Reducing Anti-Fat Prejudice in Preservice Health Students: A Randomized Trial

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Anti-fat sentiment is increasing, is prevalent in health professionals, and has health and social consequences. There is no evidence for effective obesity prejudice reduction techniques in health professionals. The present experiment sought to reduce implicit and explicit anti-fat prejudice in preservice health students. Health promotion/public health bachelor degree program students (*n* = 159) were randomized to one of three tutorial conditions. One condition presented an obesity curriculum on the controllable reasons for obesity (i.e., diet/exercise). A prejudice reduction condition presented evidence on the uncontrollable reasons for obesity (i.e., genes/environment); whereas a neutral (control) curriculum focused on alcohol use in young people. Measures of implicit and explicit anti-fat prejudice, beliefs about obese people, and dieting, were taken at baseline and postintervention. Repeated measures analyses showed decreases in two forms of implicit anti-fat prejudice (decreases of 27 and 12%) in the genes/environment condition relative to other conditions. The diet/exercise condition showed a 27% increase in one measure of implicit anti-fat prejudice. Reductions in explicit anti-fat prejudice were also seen in the genes/environment condition (*P* = 0.006). No significant changes in beliefs about obese people or dieting control beliefs were found across conditions. The present results show that anti-fat prejudice can be reduced or exacerbated depending on the causal information provided about obesity. The present results have implications for the training of health professionals, especially given their widespread negativity toward overweight and obesity.

INTRODUCTION

Juxtaposed with increasing rates of overweight and obesity is an escalation in anti-fat prejudice (1–3). Self-reported weight-based discrimination has increased by 66% over the past decade, and with current rates similar to rates of racial discrimination (3,4). Indeed, recent research shows that prejudice toward "fat" people exceeds that displayed toward other commonly stigmatized groups (2).

Several decades of research indicate that health-care professionals are a particularly common source of weight bias toward obese patients, who are vulnerable to stigma from physicians, nurses, psychologists, dietitians, fitness professionals, medical students, and even health professionals who specialize in obesity (4,5). Studies examining health professionals suggest that their anti-fat prejudice parallels (4–11), and sometimes exceeds (7), those reported in the general population. Some research has demonstrated that as many as 69% of overweight and obese women report weight bias from health providers (12). Importantly, anti-fat prejudice has direct implications for the health of those who are overweight or obese. Not only does weight bias increase vulnerability for depression, low

self-esteem, anxiety, and suicidality (5), but individuals who are teased or victimized because of their excess weight are at increased risk for maladaptive eating behaviors, avoidance of physical activity, poorer outcomes in behavioral weight loss programs, and are less likely to seek preventive health-care services (13–19). Thus, it seems crucial to reduce anti-fat sentiment in health professionals.

The limited efforts that have sought to reduce either explicit or implicit anti-fat prejudice have produced either no reductions (20–25) or only modest reductions (26–29). These studies have tested different stigma-reduction methods, used different assessment measures, and employed variable sample sizes, making it difficult to draw clear conclusions (see ref. 30 for a review of interventions). With so little research on this topic, it is not yet clear what components are necessary for effective stigma reduction, and whether there are particular strategies, or combination of strategies, that may be more effective with certain target populations. For example, only one experimental study has attempted to reduce anti-fat prejudice in preservice health professionals. Wiese *et al.* (24) found that although changes in beliefs about obesity causes and difficulties could be

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elicited following a brief education intervention in 32 medical students, significant changes in explicit anti-fat prejudice were not achieved.

The evidence for effective means of reducing anti-fat prejudice is poor. Here, we describe a randomized trial designed to modify implicit and explicit anti-fat prejudice in preservice health promotion/public health students. Health-related professionals are important target groups for intervention, as they have direct involvement in the design and implementation of many obesity interventions. However, curriculum materials primarily focus on "controllable" lifestyle reasons for obesity, with health promotion/public health programs typically emphasizing dieting and physical activity as the cornerstones of obesity treatment and prevention. Although these controllable factors are important, the predominant focus on them may exacerbate prejudice toward obese people by implying that obesity is within personal control, and that those who have excessive weight must lack willpower or be gluttonous and lazy. Research has documented that anti-fat prejudice worsened following provision of science-based information that emphasized the controllable causes of obesity (21).

In seeking to reduce anti-fat prejudice, the present study also adopts the Elaboration Likelihood Model (31), a well-tested model of persuasion and attitude change (see refs. 31,32 for a review of studies). The Elaboration Likelihood Model proposes two potential routes of message processing leading to attitude change, the central and peripheral routes. Simply put, central route processing involves effortful thought and in-depth analysis and integration of information (high-cognitive elaboration). In contrast, the peripheral route involves cognitively less complex processes (low-cognitive elaboration) where superficial aspects of the message (e.g., source attractiveness, credibility) shape attitudes. Crucially, two determining factors of whether high- or low-cognitive elaboration occurs are motivation and ability. Individuals with high motivation to process message information (e.g., message relevant, has a personal payoff), and the ability to do so (e.g., time, knowledge), will employ central over peripheral route processing. Importantly, central route processing results in stronger and more stable attitude change. Thus, the present study employs motivational strategies (grading of associated intervention assignments) and teaching structures (regular tutorial classes, group work) that meet Elaboration Likelihood Model criteria.

We expect that those receiving training about the controllable causes of obesity (e.g., diet and exercise) will display increased anti-fat prejudice relative to the control participants. Conversely, those receiving information on the uncontrollable causes of overweight and obesity (i.e., genetics, environment) will show reduced anti-fat prejudice.

METHODS AND PROCEDURES
Participants
University students ($n = 159$; 85% females) enrolled in a health promotion/public health bachelors degree program took part in the study. Mean (s.d.) age and BMI (calculated from self-reported height and weight) were 20.29 (2.32) years and 23.13 (4.12) kg/m², respectively.

Ninety-four percentage of the sample was of European descent, with 4% of participants identifying as Asian and 2% as Pacific Islander.

Measures
A questionnaire booklet was used to gather demographic details (i.e., age, gender, height, weight) and to administer measures of explicit and implicit anti-fat prejudice, beliefs about obese people, and dieting/weight control beliefs. Scales were interspersed within a battery of distracter measures and items (e.g., attitudes toward alcohol use, smoking, drug use, social and gender equality, self-concept) to disguise the true purpose of the study. Questionnaires were administered pre- and postintervention.

Explicit anti-fat prejudice
Crandall's (26) 13-item Anti-Fat Attitudes Questionnaire was used to assess explicit anti-fat prejudice. This measure is comprised of three subscales "Dislike," "Fear of Fat," and "Willpower." The Dislike subscale assesses an individual's explicit antipathy toward fat people (e.g., "I don't like fat people much"). The "Fear of Fat" subscale was not used. The "Willpower" subscale assesses the belief that being overweight is a matter of personal control or lack thereof (e.g., "Fat people tend to be fat pretty much through their own fault"). Items are scored on a 10-point Likert scale (0 = very strongly disagree, 9 = very strongly agree, with higher scores indicating greater anti-fat bias). Cronbach's α for the Dislike (baseline α = 0.86 and postintervention, α = 0.85) and Willpower (baseline α = 0.84 and postintervention α = 0.80) subscales were satisfactory.

Implicit anti-fat prejudice
The Implicit Associations Test is a widely used tool in prejudice research that measures unconscious or implicit attitudes and beliefs about specific targets (33,34). The implicit association test measures the time it takes people to correctly categorize positive or negative attributes when paired with a specific target. A paper and pencil version of the anti-fat implicit association test has shown good utility by assessing how many correct categorizations people can make within 20-s (timed). Previous work on implicit anti-fat prejudice (4,34–36) has shown that participants respond more quickly (by correctly categorizing more words) when negative attributes (e.g., "bad," "lazy") are associated with "obese/fat people," and positive attributes (e.g., "good," "motivated") are paired with "thin/slim people" as targets. Higher scores indicate greater anti-fat bias. The two attribute categories of interest within the present study were chosen to specifically assess the attitudes toward ("good" vs. "bad") and beliefs about ("motivated" vs. "lazy") fat vs. thin people (see refs. 7,34 for a detailed description of the measure). Implicit anti-fat attitudes have been shown to be predictive of behavior (37).

Beliefs about obesity and causes
Changes in anti-fat prejudice were expected to be accompanied by changes in beliefs about the underlying reasons for obesity (overeating and personal control vs. genetics and environment). Two measures were used to assess changes in these beliefs. The 8-item Beliefs About Obese People scale (38) asks participants to indicate their agreement (-3 = I strongly disagree, $+3$ = I strongly agree) with statements such as, "Obesity often occurs when eating is used as a form of compensation for lack of love or attention." Higher scores indicate a stronger belief that obesity is driven by genetic/environmental causes, and is not due to lack of personal control. Cronbach's α for baseline and postintervention were 0.84 and 0.82.

The Dieting Beliefs scale (39) assess beliefs about: the role of willpower and personal control in dieting (diet willpower/personal control scale; e.g., "Losing weight is simply a matter of wanting to do it and applying yourself"); noncontrollable causes for weight such as genes and luck (diet, genes and luck; e.g., "A thin body is largely a result of genetics"); noncontrollable causes for weight such as environmental and social support (diet and social support; e.g., "In order to lose weight, people must get a lot of encouragement from others"). A 6-point scale is used to indicate how descriptive the statements are of their beliefs (1 = not at all descriptive,

to 6 = very descriptive). Cronbach's α for each subscale were (baseline) α = 0.60, α = 0.64, α = 0.56, and (postintervention) α = 0.70, α = 0.62, α = 0.47, respectively.

Procedures

As a course requirement, students participated in 12 1-h course tutorial classes (1 per week). The present study was conducted in the first 5 weeks of tutorial classes. Before the first lecture, students were assigned to 1 of 10 tutorial classes, with tutorials commencing the second week of lectures. Tutorial classes (15–20 students per class) were randomized to one of three different study conditions, and further divided into subgroups of 4–5 students for collaboration on oral and written assignments. Experimental conditions were ostensibly presented to students as tutorial and assignment topics. Students participated in 4 weeks of compulsory tutorials that culminated in the completion of two assignments (i.e., oral presentation and written assignment) during the fifth week of tutorials.

Tutorial conditions

One tutorial condition (4 classes) titled "Alcohol and young people" (alcohol), discussed research on rates of hazardous drinking in young people (16–24 years), its consequences, drivers, and reduction approaches. A second tutorial condition (three classes) discussed research on common causes and treatments for obesity and emphasized personal responsibility and control (e.g., overeating and lack of exercise). Titled "Diet, physical activity, and obesity" (diet/exercise), this condition emphasized research on the prevalence of obesity and its behavioral causes (e.g., increased calorie consumption, reduced physical activity levels), associated health consequences, and behavioral interventions for obesity (i.e., dieting and physical activity).

The third tutorial condition (three classes), titled "Genetics and socioenvironmental reasons for obesity" (genes/environment), was designed to reduce anti-fat prejudice by providing research evidence and discussion on uncontrollable causes of obesity. Research on the prevalence and consequences of obesity was introduced, but tutorials emphasized research on the role of genetics (biological predispositions/heritability), and environmental factors (e.g., the calorie-dense food environment) in causing obesity.

Tutorial format and content

Each tutorial subgroup (4–5 students) received tutorial packages containing written discussion questions relevant to their assigned health topic, along with assignment grading guidelines. Five research publications (published 2004–2007) were included in tutorial packages. The research papers were specific to each of the respective tutorial conditions, and were sourced from leading peer-reviewed research journals. (Please contact the first author for the tutorial packages described here.) Research papers were matched (quality and content) across tutorial conditions.

Students were instructed to read two of assigned research papers before tutorials and participate in discussions during tutorials. Students were also required to bring two additional research papers relevant to their tutorial topic and briefly describe the main findings to classmates. Tutorials were allotted 35-min for presentation and discussion of research papers, and 20-min for subgroup discussion of research papers and strategy for the oral and written assignments.

Tutors (PhD candidates) were employed and provided materials and guidance for delivering the alcohol and diet/exercise conditions. The first author (K.S.O.) ran tutorial classes for the genes/environment condition due to a more advanced knowledge of the arguments around the genetic and environmental contributors to obesity. With the exception of K.S.O., course tutors were unaware that a study was being conducted alongside tutorials.

Course assessment (elaboration motivation)

Course assessments were designed to provide incentive for in-depth central route processing of the material presented in tutorials. One of the assignments was a 15-min oral presentation given by student subgroups (4–5 students) during the fifth week of tutorials. The other was a 1,200-word written assignment to be completed individually and submitted at the end of tutorial week 5. Combined, the two assignments contributed 10% to the overall course grade of 100%. Students were told that assignments would be judged on the strength of their arguments and supporting evidence. Students met with subgroup tutorial members for 2 h each week to co-ordinate information and prepare presentations. Participation in out-of-class meetings and assignment preparations was monitored for attendance. Students were also asked to indicate on a 7-point scale (1 = not at all to 7 = very) "How effective is your tutor" and "How enjoyable have the tutorials been for you."

Study design

Figure 1 shows the schematic overview of the present study design. Baseline and postintervention measures were taken during the first and seventh week of lectures. At baseline, students were told the measures were regularly used in health-related research and that it was important for students to be familiar the measures. Because a compulsory in-class test was given during a lecture in the seventh week, all students providing data at baseline were present for postintervention data collection. Six students not present during baseline assessment provided postintervention data. Upon study completion, participants were informed of the study and offered the opportunity to confidentially remove their data. No student requested their data be removed. Ethical approval for the study was obtained from the institutional review board.

Statistical analysis

ANOVA's were conducted to assess differences between tutorial conditions for demographic variables, baseline measures, and final assignment scores. Repeated measures analysis of covariance's (accounting for age and BMI) and planned comparisons were conducted to assess between-group changes in study measures. Pearson's correlation coefficients were calculated to examine the relationships between changes in anti-fat prejudice and beliefs about the causes of, and perceived personal responsibility for, obesity.

RESULTS

There were no significant differences between tutorial conditions, or gender, in baseline measures, final assignment marks, or tutor/tutorial performance/enjoyment. Age was negatively associated with baseline "good/bad" and implicit association test "motivated/lazy" scores (r (143) = −0.25, P = 0.003, and r (147) = −0.20, P = 0.014, respectively). Similarly, BMI was negatively related to "motivated/lazy" implicit association test scores (r (137) = −0.25, P = 0.004), and explicit anti-fat Willpower scores (r (143) = −0.19, P = 0.024). **Table 1** displays condition means (s.d.) at baseline and postintervention; along with significant between-group differences for demographic variables and study outcome measures.

Implicit anti-fat prejudice

Strong implicit "good/bad" anti-fat prejudice was exhibited across all conditions at baseline (t (151) = 30.393, P < 0.0001). On average, students made 14 more attribute/target pairings when negative attributes were paired with fat identifiers than when positive attributes were paired with fat identifiers. A significant time (baseline, postintervention) × tutorial condition (alcohol, diet/exercise, genes/environment) interaction for implicit "good/bad" anti-fat attitude scores (F (2,142) = 4.440, P = 0.014) was found. The genes/environment tutorial condition showed a significant decrease in implicit "good/bad"

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Baseline measures taken in first lecture (n = 159)
Precourse randomization (n = 165) to tutorial classes
and study condition (10 tutorial classes).
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Week 2 (tutorial 1)	Week 2 (tutorial 1)	Week 2 (tutorial 1)
Alcohol in youth (alcohol) $n = 61$, four tutorial classes Baseline measures $n = 58$	Diet and physical activity in obesity (diet/exercise) $n = 50$, three tutorial classes Baseline measures $n = 48$	Genes and environment in obesity (genes/environment) $n = 54$, three tutorial classes Baseline measures $n = 53$

| Week 6 (tutorial 5) Oral and written assessments completed | Week 6 (tutorial 5) Oral and written assessments completed | Week 6 (tutorial 5) Oral and written assessments completed |

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Week 7 (no tutorials week 6 or 7)
Postintervention measures obtained for all students measured at baseline (n = 159)
Total postintervention measures (n = 165)
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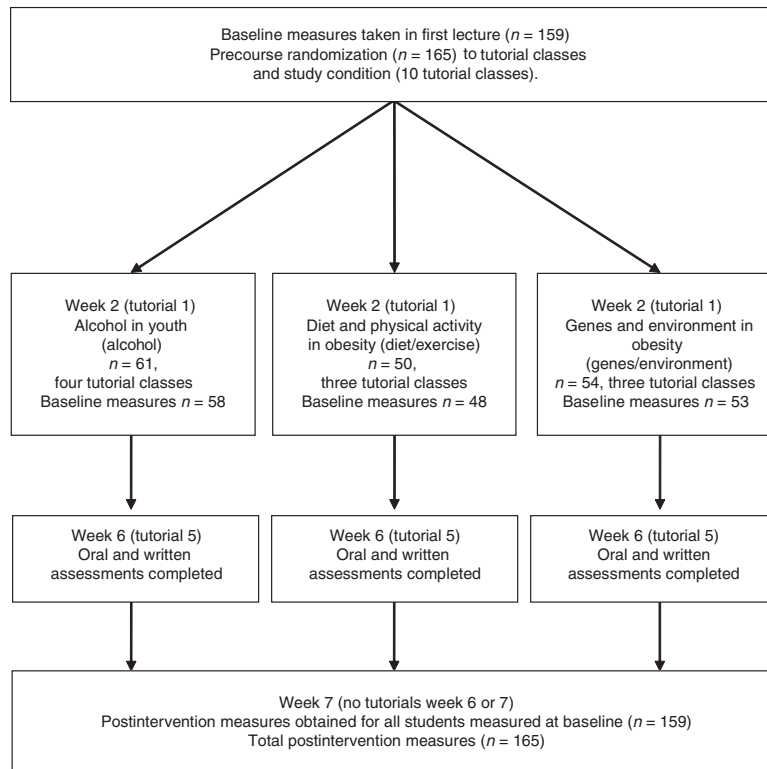
Figure 1 Schematic overview of study design and measurement time frame.

anti-fat prejudice relative to the alcohol and diet/exercise conditions. There was no significant difference between the alcohol and diet/exercise conditions.

Strong "motivated/lazy" anti-fat implicit prejudice was found at baseline across all conditions. On average, 11 more negative attributes than positive attributes (e.g., lazy vs. motivated) were correctly categorized when paired with fat identifiers (e.g., obese; (t (151) = 26.877, $P < 0.0001$)). Significant time (F (1,143) = 8.833, $P = 0.004$) and interaction (time × tutorial condition, F (2,143) = 5.165, $P = 0.007$) effects were found for "motivated/lazy" implicit scores. The genes/environment condition had significantly different "motivated/lazy" implicit anti-fat prejudice than the diet/exercise condition. The difference between the alcohol and genes/environment conditions and alcohol and diet/exercise conditions was not significant. An increase in "motivated/lazy" implicit anti-fat prejudice was found for the diet/exercise condition (t (44) = −2.425, $P = 0.02$). The decrease in "motivated/lazy" implicit scores for the genes/environment condition was not significant (see **Table 1**).

Explicit anti-fat prejudice
After accounting for covariates (i.e., age and BMI), repeated measures of analysis of covariance's showed no main or interaction effects for the Dislike or Willpower subscale scores. Simple t-tests did, however, show significant increases in Willpower scores for the alcohol and genes/environment conditions (t (55) = −3.131, $P = 0.003$, and t (49) = −3.413, $P = 0.001$, respectively). Simple paired samples t-tests also

revealed a significant reduction in Dislike scores for the genes/environment condition (t (49) = 2.865, $P = 0.006$).

Beliefs about obesity and causes
No significant main or interaction effects were found for beliefs about obese people, diet, genes, and luck, or diet and social support scales. A significant main effect of time was found for the diet and personal control subscale (F (1,144) = 21.231, $P = 0.001$), with a decrease in the belief that obesity is caused by a lack of personal control and willpower. Diet and personal control scores were reduced in the genes/environment condition compared to the alcohol and diet/exercise conditions. The genes/environment condition displayed a significant reduction in diet, genes and luck scale scores (t (45) = 2.644, $P = 0.011$). Changes in diet and personal control scale scores were not related to changes anti-fat attitude scores.

DISCUSSION
This research showed that anti-fat reduction interventions can be implemented in real world settings with groups tasked with treating overweight/obesity (i.e., health professionals in training). The present study sought to modify anti-fat prejudice in preservice health promotion/public health students via a series of compulsory tutorial classes. It was hypothesized that a traditional health curriculum emphasizing controllable causes and treatments for obesity (i.e., dieting and physical exercise) would exacerbate anti-fat prejudice, whereas a modified curriculum emphasizing uncontrollable reasons for obesity

Table 1 Baseline and postintervention scores for each of the study conditions

	Alcohol n = 58 Mean ± s.d.	Diet/exercise n = 48 Mean ± s.d.	Genes/environment n = 53 Mean ± s.d.	Total Mean ± s.d.	P value
Age	19.9 ± 1.3	20.2 ± 3.1	20.8 ± 2.1	20.3 ± 2.3	0.09
BMI	23.5 ± 4.3	22.3 ± 4.2	23.5 ± 3.9	23.1 ± 4.1	0.30
Explicit anti-fat dislike					
Baseline	2.0 ± 1.9	2.2 ± 1.6	2.1 ± 1.4	2.1 ± 1.6	0.78
Postintervention	2.0 ± 1.7	2.0 ± 1.7	1.7 ± 1.3	1.9 ± 1.6	0.57
Explicit anti-fat willpower					
Baseline	4.6 ± 2.3	5.4 ± 1.9	4.4 ± 2.3	4.8 ± 2.3	0.09
Postintervention	5.4 ± 2.1	5.1 ± 2.2	5.1 ± 2.3	5.2 ± 2.2	0.74
Implicit anti-fat good/bad					
Baseline	14.3 ± 6.0	14.0 ± 6.0	14.2 ± 5.0	14.2 ± 5.6	0.96
Postintervention	14.6 ± 6.7[a]	14.4 ± 5.7[a]	10.3 ± 6.7[b]	13.1 ± 6.7	0.001
Implicit anti-fat motivated/lazy					
Baseline	11.6 ± 5.6	10.3 ± 4.4	11.0 ± 4.8	11.0 ± 5.0	0.44
Postintervention	12.4 ± 4.8[a,b]	13.1 ± 5.9[a]	9.7 ± 5.4[b]	11.7 ± 5.5	0.004
Beliefs about obese people					
Baseline	13.7 ± 3.0	13.5 ± 3.5	12.9 ± 3.3	13.3 ± 3.3	0.39
Postintervention	14.1 ± 5.5	14.3 ± 3.5	13.0 ± 4.3	13.8 ± 4.6	0.33
Diet willpower/personal control scale					
Baseline	24.8 ± 4.3	24.0 ± 4.1	23.8 ± 4.9	24.2 ± 4.5	0.46
Postintervention	23.4 ± 4.9[a]	22.9 ± 4.1[a]	20.5 ± 4.7[b]	22.2 ± 4.7	0.004
Diet, genes, and luck					
Baseline	21.3 ± 3.4	20.7 ± 3.6	20.8 ± 3.6	20.9 ± 3.5	0.59
Postintervention	21.2 ± 3.5	20.9 ± 3.3	19.8 ± 3.7	20.7 ± 3.6	0.09
Diet and social support					
Baseline	15.3 ± 3.2	15.3 ± 2.9	15.2 ± 3.7	15.3 ± 3.2	0.99
Postintervention	15.2 ± 2.7	15.0 ± 3.4	14.9 ± 3.0	15.1 ± 3.0	0.85

P values represent between-group differences at baseline and postintervention. Within rows, different superscript letters indicate between group differences significant at the $P < 0.05$ level.

(i.e., genetics, environmental, sociocultural influences) would reduce implicit and explicit anti-fat prejudice.

The genes/environment (anti-fat reduction) condition showed decreases in two implicit anti-fat attitude measures (i.e., "good/bad" and "motivated/lazy") relative to other tutorial conditions. Notably, the genes/environment condition exhibited a 27% decrease in implicit "good/bad" anti-fat prejudice and a decrease of 12% in implicit "motivated/lazy" anti-fat prejudice. The diet/exercise condition (traditional obesity-related health curriculum) showed a 27% increase in motivated/lazy implicit anti-fat prejudice.

Although repeated measures of ANOVAs found no significant group differences for explicit anti-fat prejudice between conditions, planned *t*-tests found a significant decrease in Dislike scores for the anti-fat reduction condition (genes/environment). Surprisingly, *post hoc t*-tests showed an increase in anti-fat Willpower scores for both the control (alcohol) and anti-fat reduction conditions. Given that this increase

occurred in both the control and the prejudice reduction condition, with postintervention scores identical across all conditions, these changes may simply have been due to regression to the mean. Alternatively, participants in the control and anti-fat reduction conditions may have developed greater awareness of the difficulties of changing health behaviors generally, and were thus expressing beliefs that people wanting to lose weight would require high levels of willpower to overcome barriers. Beliefs about obese people and the noncontrollable causes of obesity (diet, genes and luck, diet and social support) showed little change across time or condition.

The present study is the first experimental work to show that implicit and explicit anti-fat prejudice can be modified in health professionals. Wiese *et al.* (24) was able to modify beliefs about the causes of obesity in medical students, but did not produce changes in anti-fat prejudice. However, Wiese *et al*'s intervention was brief in comparison to the present study and may have proven more effective with a more intensive and extensive

intervention. One other study in a small sample of kinesiology students (29) was also unable to reduce anti-fat prejudice, but did reduce beliefs about personal responsibility for obesity.

Some research has successfully produced laboratory-based modifications in implicit anti-fat prejudice (although not in health professionals). Teachman and colleagues (21) were able to reduce implicit bias slightly when inducing empathy, but only in overweight participants. In contrast, implicit anti-fat prejudice was increased after telling participants that obesity was caused by overeating and under exercising (21). Similarly, a manipulation by Zitek and Hebl (40) showed that overhearing a peer condone or condemn discriminatory views toward obese people modified negative attitudes (see ref. 30 for a comprehensive review of interventions).

The between-group changes in implicit, but not explicit, anti-fat prejudice, and their implications for anti-fat behavior, warrant discussion. Explicit attitudes are consciously accessible evaluations of a target that can be readily, if unreliably, reported and controlled. In contrast, implicit attitudes are considered to be beyond conscious awareness and control, less amenable to socially desirable responding, but still associated with explicit attitudes and behavior (41). This distinction has implications for understanding the lack of change in explicit "Dislike" on the Anti-fat Attitudes scale. Given the strong implicit prejudice at baseline, one might have expected higher self-reported Dislike at baseline (mean = 2.1), particularly with a potential scale maximum of 9. Explicit prejudice may have suffered from a floor effect. If so, the within-group reduction in explicit anti-fat Dislike displayed in the genes/environment condition could be seen as a very positive and encouraging result.

A further distinction made between explicit and implicit prejudice is in their relationships to behavior. Explicit prejudice is thought to predict conscious and deliberate behavior (e.g., teasing, bullying), whereas implicit prejudice is thought to predict unconscious and/or subtle behavior. Indeed, people with strong implicit prejudice may be unaware they are behaving in a discriminatory manner. For example, Bessenoff and Sherman (37) found that the greater the implicit anti-fat prejudice the greater the distance participants placed their chairs from that of an allegedly obese individuals. In practical terms, strong implicit anti-fat prejudice in health-care providers could result in health professionals unconsciously spending less time, or engaging in more negative interactions with an overweight client than a normal weight client.

There are limitations to the present work. Although every effort was taken to ensure that participants remained unaware of the study and intention, it is not inconceivable that some participants may have seen through the guise. Additionally, because the tutor for the prejudice reduction condition was the course leader (K.S.O.) it is conceivable that this tutor acted as a more credible source than tutors in the other conditions, and thus the reduction in implicit prejudice may be attributable to the influence of the tutor rather than the material presented. However, using the same logic, if this tutor had run all three conditions, then we might have expected the study effects to have increased rather than reduced, as the increase

in prejudice displayed in the diet/exercise condition would likely have been even greater if K.S.O. were more influential. Similarly, if the prejudice reduction tutor was more influential than other condition tutors, then we might have expected to find significant group differences on the explicit prejudice measures, particularly the explicit anti-fat dislike scale, which we did not. Indeed, participants in the prejudice reduction condition showed increases in the explicit anti-fat willpower scale. Similarly, measures of tutor/tutorial effectiveness and enjoyment did not differ across conditions (tutors). It must also be acknowledged that the reductions in anti-fat prejudice seen here could be reversed following future exposure to alternative information and attitudes. Finally, although our findings are significant, improvements in anti-fat prejudice on either explicit or implicit measures may not represent tangible changes in actual behavior (42).

Strengths of the present work include its real world training context, suggesting that the research has applicability for other health-related curricula. Additionally, the present study suggests that providing meaningful motivation to process and understand the information (e.g., with the requirement to complete two assignments worth 10% of the courses' grades) may be a valuable component for stigma-reduction strategies. By assigning a tangible value to the information presented, the curriculum reinforced the importance and credibility of that information to students. The academic setting may help to shape normative beliefs among students by suggesting that the health professionals delivering the courses agree with the perspective presented.

Clearly, efforts are required to reduce anti-fat sentiment, especially in health-care settings where bias appears so prevalent. However, the present results should not be interpreted as providing evidence or justification for reducing the emphasis on diet and exercise as cornerstones of obesity causes, or prevention/treatment. Instead, health educators should ensure that information on genetic, social and environmental causes of obesity, and their interactions, is delivered in a convincing manner along side traditional information on causes and treatments of obesity, such as diet and exercise. The present study does provide evidence for how this might be achieved logistically. Future research needs to explore whether incorporating additional approaches (e.g., norm based, social influence, peer modeling, and empathy evoking) along side those tested here can enhance prejudice reduction (28,39).

DISCLOSURE
The authors declared no conflict of interest.

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