Obesity Bias in Training: Attitudes, Beliefs, and Observations among Advanced Trainees in Professional Health Disciplines

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Abstract

Objective—This study examined weight bias among students training in health disciplines and its associations with their perceptions about treating patients with obesity, causes of obesity, and observations of weight bias by instructors and peers.

Design and Methods—Students (N = 107) enrolled in a post-graduate health discipline (Physician Associate, Clinical Psychology, Psychiatric Residency) completed anonymous questionnaires to assess the above variables.

Results—Students reported that patients with obesity are a common target of negative attitudes and derogatory humor by peers (63%), health-care providers (65%), and instructors (40%). Although 80% of students felt confident to treat obesity, many reported that patients with obesity lack motivation to make changes (33%), lead to feelings of frustration (36%), and are noncompliant with treatment (36%). Students with higher weight bias expressed greater frustration in these areas. The effect of students' weight bias on expectations for treatment compliance of patients with obesity was partially mediated by beliefs that obesity is caused by behavioral factors.

Conclusions—Weight bias is commonly observed by students in health disciplines, who themselves report frustrations and stereotypes about treating patients with obesity. These findings contribute new knowledge about weight bias among students and provide several targets for medical training and education.

Keywords

bias; stigma; attitudes; medical training; patients

Introduction

As obesity rates have risen to concerning levels in recent decades[1] there has been increasing evidence of stigma, bias, and discrimination towards individuals who are overweight and obese.[2] Of concern, people affected by obesity face considerable weight bias in health care

settings, where they are vulnerable to negative attitudes, stereotypes, and stigma from health care providers.[3] Common stereotypes reported among health professionals include attitudes that patients with obesity are lazy, lacking in self-control, non-compliant with treatment, unsuccessful, unintelligent, and dishonest.[3–8] Some research has found that physicians are reported to be one of the most frequent sources of weight bias,[5] and that weight bias is as pervasive among medical doctors as it is among the general public.[9] Other work has demonstrated that as patients' body mass index (BMI) increases, physicians report having less respect for patients, less desire to help patients, and report that heavier patients are less adherent to medications than thinner patients.[4, 10–11]

Being a target of weight stigmatization poses numerous consequences for clinical treatment and subsequent health outcomes of patients with obesity. Individuals who experience weight bias are more likely to avoid preventive health care screenings, cancel medical appointments, engage in maladaptive eating behaviors, and have heightened risk for psychological distress, poorer outcomes in weight loss treatment, and obesity.[12–19] Thus, weight bias can impair both emotional and physical health, and lead to unhealthy behaviors that can interfere with weight loss efforts and reinforce obesity. As individuals with obesity are already at heightened risk for many co-morbidities,[20] it is important to improve the medical climate to ensure that their health care experiences are productive, positive, and free of bias.

Given that weight bias has been established as a problem among health providers, efforts to address weight bias among students training in the medical and health professions are warranted. Implementing stigma reduction efforts during medical training may help prevent and attenuate weight biases that may otherwise remain and potentially worsen in the absence of intervention. The limited work that has documented weight bias among students in medical disciplines suggests that students hold similar biases as health providers,[21–25] including qualitative research showing that medical students feel that it is socially acceptable to make fun of patients with obesity.[26] Most recently, one study found that 33% of medical students self-reported moderate to strong explicit weight bias, and 39% exhibited implicit obesity bias, most of whom (67%) were unaware of their negative attitudes.[27]

However, important gaps in knowledge remain that are necessary to examine in order to identify specific targets and strategies for intervention to address weight bias in medical training and curriculum. First, it is important to examine whether, and how, student weight biases relate to their perceptions of providing treatment to patients with obesity, and to their perceptions of the causes of obesity more generally. Second, no research has assessed students' perceptions of weight bias toward patients with obesity in the broader clinical care environment, such as whether they observe weight bias among their peers or medical instructors. Third, it is not clear how individual characteristics may affect students' expressions of weight bias. One study found that weight bias among physicians varied somewhat by demographic characteristics, such as gender, race, and BMI. [9] Other work has found that personal and psychological variables, such as greater concerns "about becoming fat" [28] and stronger "just world beliefs" [29] were associated with higher levels of negative weight biases. Thus, further research is needed to better understand individual differences in weight bias, and it is clinically logical to examine associations with personal psychological

characteristics such as concerns about their own weight and body image, and self-esteem, in addition to basic demographic factors. Addressing these gaps in research will provide a more comprehensive understanding of the nature of weight bias among students training in health-related disciplines, and can be used to inform efforts to improve training and education about obesity treatment in curriculum for health-related disciplines. Thus, the present study aimed to expand on previous research in this area to examine weight bias among students training in health disciplines, to specifically assess the relationship between their weight biases and provision of treatment to patients with obesity, beliefs about the causes of obesity, observations of weight bias in the clinical care setting, and personal characteristics such as their concerns about their own shape and weight and self-esteem.

Method

Participants

Participants were students currently enrolled in a post-graduate professional health-related discipline at a university in the northeastern United States. Five classes of students participated from the university's school of medicine, including two classes (N = 55) of students enrolled in a Physician Associate (PA) program, two classes (N = 39) of doctoral-level clinical psychology interns, and one class of medical and psychiatry residents (N = 21). The study was described to students, who were then asked to complete a series of self-report surveys (see below) prior to a class lecture on the topic of the clinical implications of obesity stigma, which was their first exposure to this topic. Participation was voluntary, and the study was reviewed and approved by the author's university institutional review board. Data collection occurred during the academic year of 2012–2013.

Student participation yielded a 93% response rate, resulting in a final sample of 107 students. Of the total sample, 68% were female, 75% were Caucasian (9% Asian, 16% other), and the average age was 31.34 years (SD = 8.31). The mean BMI of participants was 23.25 (SD = 4.01). Table 1 also presents descriptive results for all primary measures.

Measures

Demographic and weight information—Participants completed demographic questions including age, gender, ethnicity, and height and weight from which body mass index (BMI) was calculated.

Universal Measure of Bias-FAT (UMB-FAT).[30]—The FAT subscale of the UMB-FAT contains 20 items assessing participants' general attitudes toward persons who are obese. Participants are asked to indicate how much they agree (on a 7-point Likert scale ranging from 'strongly agree' to 'strongly disagree') with various statements about people who are obese (e.g., 'fat people are sloppy'). Previous research has demonstrated this measure to be independent of socially desirable response styles.[30] Higher scores signify greater bias against persons who are obese. In the present sample, Cronbach's alpha for the UMB-FAT was $\alpha = 0.87$.

Perceived Weight Bias in Health care—This measure, created for the purposes of the study, queried participants about their perceptions of weight bias expressed by peers, educators, and health providers in the medical environment. Participants were asked to indicate, on a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree', how much they agreed with each of 7 statements (e.g., "I have heard/witnessed health care providers making negative comments or jokes about obese patients"). The development of these statements was guided from qualitative research with focus groups of medical students reported in previous research.[26] Item factor loadings yielded two subscales from this measure, including five items assessing perceived acceptability of weight bias among peers and instructors in the health care setting ($\alpha = 0.89$), and two items assessing personal opinions about the acceptability of weight bias toward patients with obesity ($\alpha = 0.63$).

Attitudes toward Obese Patients—This 11-item measure was developed for the purposes of this study. Participants were asked to indicate their level of agreement with statements that describe attitudes toward patients with obesity (e.g., "I often feel frustrated with obese patients", and "I feel confident that I can provide quality care to obese patients"). Two subscales were developed through exploratory factor analysis, and only items with adequate scale reliability were retained: one subscale reflecting negative attitudes toward patients with obesity (6 items, $\alpha = 0.83$), and a second subscale reflecting perceived confidence and preparedness to effectively treat patients with obesity (2 items, $\alpha = 0.70$).

Perceptions of Treatment Compliance and Success of Obese Patients—This 6-item measure was developed for the purposes of this study. Participants were asked to indicate on a scale from 1 (very little) to 10 (very much) their beliefs about the extent to which they perceive patients with obesity to be receptive to weight loss recommendations, compliant with treatment, motivated to change their diet, successful in making dietary changes, able to maintain weight loss, and how much they would enjoy working with these patients. In the present sample, Cronbach's alpha was $\alpha = 0.76$.

Causes of Obesity—Participants' beliefs about the causes of obesity were assessed using a measure by Foster and colleagues.[3] This measure describes 11 factors commonly believed to contribute to obesity (e.g., genetic factors, overeating, lack of willpower), and participants are asked to assess how important each factor is in causing obesity. Responses are provided on a 5-point Likert scale ranging from 1 (not at all important) to 5 (extremely important). Subscales were developed through exploratory factor analysis, and only items with adequate scale reliability were retained, yielding 3 subscales including "physiological causes" (3 items, $\alpha = 0.85$), "behavioral causes" (4 items, $\alpha = 0.71$), and "psychological causes" (3 items, $\alpha = 0.74$).

Rosenberg Self-Esteem Scale (RSE).[31]—The RSE is a valid, reliable, and widely-used measure of self-esteem. Participants are asked to indicate to what extent they agree with 10 statements reflecting their self-esteem (e.g., I certainly feel useless at time) on a 4-point Likert scale from 'strongly agree' to 'strongly disagree'. In the present sample, Cronbach's alpha for the RSE was $\alpha = 0.88$.

Body Shape and Weight Concerns Subscales, Eating Disorder Examination Questionnaire (EDE-Q).[32]—The EDE-Q is an established measure of current eating disorder psychopathology and features with demonstrated validity and reliability.[33] Two subscales of the EDE-Q subscales, Shape Concerns and Weight Concerns, comprising 12 questions were included to assess participants' concerns about their own body shape and weight. Items are rated on a seven-point forced-choice format, ranging from 0 (No days) to 6 (Every day), with higher numbers reflecting greater severity or frequency. In the present sample, Cronbach's alpha for these scales was$\alpha = 0.94$.

Results

Descriptive Results

Observations of Weight Bias and Attitudes Toward Patients—Table 2 presents the percentage of participants who expressed agreement (as measured by ratings of "agree" or "strongly agree") with statements regarding their observations of weight bias in the medical setting as well as their personal attitudes about patients with obesity. These findings show that a substantial portion of students witnessed their peers and instructors expressing weight bias in the medical setting. Although only 3% of students reported that they themselves believe it is acceptable to make jokes about patients with obesity, high percentages of students indicated that patients with obesity are a common target of derogatory humor in the medical setting by students, residents, and attendings (43%), that their peers have negative attitudes toward patients with obesity (50%) and that they have witnessed other students making jokes about patients with obesity (63%). In addition, students reported witnessing negative comments or jokes about patients with obesity made by health care providers (65%) and by professors or instructors (40%). Table 2 also summarizes students' personal attitudes about patients with obesity. Approximately one-third of students reported often feeling frustrated with patients with obesity (36%), that patients with obesity lack motivation to make lifestyle changes (33%) and are difficult to deal with (33%). Only 27% of students agreed that treating patients with obesity is professionally rewarding, and 13% indicated that they dislike treating patients with obesity.

Expectations of Treatment Compliance and Success of Patients—As shown in Table 2, students expressed considerable pessimism with respect to treatment of patients with obesity. Less than half of students felt that patients with obesity are compliant with treatment recommendations (42%) and had confidence that patients can maintain weight loss once it is achieved (41%). Lower percentages of students felt that patients with obesity are receptive to weight loss recommendations (35%), motivated to change their diet (36%) or can be successful in making dietary changes (38%), and only 25% indicated that they would enjoy counseling and working with patients who have obesity.

Regression Analyses

Linear regression models (OLS) were used to regress students' observations of weight bias, expectations of compliance and treatment success of patients, and beliefs about the causes of obesity on self-esteem, personal concerns about body shape/weight, and explicit weight bias measures. Participants' gender, age, race/ethnicity, and BMI were included as covariates. A

linear path model was used to separate the effect of weight bias on participants' expectations of treatment compliance of patients with obesity into both a direct and indirect effect, where the assumption was made that the indirect effect arose from a mediation pathway via participants' beliefs that obesity is caused by behavioral factors. The two outcome variables in the path model were derived using an arithmetic mean scale based on a principal factor analysis.[34] Beliefs in behavioral causes of obesity was the second strongest of three meaningful factors, explaining 30% of the variance within a set of eleven items (eigenvalue = 1.35). The second outcome variable in the path model, expectations of compliance and success, was derived by the same method. Here, expectations of patients' compliance and success was a single dominating factor explaining 92% of the variance within a set of six items (eigenvalue = 2.24). Covariates noted above were included in both regression equations of the path model. All analyses were performed in Stata version 11.2 and MPlus version 6.

Table 3 presents regression results for participants' beliefs about the causes of obesity and their perceptions of weight bias in health care settings. Participants' self-esteem, personal concerns about body shape/weight, and explicit weight bias had no effect on their beliefs about the physiological and psychological causes of obesity. However, participants' reported weight bias (UMB-FAT scores) had a moderate-sized effect on their beliefs that obesity is caused by behavioral factors, in which higher weight bias was associated with stronger beliefs that obesity is caused by behavioral factors (b = 0.381, p<0.001). In addition, the EDE-Q was significantly associated with the perceptions of weight bias by peers, educators, and providers in health care settings, indicating that participants with more severe personal body shape/weight concerns perceived there to be more weight bias by others in the medical setting (b = 0.304, p<0.05).

Table 4 shows regression results for personal acceptability of weight bias and attitudes towards patients with obesity. Self-esteem and personal body shape/weight concerns were not associated with any of the four outcome variables. Weight bias (UMB-FAT scores) significantly predicted students' personal acceptability of weight bias, such that higher levels of general weight bias were associated with beliefs that it is acceptable to make jokes about patients with obesity (b=0.372, p<0.001). In addition, higher UMB-FAT scores among participants were associated with more negative attitudes about treating patients with obesity (b = 0.483, p<0.001), and lower expectations of treatment compliance and success of patients with obesity (b = −0.408, p<0.001).

Table 5 shows results from the path model that was used to assess the potential mediation of the effect of weight bias on expectations of treatment compliance by means of beliefs that obesity is caused by behavioral factors. The total effect of weight bias on treatment expectations of −0.4 (standardized effect size, as presented in Table 5) was separated into a direct effect (b = − 0.27, p = 0.002) and indirect effect (b = −0.142, p = 0.003), indicating a significant partial mediation of 34%. Thus, part of the effect of weight bias on expectations of treatment compliance of patients with obesity can be attributed to participants' beliefs that obesity is caused by behavioral factors, such as a patients' lack of willpower or overeating.

Discussion

The findings of the present study extend upon previous research documenting weight bias among students in health disciplines, to show that these weight biases are commonly observed in the clinical care setting and have important associations with students' provision of treatment of patients with obesity and their beliefs about the causes of obesity. Although students reported feeling confident in their ability to treat patients with obesity, many expressed frustrations about treating these patients, and viewed them to be difficult to deal with, lacking in motivation, and non-compliant with treatment recommendations. Students with higher levels of general weight bias expressed more negative attitudes and pessimism in these areas, and were more likely to attribute obesity to behavioral causes compared to students with less weight bias. In general, students were reluctant to indicate that they feel it is acceptable to make fun of patients with obesity, but high percentages (ranging from 40–65%) nevertheless reported observing peers, students, instructors, and health providers making negative comments or derogatory jokes about these patients, suggesting that weight bias is indeed commonly expressed and socially acceptable in training and medical settings. Thus, although it appears that trainees feel that it is unacceptable to endorse weight bias, they report being exposed to it in their training. While it is not clear what impact this exposure may have on trainees, it may be that the social acceptability of weight bias in the clinical care environment is rarely challenged, and, as a result, trainees may be reluctant to question it or voice their concerns, especially if bias is expressed by instructors or health providers.

Collectively, these findings suggest that obesity stigma-reduction efforts are warranted for students training in health-related professions, and that these efforts should include an emphasis on several specific issues. First, in light of our findings suggesting that students' beliefs that obesity is caused by behavioral factors partially mediates the association of weight bias and poor expectations of treatment compliance of patients with obesity, it will be important for stigma-reduction efforts to include education about the complex etiology of obesity to dispel oversimplified assumptions that obesity is merely caused by behaviors such as overeating or lack of willpower. The recent declaration by the American Medical Association classifying obesity as a disease may be useful in these efforts,[35] to help students understand that obesity is a complex, chronic condition with multiple pathophysiological aspects requiring a range of interventions. In addition, experimental research has demonstrated that educational strategies emphasizing the complex etiology of obesity (e.g., biological and genetic contributors outside of personal control) can reduce weight stigmatization among medical students.[36–37] These approaches have been implemented using different formats (e.g., lectures, written materials, videos) and can thus be feasibly integrated in curricula and clinical training settings.

Second, our findings suggest that, in addition to challenging the acceptability of derogatory humor toward patients with obesity, stigma-reduction efforts should also address students' perceptions, beliefs, and frustrations pertaining to provision of treatment of patients with obesity. For example, educating students about the difficulties for patients to achieve significant, sustainable weight loss over time may promote increased appreciation of the challenges they face. In light of considerable obstacles achieving and sustaining significant

weight loss over time[38], a greater understanding of the complexity of weight control and the multifaceted biological and behavioral factors that contribute to weight may serve to counter common views that a patient's inability to lose weight merely reflects lack of motivation or compliance in treatment. Such educational messages and efforts may be assisted with evidence from major medical panels like the Institutes of Medicine and National Institutes of Health, whose guidelines suggest that health providers set realistic expectations for patients to lose and maintain only modest weight losses of approximately 10% of body weight.[38]

Third, although students' personal body weight and shape concerns were not related to primary outcome variables in our study, the findings that students with greater personal body shape/weight concerns perceived more weight bias by others in the medical setting is noteworthy. This finding holds some clinical appeal and it builds upon previous research with diverse patient groups indicating that negative biases towards obesity do not appear to be correlated with the intensity of eating disorder psychopathology including degree of shape/weight concerns.[39] It seems, however, that greater shape/weight concerns may make trainees more observant to negative weight biases and behaviors exhibited by others (i.e., they may be more attuned to negative bias about a topic that may be sensitive to them). Further research is needed in this area to clarify whether this will be a useful component of interventions to reduce bias.

Several limitations of this study should be noted. Our study group was not a random or necessarily representative sample of trainees in the selected disciplines. Thus, the magnitude of the biases and beliefs may not generalize or reflect levels in these trainees in different settings. Moreover, the findings may not generalize to trainees in other health disciplines, although we note that elevated rates of negative weight biases have been documented in numerous studies of health-care professionals.[2] Our study enrolled trainees of different disciplines with the goal of increasing heterogeneity and potential generalizability, but more work is needed to compare attitudes and beliefs across different disciplines. The cross-sectional nature of the study precludes making any causal inferences. Given that participants' attitudes were assessed via self-report, it will be important for future research to examine whether student weight biases affect actual interactions with patients or patient outcomes, and how their weight biases compare to attitudes toward other patient populations. Anonymous self-report, however, might facilitate honest self-disclosure and reporting of sensitive and potentially embarrassing feelings and behaviors by the participants. While social desirability could potentially affect participants' responses, previous research has documented a lack of correlation between socially desirable response styles and the primary measure used in this study[30] as well other self-report measures of weight bias,[40] which suggest that social desirability was unlikely in the present study. In the future, it will be important to identify whether similar weight biases emerge in a more ethnically diverse sample, and whether students' perceptions differ according to patient characteristics such as gender and race. It may be additionally useful for future research to refine measurement of students' biased attitudes and beliefs, to improve upon the internal consistency and external validity of some of the scales used in this study. Finally, given that this study shows that students' attitudes may be influenced by their beliefs about the causes of obesity, it will be important for future research to assess students' attitudes and

knowledge about a broader range of contributors and causes of obesity (e.g., environmental causes) that were not included in measures used in the present study.

In conclusion, this study suggests that weight bias is commonly observed by students training in health disciplines, who themselves also report considerable frustration, pessimism, and stereotypes about treating patients with obesity. Students' beliefs about the causes of obesity, may play an important role in these perceptions, and should be included as a component of stigma-reduction efforts to reduce weight bias. These findings contribute new knowledge about weight bias among students in health disciplines, and provide several targets for training and education to help remove barriers that may otherwise interfere with provision of treatment and health care experiences for patients with obesity.

Acknowledgements

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What is already known about this subject?

☐ Patients with obesity are vulnerable to bias from health-care providers in medical settings

☐ Weight bias poses negative emotional and physical health consequences for those affected.

☐ Limited research has documented weight bias among medical students, but important gaps in knowledge remain that need to be addressed to inform medical training.

What does this study add?

☐ Weight bias is commonly observed by students training in health disciplines, who themselves also report frustration, pessimism, and stereotypes about treating patients with obesity.

☐ The relationship between students' weight bias and attitudes about treatment of patients with obesity is partially mediated by beliefs that obesity is caused by behavioral factors.

☐ This study provides several targets for training and education to help remove barriers that may otherwise interfere with provision of care for patients with obesity.

Table 1

Descriptive statistics of primary measures (N = 107)

Primary Variables	M	SD	Min	Max
BMI	23.25	4.01	16.14	39.11
UMB-FAT	3.04	0.75	1.56	5.44
Perceived weight bias in health setting	3.23	0.89	1	5
Personal acceptability of weight bias	1.56	0.63	1	3.5
Attitudes toward obese patients: negative	2.76	0.83	1	5
Attitudes toward obese patients: professional	3.78	0.76	1.5	5
Expectations of treatment compliance/success	5.29	1.34	1.83	8.5
Perceived causes of obesity: physiological	3.46	0.87	1.33	5
Perceived causes of obesity: behavioral	3.63	0.71	1.75	5
Perceived causes of obesity: psychological	3.36	0.74	1.67	5
Self-Esteem (RSE)	2.32	0.49	1	3
EDE-Q shape/weight concerns	1.79	1.52	0	5.5

Table 2

Participants' observations and attitudes about patients with obesity

Questionnaire Items	% Agreement
Perceived acceptability of weight bias in the medical setting	
My peers tend to have negative attitudes towards obese patients.	50%
I have heard/witnessed other students making jokes about obese patients.	63%
It is acceptable to make jokes about obese patients.	3%
I have heard/witnessed professors or instructors making negative comments or jokes about obese patients.	40%
I have heard/witnessed health care providers making negative comments or jokes about obese patients.	65%
In the medical setting, obese patients are a common target of derogatory humor by students, residents, and/or attendings.	43%
If a person becomes obese, it's really their own fault, so it is acceptable to make jokes about their weight.	1%
Attitudes toward obese patients	
I often feel frustrated with obese patients.	36%
Obese patients can be difficult to deal with.	33%
I feel that it is important to treat obese patients with compassion and respect.	95%
I dislike treating obese patients.	13%
I see no difference between obese patients and normal weight patients.	21%
I feel confident that I provide quality care to obese patients.	80%
I feel professionally prepared to effectively treat my obese patients.	57%
I feel that obese patients are often non-compliant with treatment recommendations.	36%
I feel that obese patients lack motivation to make lifestyle changes.	33%
Treating obese patients is professionally rewarding.	27%
Obese patients tend to be lazy.	18%
Expectations of treatment compliance and success of obese patients	
Obese patients are receptive to weight loss recommendations.	35%
Obese patients are compliant with treatment recommendations.	42%
Obese patients are motivated to change their diet.	36%
Obese patients can be successful in making dietary changes.	38%
I have confidence that obese patients can maintain weight loss, once it is achieved.	41 %
I would enjoy counseling and working with obese patients.	25%

Note: Agreement = responses of 'agree' or 'strongly agree'

Table 3

Beliefs about the causes of obesity and perceived acceptability of weight bias in health care settings: Linear regression models

	Cause of obesity: physiological	Cause of obesity: behavioral	Cause of obesity: psychological	Perceived weight bias in health care setting
Self-esteem	0.113	0.154	0.190	−0.048
EDE-Q	0.012	0.029	0.101	0.304[*]
UMB-FAT	0.060	0.381[***]	−0.068	−0.011
Females	0.107	−0.103	0.298	−0.230
Age (years)	−0.014	−0.020[+]	−0.006	−0.008
Caucasian				
Asian	−0.105	0.199	0.065	0.488
Other	0.336	0.179	0.064	0.107
BMI	−0.059[*]	−0.0	−0.0	−0.011
Constant	1.693[*]	1.584[*]	0.883	0.579
R² Adjusted	0.123	0.217	0.099	0.110
R²	0.051	0.154	0.025	0.037
N	107	107	107	107

Note. Presented are coefficients from linear regression models (OLS). All outcome variables and the scales self-esteem, EDE-Q shape/weight concerns, and UMB-FAT are z-standardized and the coefficients can be interpreted in terms of standard deviations. For example, an increase in weight-bias (UMB-FAT) by one standard deviation leads to an increase of roughly 0.4 standard deviations in the belief that obesity is due to obese persons' behavior (e.g., physical inactivity, overeating), adjusted for other variables in the model. Weight bias X gender interaction effects were explored in separate models and there were no significant differences in the weight bias effects between male and female participants.

Significance levels:

[+] $p < 0.1$,

[*] $p < 0.05$,

[**] $p < 0.01$,

[***] $p < 0.001$.

Table 4

Personal acceptability of weight bias and attitudes towards patients with obesity: Linear regression models.

	Personal acceptability of weight bias	Negative attitudes toward OB patients	Confidence/ preparedness in treating OB patients	Expectation of treatment compliance/success of OB patients
Self-esteem	−0.081	−0.014	0.011	0.086
EDE-Q	−0.111	0.015	−0.019	−0.025
UMB-FAT	0.372***	0.483***	−0.135	−0.408***
Females	0.014	0.151	−0.495*	0.313
Age (years)	−0.009	−0.029*	−0.016	0.016
Caucasian				
Asian	0.186	0.139	−0.604+	−0.317
Other	−0.317	−0.229	−0.299	−0.478+
BMI	−0.011	−0.012	0.043	0.014
Constant	0.573	1.112+	−0.046	−0.936
R^2 Adjusted	0.197	0.302	0.152	0.224
R^2	0.132	0.245	0.083	0.160
N	107	107	107	107

Note. Presented are coefficients from linear regression models (OLS). All outcome variables and the scales self-esteem, EDE-Q shape/weight concerns, and UMB-FAT are z-standardized and the coefficients can be interpreted in terms of standard deviations. For example, an increase in weight-bias (UMB-FAT) by one standard deviation leads to a decrease of roughly 0.4 standard deviations in the expected success of treatment of obese patients, adjusted for other variables in the model. Weight bias X gender interaction effects were explored in separate models and there were no significant differences in the weight bias effects between male and female participants. Significance levels:

+ $p<0.1$,

* $p<0.05$,

** $p<0.01$,

*** $p<0.001$.

Table 5

Mediation of the effect of weight bias on expectations of treatment compliance by means of beliefs that obesity is caused by behavioral factors.

	Cause of obesity: behavioral		
	b	**se**	**P**
UMB-FAT	0.375	00.0	0.000
Females	−0.133	0.198	0.501
Age (years)	−0.019	0.011	0.093
BMI	−0.042	0.024	0.083
Caucasian			
Asian	0.191	0.303	0.528
Other	0.226	0.243	0.353

	Expectation of compliance/ success of obese patients		
	b	se	P
Cause of obesity: behavioral	−0.380	0.088	0.000
UMB-FAT	−0.270	0.089	0.002
Females	0.218	0.181	0.230
Age (years)	0.010	0.011	0.364
BMI	−0.007	0.023	0.754
Caucasian			
Asian	−0.232	0.277	0.403
Other	−0.361	0.223	0.106

Indirect effect:	b	se	P
UMB-FAT --> expectation via behavioral cause of obesity	−0.142	0.048	0.003
Total effect:			
UMB-FAT --> expectation	−0.412		
% mediation	34%		

R^2 (cause of obesity)		0.198
R^2 (expectation)		0.330
N		107

Note. Presented are coefficients from a linear path model. The two outcome variables and the UMB-FAT scale are z-standardized and the coefficients can be interpreted in terms of standard deviations. The effect of weight bias (UMB-FAT) on compliance and success expectations is mediated by whether the participants think obesity is due to obese persons' behavior (e.g., physical inactivity, overeating). The total effect on weight bias on compliance and success expectations is −0.41 which can be decomposed into a direct effect of −0.27 and an indirect effect of −0.14. Thus, the effect of weight bias on success expectations is partly mediated (34%) by behavioral beliefs in obesity causes.