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The mixed impact of medical school on medical students' implicit and explicit weight bias

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Abstract

Background—Healthcare trainees demonstrate implicit (automatic, unconscious) and explicit (conscious) bias against people from stigmatized and marginalized social groups, which can

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negatively influence communication and decision-making. Medical schools are well positioned to intervene and reduce bias in new physicians.

Objective—To assess medical school factors that influence change in implicit and explicit bias against individuals from one stigmatized group, people with obesity.

Design—Prospective cohort study of medical students enrolled at 49 US medical schools randomly selected from all US medical schools within strata of public/private schools and region.

Participants—1,795 medical students surveyed at the beginning of their 1st year and end of their 4th year.

Measurement—Web-based surveys included measures of weight bias, and medical school experiences and climate. We compared bias change to changes in the general public over the same time period. We used linear mixed models to assess the impact of curriculum, contact with people who have obesity, and faculty role-modeling on weight bias change.

Results—Increased implicit and explicit biases were associated with less positive contact with patients who have obesity and more exposure to faculty role-modeling of discriminatory behavior or negative comments about patients with obesity. Increased implicit bias was associated with training in how to deal with difficult patients. On average, implicit weight bias decreased and explicit bias increased during medical school, over a period of time where implicit weight bias in the general public increased and explicit bias remained stable.

Conclusion—Medical schools may reduce students' weight biases by increasing positive contact between students and patients with obesity, eliminating unprofessional role-modeling by faculty and residents, and altering curricula focused on treating difficult patients.

Introduction

Health care provider implicit (automatic, unconscious) biases and attitudes about stigmatized groups have been shown to impact interpersonal care processes with members of those groups. These biases are caused, in part, by exposure to societal stigma and shared stereotypes about these groups. Medical school is a time of rapid socialization into the field of medicine, and as such, the medical school climate and specific observed behaviors are likely to influence students' implicit, as well as explicit, biases. In this paper, we measure these processes and how they influence change in attitudes about one highly stigmatized group, people with obesity. Health care providers and trainees, like the general public, hold negative attitudes about people with obesity, including beliefs that they are lazy, non-compliant, and unintelligent. (1–5) These attitudes, though only part of the stigma that individuals with obesity experience, can impact communication and decision-making in ways that impede patients' attempts to make lifestyle changes (6, 7), prevent them from seeking follow-up care (8), and lead to suboptimal quality of care. (9–11)

Weight bias consists of at least two cognitive processes(12): implicit bias, an unconscious preference for thin over fat people; and explicit bias, a conscious preference. These processes are largely independent of each other (12) and independently predict less patient-centered communication and decision-making. (13–16) High prevalence rates of obesity and

overweight mean that approximately 2/3 of patients may be struggling with weight. Thus, weight bias is an important clinical concern that should be addressed in training.

Medical students have high levels of implicit and explicit weight bias at the start of medical school (1), thus medical schools are well-positioned to intervene to reduce bias prior to students' practicing medicine. Several key elements of medical education, including curriculum content, instructor role-modeling, and student interactions with individuals who have obesity, may affect students' weight bias. A better understanding of these factors is needed to guide interventions to reduce bias in emerging generations of physicians.

Curriculum

Few medical schools provide curriculum content on obesity prevention and treatment, let alone instruction to reduce weight bias. (17) However, most schools offer instruction in health disparities and provider bias broadly (usually in the context of racial bias) (18) as well as skill building in empathic responses to patients, interpersonal communication, and regulation of emotions. (19) These experiences may impact implicit or explicit biases. Coursework to develop skills in treating patients with obesity that does not include a consideration of weight bias may increase bias by defining patients with obesity as different and more challenging patients, a process called "othering". (20, 21)

Modeling

A powerful hidden curriculum (22) is conveyed through faculty and instructor modeling of behaviors and attitudes. (23, 24) Role models who demonstrate prejudice, disrespect, poor treatment, or low expectations of patients with obesity may establish norms that negative attitudes about these patients are expected and even desirable. In a recent study of medical students, 40% reported witnessing instructors make jokes and negative comments toward patients with obesity, and 65% witnessed such comments by other health providers. (25) Alternatively, exposure to role models who demonstrate positive attitudes about treating patients who have obesity may improve students' attitudes about these patients.

Contact

Positive contact with members of stigmatized groups has been shown to reduce prejudice. (26) Positive contact with patients may challenge students' expectations and stereotypes and increase understanding of causes of obesity or difficulty losing weight. Working with a peer with obesity or appreciating the accomplishments of a faculty member with obesity may help develop positive emotions about people with obesity.

The objective of this study is to assess change in implicit and explicit weight bias during medical school, and the medical school factors that influence such change.

Methods

Sample

The Medical Student Cognitive Habits and Growth Evaluation Study (CHANGES) is a longitudinal study of medical students who matriculated in US medical schools in the fall of

2010. We randomly selected 50 medical schools from strata of public and private schools in 6 regions of the country, using sample proportional to strata size methodology. One sampled school with highly unique characteristics (military school) was excluded, leaving a sample of 49 schools. From those schools, we ascertained and invited 5,823 first year students (68% of all 1st year students attending sampled schools) to participate in the web-based survey during their first semester of medical school. Recruitment consisted of three parts: first, the Association of American Medical Colleges (AAMC) added an item to their Matriculation Questionnaire asking students to provide an email address to learn more about participating in the study. Second, a publicly available (but incomplete) list was purchased from the American Medical Association (AMA). Third, survey completers received an email with study contact information that they could forward to classmates. Students who contacted us were screened for eligibility and sent a link to complete the survey. (1) The sample (n = 4,732) consisted of 81% of those sent an invitation and 55% of all first year medical students at study schools. To reduce overall respondent burden, 50% (n=2,370) were randomly assigned to complete a Weight Implicit Association Test (a measure of implicit bias). In spring of 2014, during the students' final semester, we emailed a follow-up survey to students who completed the Weight IAT. Using a response rate maximization strategy, including a $50 incentive, we received completed surveys from 1,890 students (80%). Students who were not in their 3rd/4th year of medical school for any reason (e.g., delaying attendance, pursuing another degree) were excluded (n=95), leaving complete longitudinal datafor 1,795 students. This study was approved by the Mayo Clinic IRB.

Measures

Common survey questions were used to measure age, sex, race, Hispanic/Latino ethnicity, height, and weight at baseline. Students reported their household income during high school (age 15–18 years) to assess family SES. Family income was dichotomized into <$100k/year and ≥ $100k/year. Because previous research showed that Black medical students have, on average, more pro-fat implicit attitudes than members of other race groups (1), race was dichotomized into Black vs. all other races. Body Mass Index (BMI) was calculated.

Implicit weight bias was measured with the Weight Implicit Association Test (IAT), an extensively validated measure of automatic, unconscious attitudes that predicts behavior independently of explicit attitudes. The Weight IAT is a computer-based measure that compares the time it takes to categorize silhouettes of people with large body sizes with negative words (e.g., awful, horrible) and silhouettes of thin people with positive words (e.g., wonderful, joy) to the opposite (fat/positive, thin/negative). (27, 28) Difference scores are calculated and range from −2 (strong pro-fat bias) to 2 (strong anti-fat bias). Change in implicit bias was calculated by subtracting 1st year scores from 4th year scores, thus a negative change score represented a reduction in implicit bias.

Explicit weight bias was measured using a validated "feeling thermometer" strategy in which participants indicated their feelings toward "obese people" by moving a slider along a thermometer.(29) Numbers along the thermometer ranged from 0 to 100 degrees, by 10s, with ends labeled "very cold or unfavorable and "very warm or favorable." Change in explicit bias was calculated by subtracting 4th year scores from 1st year scores, thus a

negative change score represents a reduction in explicit bias. For comparison with the general public, we obtained data from Project Implicit, which collects implicit and explicit data from individuals who visit their website, projectimplicit.org. (2, 9) These data included weight IAT and feeling thermometer scores from 397,600 visits during 2010–2013.

Formal curriculum was assessed by calculating the average number of hours the student reported that he or she spent training in each of four domains. Health disparities curriculum is often focused on race disparities, and these classes are most likely to cover the concepts of implicit bias and stigmatized populations. Thus, hours of training related to disparities (Cronbach's alpha (α)=.88) was an average of self-reported hours of training devoted to a) racial disparities in health care, b) identifying cultural customs that might affect clinical care, and c) the potential effect of unintended racial bias on care. Hours of training related to emotion regulation (α=.85) was an average of self-reported hours of training devoted to a) managing emotions, and b) managing or reducing stress. Hours of training related to interpersonal skills (α=.81) was an average of self-reported hours of training devoted to a) communication skills, b) partnership-building skills, c) seeing things from patients' perspective, and d) working effectively in inter-professional teams. Students also reported hours of training devoted to working with difficult patients, a term used to describe patients who are non-compliant, medically complex, and/or difficult to communicate with. We categorized this variable into quartiles due to a highly skewed distribution. We also assessed student self-reported skill in providing weight loss counseling to patients with obesity as a proxy for training in providing such counseling.

Role modeling was assessed using 2 sets of items. Observed weight stigma was an average of 2 items measured on a 5-point scale: a) How often have you heard professors or residents make negative comments about obese patients? and b) While in medical school, how often have you witnessed discriminatory treatment of an obese patient (α=.60). Each participant also reported whether he or she observed another student being a) given lower grades for unfair reasons, b) treated in an unfriendly way as if not welcome, c) subjected to offensive remarks/names, d) treated with less respect than other students, e) publicly humiliated, and f) ignored by resident or attending physicians. For each of these observations, participants reported the extent to which they attributed the incidents to the recipient student's body size, race or ethnicity, gender, or sexual orientation. We created a 2-category variable with one category assigned to participants who either witnessed none of these incidents or witnessed these incidents but said that they were not at all likely to have occurred because of the student's body size. Students who witnessed any of these incidents and attributed it to the recipient student's body size were placed in the second category.

Contact with people with obesity was measured by 6 items. Students reported on a 4-point scale how much interaction they had with a) obese medical students, b) obese faculty, attending physicians or residents, and c) obese patients. Students also reported on a 4-point scale how favorable their interactions were with a) obese medical students, b) obese faculty, attending physicians or residents, and c) obese patients.

Analysis

We calculated implicit and explicit weight bias in our sample, and compared them tothe general public during the same period of time. We then developed 6 preliminary linear mixed models (1 for each domain of medical school environment: curriculum, contact, and role modeling) predicting change in implicit or explicit bias. Each model included a random intercept for school, all independent variables from the given domain and the respective baseline implicit or explicit weight bias score. Model fit was evaluated using R^2 adjusted for mixed models, measuring the variation explained by adding the fixed effects to the random intercept model. We examined beta coefficients and corresponding p-values to assess associations. We examined variance inflation factors, but found no evidence of excessive multicollinearity. We then tested the interactions between amount and favorability of contact with students, faculty, and patients. The 2 final linear mixed models included a random intercept for school, the respective baseline implicit or explicit bias score, socio-demographic covariates, and the independent variables and interactions that reached $p<.15$ in the three preliminary models.

Results

Sample demographic characteristics are presented in Table 1. Figure 1 shows the mean Weight IAT score at each year between 2010 and 2013 for the Project Implicit (public) sample, and the mean score in 2010 and 2014 for the CHANGES sample. In 2010, the scores in each sample are approximately equal (0.42 and 0.43). Over the next 2 years, public IAT scores increased (indicating stronger implicit preference for thin people), before decreasing slightly between 2012 and 2013. In contrast, between 2010 and 2014, the average medical student IAT score in the CHANGES sample decreased substantially (−0.11), representing a steep reduction in implicit weight bias. Of the 49 sample schools, implicit weight bias increased in 5 schools and decreased in 44 schools. Figure 2 shows the mean feeling thermometer score by year for the public and CHANGES samples. Absolute differences between the samples are difficult to interpret because of different wording in the public (“fat people”) and CHANGES (“obese people”) samples. The CHANGES sample has a small but significant increase in explicit bias between 2010 and 2014 (30.4 to 35.6; $p<0.001$), whereas the mean score for the public sample changes little.

In the domain-specific models (Table 2), greater increase in implicit weight bias was associated with more hours of training in dealing with difficult patients ($b=0.032$; $p=0.027$), and observing more discrimination or negative comments about patients with obesity by faculty ($b=.025$; $p=.029$). Greater decrease in implicit weight bias was associated with more favorable interactions with patients with obesity ($b=-.047$; $p=.014$) and marginally associated with more interaction with medical students with obesity (−.034; $p=.052$) and patients with obesity ($b=-.031$; $p=.098$). Greater explicit bias increase was associated with observing more discrimination or negative comments about patients with obesity by faculty ($b=2.104$; $p<.001$). Greater reduction in explicit bias was associated with more skill providing weight loss counseling to patients with obesity ($b=-1.631$; $p=.005$), and more favorable interactions with patients with obesity ($b=-9.051$; $p<.001$). None of the interactions between amount and favorability of contact reached significance.

The final adjusted models explained 41% and 32% of the variance in implicit bias change and explicit bias change, respectively (Table 3). In these models, greater increase in implicit weight bias was associated with more hours of training in dealing with difficult patients (b=.028; p=.034), and faculty/resident discrimination or negative comments about patients with obesity (b=.026; p=.022). Greater decrease in implicit weight bias was associated with more favorable interactions with patients with obesity (b=−.033; p=.023) and family income > $100,000 (b=−.001; p=.008) and marginally associated with more interaction with medical students with obesity (b=−.026; p=.057) and Black race (b=−.086; p=.058). Greater increase in explicit weight bias was associated with observing faculty/resident discrimination or negative comments about patients with obesity (b=1.212; p=.032) and male gender (b=3.936; p<.001). Greater decrease in explicit weight bias was associated with more favorable interactions with patients with obesity (b=−8.599; p<.001).

Discussion

We found evidence that medical school factors influence change in attitudes about stigmatized patient groups. Implicit weight bias declined considerably and explicit weight bias increased slightly but significantly during medical school. Increased explicit bias, but not decreased implicit bias, is consistent with evidence of declining empathy as one progresses through medical school. (30, 31) During the same time, implicit weight bias increased in the general public, and explicit bias was stable, suggesting that the changes during medical school do not reflect a secular change in the broader population but may be due in some part to the medical school experience. Previous research suggests that implicit weight bias among physicians is similar to the population average (2); thus these findings suggest that either recent changes in medical schools are causing positive change that was not seen historically, or the change is relatively temporary and proximal to medical school completion. Importantly, although implicit bias was reduced overall, the average IAT score at year 4 still shows slight bias against people with obesity.(32) The implications of these changes for care delivery require additional study. Given evidence that decisions (deliberative behavior) are powerfully influenced by explicit cognitions (15, 33) one might expect that worsening explicit weight bias over medical school will decrease the likelihood that a provider utilizes face-to-face weight loss counseling. This is consistent with evidence that most providers choose not to initiate weight loss discussions with patients,(34–36) despite clinical guidelines and reimbursement provision in the Affordable Care Act encouraging them to.(37, 38) Improved implicit bias, which has been shown to exert more influence on subtle nonverbal communication (spontaneous behavior) and improve patient satisfaction (15, 33), may lead to communication that is more respectful and patient-centered, perhaps improving patient experience and outcomes when these actions are taken.

One explanation for the divergent trends in implicit and explicit bias is the influence of mediating variables. Positive contact has been found to influence explicit bias partially through decreased anxiety about contact.(39) Thus, if students remained anxious about providing care for patients with obesity, perhaps due in part to increased knowledge or emphasis of the health risks of obesity, the potential benefits of contact in medical school may be negated. In contrast, evidence shows that the impact of contact on implicit bias is

direct (39); thus, this effect was not contingent on intermediary experiences. Further study is necessary to understand these complex processes.

Self-reported hours of curriculum on disparities, emotion regulation, or interpersonal skills did not predict bias change. Emotion regulation and interpersonal skills are more likely to affect the likelihood that bias influences care, thus it is unsurprising that they did not predict change in bias itself. It is more surprising, given the reduction in implicit bias overall, that hours of training in health disparities did not predict reduced implicit or explicit bias. This may be because disparities curriculum is often focused on race bias. Medical schools should consider including discussions about caring for members of stigmatized populations like patients with obesity in disparities curricula. With the exception of favorable interactions with obese patients, amount and favorability of interaction with obese people were inconsistently associated with bias change. Consistent with the contact hypothesis, independent of favorable interactions with obese patients, amount of contact did not predict attitude change, suggesting the usefulness of a smaller number of meaningful positive experiences.

The number of hours of training in dealing with difficult patients was associated with increased bias. Patients who have obesity tend to have more comorbidities (40) and are often thought of as unable or unwilling to make behavior changes (41), thus they may be more likely to be considered difficult patients. This finding underscores both the importance of addressing students' negative perceptions about treating patients with obesity and the need for strategies and appropriate/accessible examination and care tools to reduce the physical difficulties associated with providing care for this population. Further research is needed to determine the impact of various approaches. For example, schools that emphasize this as a special population that requires more resources and time may communicate to students that these patients are a "problem" and increase students' anxiety and negative attitudes about treating them. This hypothesis should be directly tested in future research. Alternately, in-depth training on care for challenging patients may help reduce trainees' feelings of failure when these patients are not able to be cured.

The contact hypothesis (42) states that prejudice between groups can be reduced when group members interact with each other in positive ways and find shared characteristics and experiences. Extensive study has supported this hypothesis (26), and found that the effects of inter-group interactions are mediated by increased empathy and reduced anxiety, and most robust when there are shared goals and equal status between group members. (43, 44) Interaction with other students, for example, during team-based learning, may be equal status and directed toward a common goal (academic success). Thus, the positive association between amount of interaction with obese students and implicit bias reduction is consistent with contact hypothesis. Favorable contact with patients with obesity may reduce anxiety about providing care for these patients and help students' see them as individuals, which may increase empathy and reduce bias, although there is some evidence to the contrary. (45) Further research should clarify whether inter-group contact reduces bias and/or improves care quality.

Role-modeling is an important part of medical education and socialization, (24) and is a primary vehicle for learning professionalism. (23) It is not a surprise then that observing role models make negative comments about or discriminate against patients with obesity is associated with increased bias. The frequency and normalization of derogatory humor and comments are pervasive problems in medical education, (46, 47) and their reduction or banishment may lead to greater improvements in students' attitudes.

This study uses a robust longitudinal design to assess change in implicit weight bias, and benefits from a large national sample of medical students. It provides vital information to guide medical school interventions to reduce bias and improve patient scare. Still, there are several additional elements of medical education that are unmeasured and may influence weight bias. Thus, more research is needed to understand the elements of medical school that are reducing implicit weight bias in students, and future studies should expand upon the school factors measured in this study. Furthermore, research is needed to test whether the associations found here are consistent for other stigmatized groups, including racial and ethnic minorities, sexual minorities, and people from lower socioeconomic backgrounds, and whether attitudes about individuals with multiple stigmatized group memberships are similarly affected.

Conclusions

The findings of this study point to a number of potential interventions to improve new physicians' attitudes. Providing positive learning experiences with patients who have obesity may reduce bias. Promoting a school climate that communicates respect for patients of all sizes, and adopting a zero-tolerance policy toward discriminatory behavior or derogatory comments may instill in students a professional and caring attitude toward patients who are obese. Finally, eliminating the message that certain patients are "difficult" may avoid future adversarial encounters with patients so labeled, and help students develop empathy and understanding of each patient's individual needs.

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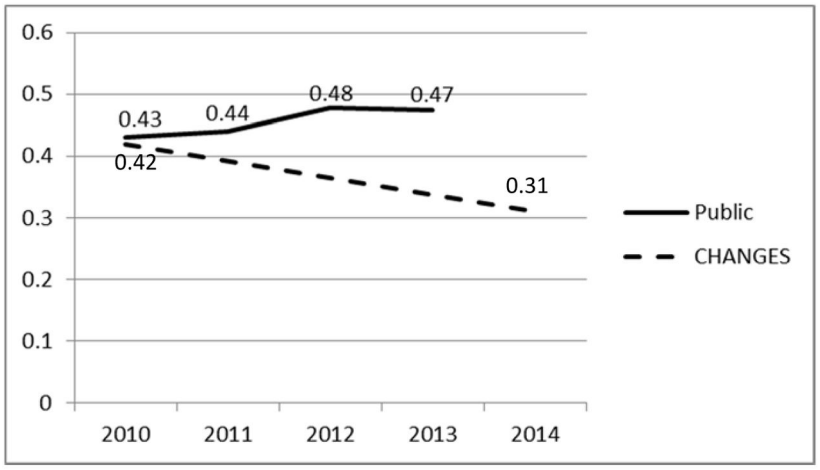

Figure 1.

Change in implicit weight bias for medical students in the CHANGES Study (2010–2014; n=1,795) and visitors to projectimplicit.org (2010–2013; n=397,600). Implicit weight bias was measures with the Weight Implicit Association Test, a measure of the difference in the amount of time participants take to categorize images of people with positive or negative words. The CHANGES survey was administered in students' 1st and 4th years of medical school. Project Implicit data was available for each year between 2010 and 2013.

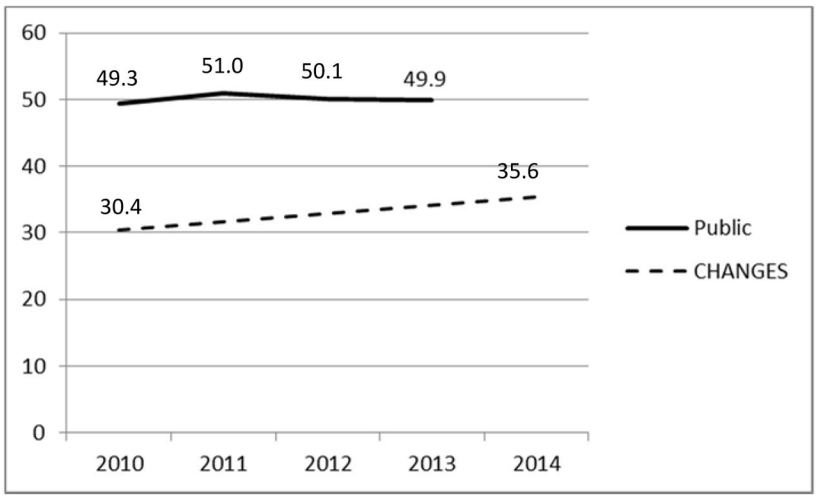

Figure 2.

Change in explicit weight bias for medical students in the CHANGES Study (2010–2014; n=1,795; bias against "obese people") and visitors to projectimplicit.org (2010–2013; n=397,600; bias against "fat people"). Scores were recorded on a feeling thermometer, consisting of a slider from 0 (very cold) to 100 (very warm), where participants indicate their warmth toward people who are obese. The CHANGES survey was administered in students' 1st and 4th years of medical school. Project Implicit data was available for each year between 2010 and 2013.

Table 1

Sample characteristics of 1795 4th year medical students

Characteristic	n (%)
N	1795 (100.0)
Age	
19–22	575 (32.0)
23	456 (25.4)
24–25	473 (26.4)
26+	281 (15.7)
Missing	10 (.6)
Sex	
Women	917 (51.1)
Men	878 (48.9)
BMI	
<18.5	50 (2.8)
18.5–24.9	1211 (67.5)
25–29.9	430 (24.0)
30+	100 (5.6)
Missing	4 (.2)
Family Income	
<100k	774 (43.1)
≥100k	989 (55.1)
Missing	32 (1.8)
Race	
American Indian / Alaska Native	25 (1.4)
Black	93 (5.2)
Hispanic	83 (4.4)
East Asian	257 (14.3)
Native Hawaiian / Pacific Islander	24 (1.4)
South Asian	176 (9.8)
White	1281 (71.4)
Unknown	57 (3.2)

Table 2

Hierarchical linear regression models predicting change in implicit and explicit weight bias for 3 levels of school environment: curriculum, contact, and role modeling.

	Implicit Bias Change		Explicit Bias Change	
	Coef.	**p-value**	**Coef.**	**p-value**
Curriculum				
Hours of training related to health disparities	−.002	.135	−.094	.218
Hours of training related to emotion regulation	−.001	.683	−.018	.788
Hours of training related to interpersonal skills	.001	.457	−.048	.442
Hours of training in dealing with difficult patients	.034	.027	1.132	.162
Skill providing weight loss counseling to patients with obesity	−.014	.200	−1.631	.005
Baseline bias (implicit or explicit)	−.700	<.001	.490	<.001
Contact				
Amount of interaction with medical students with obesity	−.034	.052	−.326	.712
Amount of interaction with faculty with obesity	.017	.337	−.039	.966
Amount of interaction with patients with obesity	−.031	.098	−.358	.708
Favorability of interaction with medical students with obesity	−.031	.293	1.451	.340
Favorability of interaction with faculty with obesity	.041	.174	−3.066	.046
Favorability of interaction with patients with obesity	−.047	.014	−9.051	<.001
Baseline bias (implicit or explicit)	−.721	<.001	.565	<.001
Role Modeling				
Observed discrimination/negative comments about patients with obesity	.021	.060	2.104	<.001
Witnessed micro-aggression against a medical student due to his/her body size	.026	.224	−.998	.387
Baseline bias (implicit or explicit)	−.716	<.001	.486	<.001
Contact Interactions[a]				
Amount*favorability of interaction with medical students with obesity	−.007	.731	−.131	.910
Amount*favorability of interaction with faculty with obesity	−.027	.190	1.178	.327
Amount*favorability of interaction with patients with obesity	−.036	.166	−.697	.606

[a]Interaction effects tested in separate models; main effects for the interaction being modeled and baseline bias were also included in each model, but are not shown in table.

Table 3

Final adjusted mixed models predicting change in implicit and explicit weight bias during medical school.

	Implicit Bias Change		Explicit Bias Change	
	Coef.	**p-value**	**Coef.**	**p-value**
Fully Adjusted Models				
Hours of training related to health disparities	−.001	.513		
Hours of training in dealing with difficult patients	.028	.034		
Skill providing weight loss counseling to patients with obesity			−.811	.117
Amount of interaction with medical students with obesity	−.026	.057		
Amount of interaction with patients with obesity	−.031	.100		
Favorability of interaction with faculty with obesity			−1.539	.176
Favorability of interaction with patients with obesity	−.033	.023	−8.599	<.001
Faculty/residents discriminate against/make negative comments about patients with obesity	.026	.022	1.212	.032
Baseline BMI	−.005	.074	−.105	.494
Black race	−.086	.058	.255	.910
Male sex	.020	.345	3.936	<.001
Family income >$100,000	−.001	.008	.008	.138
Baseline implicit bias	−.717	<.001		
Baseline explicit bias			.567	<.001