	1.01 (0.93–1.09)	1.02 (0.95–1.09)	0.73 (0.49–1.09)	0.83 (0.65–1.07)	1.35 (0.97–1.88)	1.37 (1.04–1.81)	0.83 (0.64–1.09)	0.70 (0.52–0.96)

$N = 6{,}967$. All analyses control for: age, sex, race/ethnicity, education, marital status, body mass index, age of overweight onset, and WW membership type and duration.

WBIS-M Modified Weight Bias Internalization Scale.

***$p < .001$.

care, and in the broader community was also associated with greater odds of weight loss. WBIS-M scores were still significantly associated with lower odds of weight loss and greater odds of weight gain even when including all other weight stigma variables.

Greater weight stigma distress in the past year was associated with greater appearance orientation (Table 5). While there were some statistically significant associations between other variables and weight stigma frequency, distress, and interpersonal sources, all absolute β values were <0.10 (see Table 5). WBIS-M scores were still significantly associated with all prior variables—and also self-monitoring of and engagement in physical activity—in the models including all weight stigma variables, with all absolute β values for WBIS-M scores ≥0.10.

Discussion

This study is the largest investigation of associations of both experienced and internalized weight stigma with weight-related health. Findings showed that participants with higher levels of WBI had lower odds of achieving ≥5%, ≥10%, and ≥15% weight loss in the past year and higher odds of gaining ≥5% and ≥10% of their weight in the past year. WBI was also consistently associated with less engagement in weight management behaviors (e.g., self-monitoring and physical activity) and with poorer psychosocial well-being. The associations between WBI and all variables remained significant above and beyond the effects of weight-stigmatizing experiences, including specific aspects of these experiences, such as the onset, frequency, distress, and sources of weight stigma. Overall, WBI appeared to operate independently from experiences of weight stigma in its associations with weight-related health. These findings confirm preliminary findings from smaller studies highlighting that, regardless of whether or not someone personally experiences weight-based victimization or discrimination, the internalization of negative societal messages about weight is linked to harmful health factors.

Experiences of weight stigma showed mixed associations. Some aspects of weight-stigmatizing experiences were associated with adverse health factors, others were associated with more positive aspects of health, and none of the effect sizes were greater than 0.10. Further research is needed to determine whether the interpretation of and responses to weight-stigmatizing experiences predict health outcomes more directly than the stigmatizing experience itself [28]. Alternatively, the three items used to measure stigmatizing experiences in this study—which were chosen to limit participant burden—may not have fully captured participants' weight-stigmatizing encounters, and use of dichotomous categorization may have limited statistical variability. More attention is also

Table 5. Linear regression results for secondary analyses: Standardized beta values

Variable	WBIS-M	Onset	Frequency	Distress	Family	Friends	School	Work	Health care	Community
Weight cycling	**0.10***	−0.003	0.01	0.003	0.02	0.01	0.01	0.03	0.02	0.05***
Monitoring activity	**−0.10***	−0.01	0.02	0.05***	0.001	−0.01	0.02	0.04	0.02	0.04***
Monitoring food intake	**−0.12***	0.01	0.02	0.02	−0.02	−0.02	0.01	0.04	0.03	−0.02
Monitoring weight	0.01	−0.01	−0.02	0.02	−0.02	0.002	0.01	−0.01	−0.004	−0.02
WEL Scale	**−0.37***	0.001	0.02	0.02	−0.01	−0.03	−0.01	<0.000	0.02	0.01
Eating to Cope Scale	**0.36***	−0.03	0.03	0.05***	0.02	0.02	0.02	0.03	−0.01	0.02
GL-TEQ	**−0.14***	−0.02	0.02	0.02	0.001	0.02	0.04	−0.02	0.03	0.03
Perceived Stress Scale	**0.40***	−0.02	0.02	0.04	0.03	0.01	0.01	0.02	−0.01	0.01
SF-12: Mental Health	**−0.40***	0.03	−0.02	−0.05***	−0.02	−0.03	0.01	−0.02	0.02	−0.02
SF-12: Physical Health	−0.05***	−0.03	−0.04***	−0.003	−0.01	−0.001	−0.002	−0.02	−0.04***	0.004
MBSRQ—AE	**−0.61***	−0.02	0.002	−0.02	−0.01	0.03	0.01	−0.01	0.04***	<0.000
MBSRQ—AO	**0.10***	−0.03	−0.04***	**0.10***	0.01	−0.01	0.00	−0.01	0.02	−0.01

All analyses control for: age, sex, race/ethnicity, education, marital status, body mass index, age of overweight onset, and WW membership type and duration. Absolute β values ≥0.10 are in bold.

AE Appearance Evaluation; *AO* Appearance Orientation; *GL-TEQ* Godin Leisure-Time Exercise Questionnaire; *MBSRQ* Multidimensional Body Self-Relations Questionnaire; *SF-12* Short Form Health Survey-12; *WEL* Weight Efficacy Lifestyle Questionnaire.

***$p \leq .001$.

warranted to identify under what circumstances weight stigma facilitates or hinders weight loss. While experienced stigma was associated with greater odds of weight loss in this sample, it is plausible that these associations will dissipate or reverse over time in light of the broader literature demonstrating long-term, longitudinal associations between weight stigma and weight gain [11–13]. For example, people who experience weight stigma might initially engage in more extreme dieting behaviors that produce short-term weight loss but are unsustainable over time and may increase long-term health risk [63, 64]. Thus, the current findings do not provide evidence that weight stigma promotes better health. Given evidence that people who internalize weight bias are more likely to have weight-stigmatizing experiences [36], as well as the social injustice inherent in any form of stigma and discrimination, it is still imperative to promote efforts to reduce societal weight stigma.

The current findings address a gap in the literature regarding associations between weight stigma and weight management in treatment-seeking adults. In addition, this study was novel in its assessment of stigma in commercial weight management participants, who represent an understudied yet prevalent subpopulation of treatment seekers that may differ from the patient samples in small, tightly controlled clinical trials. A high proportion of participants reported experiencing weight stigma, and the mean WBIS-M score was higher than has been shown in the general population of adults with overweight/obesity [5]. Prospective research is needed to understand the longitudinal relationship between weight stigma and weight management outcomes and to identify mechanisms (e.g., self-efficacy) by which stigma may affect weight change. However, considering the robust, negative associations between WBI and weight-related health found in this study, the internalization of weight-based stereotypes and societal messages may serve as an important target for intervention in both clinical and community-based weight management settings. Preliminary results from small pilot studies suggest the utility of empirically supported cognitive-behavioral and acceptance-based techniques for the reduction of WBI in adults with overweight/obesity [65, 66]. Future research may continue to develop and test in larger samples and, specifically, within the context of weight management, the effects of these interventions on weight loss, health behaviors, and psychosocial well-being.

Limitations

The study was limited in its reliance on self-reported current weight and retrospective recall of weight 1 year ago to compute weight change in the past year. Prospective research or use of chart review in clinical

settings would provide more accurate information about patient weight change. The cross-sectional nature of the study also precludes assumptions about causality. For example, WBI may have led to reduced odds of achieving significant weight loss and/or those who did not achieve significant weight loss may have developed WBI as a consequence of feeling defeated or blaming themselves for not meeting their goals. This sample of WW members self-selected to participate in a study about stigma and, thus, may not be representative of WW members or treatment-seeking adults. These factors may have biased the results toward stronger effects. The sample was also predominantly white, female, and educated, and the findings of this study may not generalize to a broader treatment-seeking population; more gender and racial/ethnic diversity is needed in weight stigma research overall [6, 67]. Although a conservative significance cutoff $p \leq .001$ was used to account for the number of analyses and sample size, several of the effects were significant with very small effect sizes and should be interpreted with caution. Still, the large sample size represents a step forward in establishing associations between weight stigma and treatment-related outcomes, which have previously been identified predominantly in small clinical trials.

Conclusions

WBI was consistently associated with adverse factors related to weight loss, weight management behaviors, and psychosocial well-being in a large sample of adults in a commercial weight management program. Specific aspects of weight-stigmatizing experiences appear to be less critical to health variables than the overall internalization of negative societal messages about weight. While efforts advance to reduce weight stigma at the societal level, researchers and practitioners have an opportunity to develop and test interventions targeting WBI in the context of weight management, in order to determine whether such an intervention could have benefits for weight, health, and psychological well-being.

Supplementary Material

Supplementary material is available at *Annals of Behavioral Medicine* online.

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Compliance With Ethical Standards

Authors' Contributions R.L.P. contributed to the design of this specific study and held primary responsibility for the data analyses and manuscript preparation. R.M.P. was the principal investigator of the larger study, contributed to the design of this specific study, and provided feedback on the manuscript. M.S.H. contributed to the design of this specific study and the larger study, held primary responsibility for managing the dataset, and provided feedback on the manuscript. A.M.P. facilitated data collection and provided feedback on the manuscript. G.D.F. contributed to the design of the larger study, facilitated data collection, and provided feedback on the manuscript.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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