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Attitudes Toward Obesity in Undergraduate and Graduate Students Intending to Enter the
Healthcare Field

Sloane E. Kelly

Senior Honors Project

**Submitted in partial fulfillment of the graduation requirements
of the Westover Honors Program**

Westover Honors Program

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Abstract

Weight bias is defined as negative weight-related attitudes toward an overweight or obese individual. Healthcare workers have the potential to exacerbate the prevalence of weight bias in American society. Harboring weight bias negatively influences providers' thoughts and decision-making abilities, which can negatively impact their patient care. Consequently, patients experience a lower quality visit that decreases overall patient satisfaction and health improvement outcomes. Previous studies suggested viewing obesity as a disease lowers weight bias within providers. This study used a pre-test/post-test quasi-experimental design that examines the effect of perceiving obesity as a chronic disease on weight bias in undergraduate and graduate students who intend to enter the healthcare field. A self-selected sample of 120 participants were randomized into two groups: participants who read arguments for and participants who read arguments against viewing obesity as a disease. Regardless of participants' intention to enter the healthcare field, participants experienced an increase in weight bias regardless of the intervention group. Some participants experienced a significant increase in weight bias after reading statements against viewing obesity as a chronic disease. Implications of these findings are discussed with emphasis on developing an intervention that reaches individual thinking on a more impactful level.

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Introduction

Defining Weight Bias

The number of people who are considered to be obese has steadily increased in the United States; by 2030, the expected percentage of obese people within the United States will be 85% (Wang et al., 2008). Despite the vast prevalence of obesity in society, it is condemned and discriminated against. A study conducted in 2008 concluded that, among women, weight bias was the third most common type of discrimination and the fourth most common type of discrimination reported by both the male and female gender (Puhl et al., 2008). According to Puhl (2008), weight bias can be defined as “negative weight-related attitudes toward an overweight or obese individual” (p. 1). As a result of weight bias perpetuation by individuals, negative stereotypes arise, ascribing overweight or obese people as unmotivated or negligent to maintain their health. Weight bias exists both explicitly, such as name-calling or being treated with a lack of respect, and implicitly, such as forming an opinion about an individual based on their appearance (Puhl, 2008).

Weight Bias in the Healthcare Field

Healthcare workers have the potential to exacerbate the prevalence of weight bias in American society. Harboring weight bias influences providers' thoughts, decision-making abilities, and interpersonal conduct which can negatively impact their patient care (Phelan et al., 2015). Specifically, weight bias demonstrated by healthcare workers induces non-patient-focused communication and less respect for patients on the part of the provider. As a result, education efforts made by current and future providers on behalf of the patient become less effective. Further, providers are more likely to misdiagnose symptoms as resulting from obesity and not

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recommend appropriate treatment for potentially fatal conditions (Bertakis & Azari, 2005; Persky & Eccleston, 2011; Phelan et al., 2015; Street et al., 2007).

As a result of experiencing weight bias in the medical setting, patients experience a lower quality visit, which impairs patient payoff and decreases overall patient satisfaction (Phelan et al., 2015). Consequently, patients avoid future care due to fear of judgement and ridicule, have a lower chance of losing weight, and experience poor psychosocial health (Drury & Louis, 2002; Gudzone et al., 2014; Pearl et al., 2020). A cross-sectional study conducted in 2015 examined the relationship between weight discrimination and mortality while controlling for factors such as Body Mass Index (BMI); the study found that experiencing weight bias was associated with an increase in mortality risk among approximately 60% of the sample population (Sutin et al., 2015).

The prevalence of weight bias has been found in various types of pre-professional health students. Previous research found that of a sample population, undergraduate and graduate students across several disciplines displayed weight bias (Puhl et al., 2009; 2014). Additionally, pre-health students report negative and stereotypical attitudes towards obese patients (Puhl et al., 2014). Because the literature demonstrates weight bias is prevalent among the pre-health student population, regardless of discipline, intervention methods that combat weight bias should be examined.

Previous Interventional Research

Previous research conducted suggests that intervention methods reduce weight bias within healthcare providers. For instance, a weight bias seminar reduced participants' weight controllability beliefs, anti-fat attitudes, and negative attitudes towards obese people (Brochu, 2008); another study found showing two anti-weight bias films immediately reduced

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participants' weight bias attitudes (Swift et al., 2013). Additionally, previous research suggests that physicians who perceive obesity as a disease display reduced negativity and higher levels of empathy toward their patients (MacInnis et al., 2020).

The purpose of this study was to examine the effectiveness of an educational intervention method that uses statements that support or refute obesity as a chronic disease to decrease weight bias within a collegiate student population that intends on entering the healthcare field post-education.

Methodology

This study followed a quasi-experimental design as randomization as participants were not randomly selected for participation, and randomization to a study group occurred. Participants not wishing to enter the healthcare field post-graduation (undergraduate or graduate) served as the control group. Participants were invited to complete a set of validated and randomized explicit weight bias questions, experience a randomly assigned educational intervention, and then complete the same set of validated explicit weight bias questions randomized again to reduce test-retest bias. Comparisons were made between each participant's pre- and post-test. Specifically, data analysis examined the intervention's effects on the prevalence of weight bias within each participant and across each participant group (healthcare and non-healthcare intentions). Institutional Review Board approval for this study was obtained in September of 2021.

Participants

Participants needed to be at least eighteen years of age and enrolled as an undergraduate or graduate student at the University of Lynchburg to engage in this study. Before completing the survey, participants were reminded of their right to remove themselves from the study should they choose to by not completing the pre- or post-test or not submitting a completed survey.

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Data Measurement Instruments

Explicit weight bias was measured using two validated data measurement instruments developed by Allison, Basile, and Yuker (1991). The Beliefs About Obese Persons (BAOP) and Attitudes Towards Obese Persons (ATOP) scales are routinely chosen by researchers due to their psychometric strength when used in a variety of participant populations (LaCroix et al., 2017). Each of the instruments will be described in detail in the content that follows.

The Beliefs About Obese Persons (BAOP) is an 8 question Likert scale by Allison et al. (1991). An example question from this survey includes “Most obese people cause their problems by not getting enough exercise.” Participants indicated whether they strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree, or strongly agree with each statement (Allison et al., 1991). Each categorical response corresponds to a number (-3, -2, -1, 1, 2, or 3) that is paired with its corresponding categorical answer during data entry. BAOP utilizes a score from 0-48 with a higher score indicating the belief that obesity is not controllable. See Appendix A for a full listing of the questions included in the BAOP instrument, including instructions, and scoring methodology.

Participant weight bias was also measured using the ATOP validated survey, a 20 question Likert scale by Allison et al. (1991). An example question from this survey includes “Obese people are as happy as nonobese people.” Participants indicate whether they strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree, or strongly agree with each statement (Allison et al., 1991). Each categorical response corresponds to a number (-3, -2, -1, 1, 2, or 3) that is paired with its corresponding categorical answer during data entry. ATOP utilizes a score from 0-120 with a higher score indicative of more positive attitudes

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toward obese people. See Appendix B for a full listing of the questions included in the ATOP instrument, including instructions, and scoring methodology.

Procedure

Recruitment

The opportunity to participate in the research study was presented by a campus-wide email to all undergraduate and all graduate students detailing the study. The email contained information regarding informed consent. The link to complete the survey was embedded at the end of the informed consent. Clicking on the link inherently provided participant consent. A copy of the invitation email and informed consent can be found in Appendix C and D, respectively.

Pre-Test

After reading the informed consent, participants opened a link to a Google Form (thereby providing informed consent) where they reviewed survey instructions. After reviewing the instructions, participants automatically moved to the next section of the Google Form that contained the pre-test. The pre-test consisted of the two validated surveys, BAOP and ATOP, that were randomly combined to reduce testing bias.

Participants were prompted to pick an image depicting different landscapes at the end of the pre-test. Image location for selection (option A, B, C, or D) was additionally randomized. Depending on their answer, participants were randomized to either the educational intervention containing arguments against viewing obesity as a disease or the educational intervention containing arguments in support of viewing obesity as a disease.

Intervention

Participants were prompted to read five quotes from reputable individuals and organizations that are for or against viewing obesity as a disease. Five pro and five con statements were

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selected from an article (*Obesity - Pros & Cons - ProCon.Org*, n.d.) based on ease of understanding for participants of all comprehension levels and the notoriety of each author who made the statement or quote. After reading each of the quotes, participants were asked to indicate that they fully read each quote by selecting an answer choice reading “I have read the above statement”.

Post-Test

Students were directed to complete the post-test upon completion of the intervention. The post-test consisted of the same two validated surveys as the pretest, BAOP and ATOP, that were combined in a mixed order to reduce testing bias. Additionally, the question order was different from the pretest to avoid test/retest bias.

Demographic Questions

Following the post-test, participants completed demographic questions regarding their current student classification, gender identity, intended major, and intentions of entering the healthcare field upon graduation. No personally identifying information was obtained. Students completed their participation in the study by hitting the submit button (see Table 1).

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Results**Table 1*****Demographic Characteristics of Participants Compared to the Total Student Enrollment***

Identifier	N	Total Enrollment	Enrolled Student Response Rate (%)
Male	35	939	3.7%
Female	81	1614	5.0%
Undergraduate	88	1640	5.4%
Graduate	29	913	3.2%
All Enrolled Students	120	2553	4.7%
Intending to Enter the Healthcare Field	71	120 ^a	59.2%
Not Intending to Enter the Healthcare Field	49	120a	40.8%

^a Total number of participants enrolled in the study

Beliefs About Obese Persons Survey***Normality of Data***

A Shapiro-Wilk Test was performed to determine the normality of the pre-BAOP scores. The results showed the distribution of the pre-BAOP scores departed significantly from normality ($W = 0.974, p = .019$). Based on this outcome, the assumption of normality was violated, and nonparametric analysis was needed.

Pre-BAOP Statistical Significance Between Gender Groups

A Kruskal-Wallis test was used to determine the statistical significance between the two gender groups, male and female. Due to the small size of the other gender group, participants that indicated a gender outside of male or female were not included in data analysis; because there were less than five participants who indicated a gender outside of male or female, the other gender group was in violation of assumptions to use Kruskal-Wallis test. For reporting purposes, no statements about the other gender group were made. The Kruskal-Wallis test revealed a statistically significant difference in pre-BAOP scores across the two conditions of male and female, $X^2(1) = 23.958, p < .001$. Scores were lower in males ($Md = 13.00$) in comparison to

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females ($Md = 24.00$). different such that the educational intervention changes were not due to the similarities between the two groups (see Table 2).

Pre-BAOP Statistical Significance Between Undergraduate and Graduate Students

A Mann-Whitney Test was employed to determine if a difference existed between graduate and undergraduate students regarding their pre-BAOP score. The nonparametric test was used because of the continuous nature of the dependent variable. Although undergraduate students ($n = 88$, mean rank = 60.70) scored higher on their pre-BAOP scores than graduate students ($n = 29$, mean rank = 53.83) ($U = 1126.0$, $Z = -0.948$, $p = .343$, $r = -0.09$), the findings indicate the difference between the pre-BAOP scores of graduate and undergraduate students is not significant (see Table 2).

Pre-BAOP Statistical Significance Between Participants Who Intend and Do Not Intend to Enter the Healthcare Field

A Mann-Whitney test was employed to determine if a difference existed between participants intending to enter the healthcare field (HC) and those who do not (NHC) regarding their pre-BAOP score. The nonparametric test was used because of the continuous nature of the dependent variable. Distributions of the pre-BAOP scores for HC and NHC participants were similar, as assessed by visual inspection. Median pre-BAOP score was not significantly different between HC and NHC participants, ($U = 1801$, $Z = 0.329$, $p = .742$) (see Table 2).

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Table 2:***Pre-BAOP Score Comparisons***

Subcategory	<i>N(n)</i>	Mean (SD)	Significance
Overall participants Completing Pre-BAOP	120	21.96 (9.823)	
Gender	116 ^a		p < .001^b
Male	(35)	15.20 (8.109)	
Female	(81)	24.40 (9.159)	
Rank	117 ^c		p = .343 ^d
Graduate	(29)	19.90 (8.169)	
Undergraduate	(88)	22.59 (10.284)	
Career Intention	120		p = .742 ^e
Healthcare	(71)	21.72 (9.532)	
Non-Healthcare	(49)	22.31(10.320)	

^aThe combined group of Transgender female, Transgender male, Nonbinary, Genderfluid represented only 4 participants and required being removed from the analysis due to violating statistical assumptions for analysis using Kruskal Wallis.

^bKruskal-Wallis: $\chi^2(1, N = 116) = 23.958, p < .001$. Scores were lower in males ($Md = 13.00$) in comparison to females ($Md = 24.00$).

^cThree participants did not answer, therefore, $n = 117$.

^dMann-Whitney U: $U = 1126, z = -.948, p = .343$, no significant difference

^eMann-Whitney U: $U = 1801, z = .329, p = .742$, no significant difference

Participants' Pre- and Post-BAOP for Intervention Group for Obesity as a Chronic Disease

A Wilcoxon test was employed to determine any differences between pre-BAOP scores and post-BAOP scores after participants read statements in favor of viewing obesity as a chronic disease. Participants in the study ($n = 61$) scored an average of 22.09 ($SD = 9.880$) on the BAOP pre-test and 23.26 ($SD = 10.134$) on the BAOP post-test. There was a statistically significant median increase (1.75) in the post-BAOP score in favor of weight bias compared to the pre-BAOP score after reading statements in support of viewing obesity as a chronic disease, ($Z =$

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-2.288, $p = .022$). The effect size of this significant difference was explored producing a small effect size ($r = 0.2071$) indicating that there was no significant difference between participants' level after reading statements in favor of viewing obesity as a chronic disease (see Table 3).

Participants' Pre- and Post-BAOP Scores for Intervention Against Obesity as a Chronic Disease

A Wilcoxon test was employed to determine any differences between pre-BAOP scores and post-BAOP scores after participants read statements against viewing obesity as a chronic disease. Participants in the study ($n = 58$) scored an average of 21.51 ($SD = 10.262$) on the BAOP pre-test and 19.55 ($SD = 9.676$) on the BAOP post-test. There was a statistically significant median decrease (-1.96) in the post-BAOP score compared to the pre-BAOP score after reading statements in support of viewing obesity as a condition of personal responsibility, ($Z = -3.483$, $p < .001$). The effect size of this significant difference was explored producing a moderate effect size ($r = 0.3233$) indicating that there was a moderately significant difference between participants' pre- and post-BAOP scores after reading statements against viewing obesity as a chronic disease (see Table 3).

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Table 3:***Pre- versus Post-BAOP Score Comparisons for Intervention Groups***

Subcategory	<i>n</i>	Pre BAOP ^a Mean (SD)	Post BAOP ^a Mean (SD)	Significance (Effect Size)
Obesity as a Chronic Disease intervention group	61	22.09 (9.880)	23.26 (10.134)	$p^b = .022$ ($r = .2071$, small effect size) ^c
Obesity is not a Chronic Disease intervention group	58	21.51 (10.262)	19.55 (9.676)	$p^d < .0001$ ($r = .359$, moderate effect size) ^e

^ahigher BAOP scores are associated with a stronger belief that obesity is not under the obese person's control or the more positive one's view is towards obese persons.

^b $\alpha = .05$, $p = .022$ while significant median increase in scores, the effect is very minimal

^cWilcoxon Signed Ranks Test: (1.75), $z = -2.288$, $p = .022$

^d $\alpha = .05$, $p < .0001$, significant median increase in scores, the effect is moderate

^eWilcoxon Signed Ranks Test: (-1.96), $z = -3.483$, $p < .001$

Comparison of Pre- and Post-BAOP Scores for Participants in the Pro-Intervention Group***Who Intend to Enter the Healthcare Field***

A Wilcoxon test was employed to determine any differences between pre-BAOP scores and post-BAOP scores after participants who intend to enter the healthcare read statements in favor of viewing obesity as a chronic disease. Participants in the study ($n = 32$) scored an average of 20.31 ($SD = 9.713$) on the BAOP pre-test and 21.03 ($SD = 9.727$) on the BAOP post-test.

There was not a statistically significant median increase (0.72) in the post-BAOP score compared to the pre-BAOP score in the subgroup of participants who intend to enter the healthcare profession after reading statements in support of viewing obesity as a chronic disease, ($Z = -0.560$, $p = .575$) (see Table 4).

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Comparison of Pre- and Post-BAOP Scores for Participants in the Con-Intervention Group Who Intend to Enter the Healthcare Field

A Wilcoxon test was employed to determine any differences between pre-BAOP scores and post-BAOP scores after participants who intend to enter the healthcare read statements against viewing obesity as a chronic disease. Participants in the study ($n = 37$) scored an average of 23.10 ($SD = 9.40$) on the BAOP pre-test and 20.30 ($SD = 9.46$) on the BAOP post-test. There was a moderately significant median decrease (-2.80) in the post-BAOP score compared to the pre-BAOP score in the subgroup of participants who do not intend to enter the healthcare profession after reading statements against viewing obesity as a chronic disease, ($Z = -2.723$, $p = .006$, $r = 0.317$) (see Table 4).

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Table 4:***Pre- versus Post-BAOP Score for Intervention Subgroups:******Intend to Enter Healthcare Field***

Subcategory	<i>n</i>	Pre BAOP ^a Mean (SD)	Post BAOP ^a Mean (SD)	Significant Difference (Effect Size)
Obesity as a Chronic Disease intervention group	32	20.31 (9.713)	21.03 (9.727)	$p^b = .575^c$
Obesity is not a Chronic Disease intervention group	37	23.05 (9.404)	20.32 (9.458)	$p^d = .006$ ($r = .317$, moderate effect size) ^e

^ahigher BAOP scores are associated with a stronger belief that obesity is not under the obese person's control or the more positive one's view is towards obese persons.

^b $\alpha = .05$, $p = .575$, no statistically significant difference between median scores

^cWilcoxon Signed Ranks Test: (0.72), $z = -.560$, $p = .575$

^d $\alpha = .05$, $p = .006$, statistically significant difference between median scores with a moderate effect size

^eWilcoxon Signed Ranks Test: (-2.73), $z = -2.723$, $p = .006$

Comparison of Pre- and Post-BAOP Scores for Participants in the Pro-Intervention Group***Who Do Not Intend to Enter the Healthcare Field***

A Wilcoxon test was employed to determine any differences between pre-BAOP scores and post-BAOP scores after participants who do not intend to enter the healthcare read statements in favor of viewing obesity as a chronic disease. Participants in the study ($n = 29$) scored an average of 23.00 ($SD = 10.092$) on the BAOP pre-test and 25.72 ($SD = 10.166$) on the BAOP post-test. There was a moderately significant median increase (2.72) in the post-BAOP score compared to the pre-BAOP score in the subgroup of participants who do not intend to enter

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the healthcare profession after reading statements in support of viewing obesity as a chronic disease, ($Z = -2.732$, $p = .006$, $r = 0.359$) (see Table 5).

Comparison of Pre- and Post-BAOP Scores for Participants in the Con-Intervention Group Who Do Not Intend to Enter the Healthcare Field

A Wilcoxon test was employed to determine any differences between pre-BAOP scores and post-BAOP scores after participants who do not intend to enter the healthcare read statements against viewing obesity as a chronic disease. Participants in the study ($n = 19$) scored an average of 21.42 ($SD = 11.182$) on the BAOP pre-test and 18.42 ($SD = 10.227$) on the BAOP post-test. There was a moderately significant median decrease (-3.00) in the post-BAOP score compared to the pre-BAOP score in the subgroup of participants who do not intend to enter the healthcare profession after reading statements against viewing obesity as a chronic disease, ($Z = -2.374$, $p = .018$, $r = 0.385$) (see Table 5).

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Table 5:***Pre- versus Post-BAOP Score for Intervention Subgroups:******Do Not Intend to Enter Healthcare Field***

Subcategory	<i>n</i>	Pre BAOP ^a Mean (SD)	Post BAOP ^a Mean (SD)	Significant Difference (Effect Size)
Obesity as a Chronic Disease intervention group	29	23.00 (10.092)	25.72 (10.166)	p^b = .006 (<i>r</i> = .3587, moderate effect size) ^c
Obesity is not a Chronic Disease intervention group	19	21.42 (11.182)	18.42 (10.227)	p^d = .018 (<i>r</i> = .3850, moderate effect size) ^e

^ahigher BAOP scores are associated with a stronger belief that obesity is not under the obese person's control or the more positive one's view is towards obese persons.

^b $\alpha = .05$, $p = .006$, statistically significant difference between median scores with a moderate effect size

^cWilcoxon Signed Ranks Test: (2.72), $z = -2.732$, $p = .006$

^d $\alpha = .05$, $p = .018$, significant, the effect is moderate

^eWilcoxon Signed Ranks Test: (-3.00), $z = -2.374$, $p = .018$

Attitudes Toward Obese Persons Survey***Normality of Data***

A Shapiro-Wilk test was conducted to determine the normality of the pre-ATOP scores. Results showed the distribution of the pre-ATOP scores did not depart from normality ($W = 0.987$, $p = .337$). Based on this outcome, the assumption of normality was supported, and parametric analysis was needed.

Pre-ATOP Statistical Significance Between Gender Groups

An independent-samples-t-test was conducted to compare the pre-ATOP scores for female and male groups. Participants who indicated a gender outside of male and female ($n=4$)

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were not included in the analysis due to the low participation number. There was a significant difference in the scores for females ($M = 68.25$, $SD = 14.495$) and males ($M = 58.89$, $SD = 16.007$); $t(113) = 3.087$, $p = .003$. The gender variable had a medium effect size ($d = 0.6254$) (see Table 6).

Pre-ATOP Statistical Significance Between Undergraduate and Graduate Students

An independent-samples-t-test was conducted to compare the pre-ATOP scores for undergraduate and graduate student groups. There was not a significant difference in the scores for undergraduates ($M = 66.56$, $SD = 15.667$) and graduates ($M = 65.45$, $SD = 16.894$); $t(114) = 0.325$, $p = .745$ (see Table 6).

Pre-ATOP Statistical Significance Between Participants Who Intend and Do Not Intend to Enter the Healthcare Field

An independent-samples-t-test was conducted to compare the pre-ATOP scores for the healthcare and non-healthcare groups. There was not a significant difference in the scores for healthcare ($M = 66.76$, $SD = 15.528$) and non-healthcare ($M = 65.24$, $SD = 16.510$); $t(117) = 0.509$, $p = .611$ (see Table 6).

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Table 6:***Pre-ATOP Score Comparisons***

Subcategory	<i>N</i> (<i>n</i>)	Mean (SD)	Significance
Overall participants Completing Pre-ATOP	119 ^a	66.13 (15.888))	
Gender	115 ^b		p = .003^c (<i>d</i> = .6254, medium effect size)
Male	(35)	58.89 (16.007)	
Female	(80)	68.25 (14.495)	
Rank	116 ^d		p = .745 ^e
Graduate	(29)	65.45 (16.894)	
Undergraduate	(87)	66.56 (15.667)	
Career Intention	119		p = .611 ^f
Healthcare	(70)	66.76 (15.528)	
Non-Healthcare	(49)	65.24(16.510)	

^aMissing ATOP data for one participant, therefore *n* = 119.

^bThe combined group of Transgender female, Transgender male, Nonbinary, Genderfluid represented only 4 participants and required being removed from the analysis due to violating statistical assumptions for analysis using Kruskal Wallis in the BAOP analysis. Therefore, analyzed only Male and Female for ATOP for consistency.

^cIndependent-samples-*t*-test: $t(113) = 3.087$, $p = .003$; *Cohen d* = .6254, medium effect

^dThree participants did not answer, therefore, *n* = 116.

^eIndependent-samples-*t*-test: $t(114) = .325$, $p = .745$, no significant difference

^fIndependent-samples-*t*-test: $t(117) = .509$, $p = .611$, no significant difference

Participants' Pre- and Post-ATOP for Intervention Group for Obesity as a Chronic Disease

A paired samples *t*-test was employed to determine any differences between pre-ATOP scores and post-ATOP scores after participants read statements in favor of viewing obesity as a chronic disease. Participants in the study (*n* = 60) scored an average of 65.97 (*SD* = 15.863) on the ATOP pre-test and 66.07 (*SD* = 18.475) on the ATOP post-test. There was no statistical difference between the post-ATOP score compared to the pre-ATOP score after reading

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statements in support of viewing obesity as a chronic disease (0.10), ($t(59) = 0.271, p = .787$) (see Table 7).

Participants' Pre- and Post-ATOP for Intervention Group Against Obesity as a Chronic Disease

A paired samples t-test was employed to determine any differences between pre-ATOP scores and post-ATOP scores after participants read statements against viewing obesity as a chronic disease. Participants in the study ($n = 57$) scored an average of 66.32 ($SD = 16.054$) on the ATOP pre-test and 66.84 ($SD = 17.695$) on the ATOP post-test. There was no statistical difference between the post-ATOP score compared to the pre-ATOP score after reading statements against viewing obesity as a chronic disease (0.52), ($t(55) = -0.378, p = .707$) (see Table 7).

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Table 7:***Pre- versus Post-ATOP Score Comparisons for Intervention Groups***

Subcategory	<i>n</i>	Pre ATOP ^a Mean (SD)	Post ATOP ^a Mean (SD)	Significance (Effect Size)
Obesity as a Chronic Disease intervention group	60	65.97 (15.863)	66.07 (18.475)	$p^b = .787$
Obesity is not a Chronic Disease intervention group	57	66.32 (16.054)	66.84 (17.695)	$p^d = .707$

^ahigher ATOP scores are associated with a more positive attitude towards obese persons.

^b $\alpha = .05, p = .787$

^cIndependent-samples-*t*-test: $t(59) = .271, p = .787$, no significant difference

^d $\alpha = .05, p = .707$

^eIndependent-samples-*t*-test: $t(55) = -.378, p = .707$, no significant difference

***Comparison of Pre- and Post-ATOP Scores for Participants in the Pro-Intervention Group
Who Intend to Enter the Healthcare Field***

A paired samples *t*-test was employed to determine any differences between pre-ATOP scores and post-ATOP scores after participants who intend to enter the healthcare field read statements in favor of viewing obesity as a chronic disease. Participants who intended to enter the healthcare field scored higher on the ATOP scale ($M = 66.67, SD = 13.837$) before reading statements in favor of viewing obesity as a chronic disease ($M = 66.67, SD = 13.837$) as compared to their ATOP scores after reading the previously described statements ($M = 65.10, SD$

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= 17.590). The researchers found no statistically significant differences between the pre- and post-ATOP scores ($t(29) = 0.905, p = .373$) (see Table 8).

Comparison of Pre- and Post-ATOP Scores for Participants in the Con-Intervention Group Who Intend to Enter the Healthcare Field

A paired samples t-test was employed to determine any differences between pre-ATOP and post-ATOP scores after participants who intend to enter the healthcare field read statements against viewing obesity as a chronic disease. Participants who did intend to enter the healthcare field scored lower on the ATOP scale before reading statements against viewing obesity as a chronic disease ($M = 67.08, SD = 16.947$) as compared to their ATOP scores after reading the previously described statements ($M = 68.24, SD = 18.217$). The researchers found no statistically significant differences between the pre- and post-ATOP scores ($t(36) = -1.083, p = .286$) (see Table 8).

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Table 8:***Pre- versus Post-ATOP Score Comparisons for Intervention Subgroups:******Do Intend to Enter Healthcare Field***

Subcategory	<i>n</i>	Pre ATOP ^a Mean (SD)	Post ATOP ^a Mean (SD)	Significance (Effect Size)
Obesity as a Chronic Disease intervention group	30	66.67 (13.837)	65.10 (17.590)	$p^b = .373$
Obesity is not a Chronic Disease intervention group	37	67.08 (16.947)	68.24 (18.217)	$p^d = .286$

^ahigher ATOP scores are associated with a more positive attitude towards obese persons.

^b $\alpha = .05, p = .373$

^cIndependent-samples-*t*-test: $t(29) = .905, p = .373$, no significant difference

^d $\alpha = .05, p = .286$

^eIndependent-samples-*t*-test: $t(36) = -1.083, p = .286$, no significant difference

Comparison of Pre- and Post-ATOP Scores for Participants in the Pro-Intervention Group***Who Do Not Intend to Enter the Healthcare Field***

A paired samples *t*-test was employed to determine any differences between pre-ATOP and post-ATOP scores after participants who do not intend to enter the healthcare field read statements in favor of viewing obesity as a chronic disease. Participants who did not intend to enter the healthcare field scored lower on the ATOP scale before reading statements in favor of viewing obesity as a chronic disease ($M = 65.72, SD = 18.230$) as compared to their ATOP scores after reading the previously described statements ($M = 66.41, SD = 20.629$). The researchers

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found no statistically significant differences between the pre- and post-ATOP scores ($t(28) = -0.583, p = .565$) (see Table 9).

Comparison of Pre- and Post-ATOP Scores for Participants in the Con-Intervention Group Who Do Not Intend to Enter the Healthcare Field

A paired samples t-test was employed to determine any differences between pre-ATOP and post-ATOP scores after participants who do not intend to enter the healthcare field read statements against viewing obesity as a chronic disease. Participants who did not intend to enter the healthcare field scored higher on the ATOP scale before reading statements against viewing obesity as a chronic disease ($M = 64.95, SD = 14.339$) as compared to their ATOP scores after reading the previously described statements ($M = 63.53, SD = 15.309$). The researchers found no statistically significant differences between the pre- and post-ATOP scores ($t(18) = 0.751, p = .462$) (see Table 9).

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Table 9:***Pre- versus Post-ATOP Score Comparisons for Intervention Subgroups:******Do Not Intend to Enter Healthcare Field***

Subcategory	<i>n</i>	Pre ATOP ^a Mean (SD)	Post ATOP ^a Mean (SD)	Significance (Effect Size)
Obesity as a Chronic Disease intervention group	29	65.72 (18.230)	66.41 (20.629)	$p^b = .565$
Obesity is not a Chronic Disease intervention group	19	64.95 (14.339)	63.53 (15.309)	$p^d = .462$

^ahigher ATOP scores are associated with a more positive attitude towards obese persons.

^b $\alpha = .05, p = .565$

^cIndependent-samples-*t*-test: $t(28) = -.583, p = .565$, no significant difference

^d $\alpha = .05, p = .462$

^eIndependent-samples-*t*-test: $t(18) = .751, p = .462$, no significant difference

Discussion

This study measured the magnitude of impact of reading statements for or against obesity as a chronic disease regardless of preexisting weight bias. The study found that reading simple statements for or against obesity as a disease, despite their reputable nature, did not significantly decrease weight bias across either the BAOP or ATOP survey overall or within specific subgroups (gender, student status, or healthcare intentions).

Participants' pre-test scores for both surveys displayed desired similarities or differences. Gender groups (male and female) across both surveys had statistically significant differences in the baseline; males displayed more weight bias than females. This result was expected based on

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previous research (Barnes et al., 2014; Pearl et al., 2012; Schvey et al., 2013). The other subgroups (student status and intentions of entering the healthcare field) showed no significant difference between pre-test scores which was a desirable outcome for data analysis and potential generalization.

Weight bias either increased or stayed the same depending on the intervention group. Participants with preexisting weight bias who read statements against obesity as a disease had higher rates of weight bias post-intervention. In contrast, participants who read statements for obesity as a chronic disease did not experience any significant change in weight bias. Additionally, there was no significant difference in post-intervention survey scores between the participant group intending to enter the healthcare field and the participant group not intending to enter the healthcare field; no statistical significance was found between post-intervention weight bias between gender groups or undergraduate and graduate students.

Educational interventions that provide a more in-depth education have higher potential outcomes. This study examined a minimal intervention that drew upon participant trust and admiration for reputable individuals stating an opinion regarding obesity; learning was left to each individual participant. However, this method does not appear to have an immediate impact on participant attitudes and beliefs. However, more in-depth intervention methods such as educational seminars, both in-person (Brochu, 2008; Swift et al., 2013) and virtual (Goldberg & Majdan, 2021), show promise.

Due to the lack of improvement in weight bias scores across both intervention groups, it is evident that more in-depth, impactful education is necessary. Weight bias is woven within society as a social norm; social change is needed to make lasting impacts on thoughts and attitudes towards obesity (Ramos Salas et al., 2019; Sechrist & Stangor, 2001). The perceived

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social consensus model, which describes the etiology of individual weight bias as a reflection of the majority's beliefs and attitudes, describes how weight bias has become a cultural staple; the individual is influenced by what the majority are told to think (Sechrist & Stangor, 2001).

Because the idea of weight bias is embedded into numerous aspects of society (Ramos Salas et al., 2019), it is necessary to approach weight bias systematically. This can begin by changing the individual level of thinking in a more impactful way inciting a domino effect to change the negative attitudes and beliefs the majority holds concerning weight bias.

Limitations to this study involve the lack of analysis between undergraduate and graduate students. The participants were majority undergraduate and, therefore, results cannot be examined between the two groups as the number of participants are not indicative of actual class numbers. Additionally, the participants who indicated a gender outside of male and female could not be included in the analysis due to the low participation rate (n=4). Further, participants' beliefs about obesity as a chronic disease were not examined before the intervention was implemented; any change in beliefs about obesity as a chronic disease could not be examined. Future research should examine interventions to combat weight bias in undergraduate and graduate students who intend to enter the healthcare field to dispel weight bias before they enter their healthcare career.

Attitudes and beliefs toward weight bias cannot be changed by reading reputable statements for or against obesity as a disease. Although there is research to suggest that viewing obesity as a chronic disease decreases weight bias, influencing that line of thinking is not possible by presenting individuals with reputable statements. Rather, a more impactful education is needed to address weight bias from a systematic perspective.

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Appendix A

BAOP: Beliefs About Obese Persons Scale

Please mark each statement below in the left margin, according to how much you agree or disagree with it. Please do not leave any blank. Use the numbers on the following scale to indicate your response. Be sure to place a minus or plus sign (- or +) beside the number that you choose to show whether you agree or disagree.

-3	-2	-1	+1	+2	+3
I strongly disagree	I moderately disagree	I slightly disagree	I slightly agree	I moderately agree	I strongly agree

1. _____ Obesity often occurs when eating is used as a form of compensation for lack of love or attention.
2. _____ In many cases, obesity is the result of a biological disorder.
3. _____ Obesity is usually caused by overeating.
4. _____ Most obese people cause their problem by not getting enough exercise.
5. _____ Most obese people eat more than nonobese people.
6. _____ The majority of obese people have poor eating habits that lead to their obesity.
7. _____ Obesity is rarely caused by a lack of willpower.
8. _____ People can be addicted to food, just as others are addicted to drugs, and these people usually become obese.

Scoring instructions for BAOP survey

Step 1: Multiply the response to the following items by -1: items 1, 3-6, and 8

Step 2: Sum the responses to all items

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Step 3: Add 24 to the value obtained in step 2. This value is the BAOP score (Allison et al., 1991).

Appendix B

Attitudes Toward Obese Persons Scale

Please mark each statement below in the left margin, according to how much you agree or disagree with it. Please do not leave any blank. Use the numbers on the following scale to indicate your response. Be sure to place a minus or plus sign (- or +) beside the number that you choose to show whether you agree or disagree.

-3	-2	-1	+1	+2	+3
I strongly disagree	I moderately disagree	I slightly disagree	I slightly agree	I moderately agree	I strongly agree

1. _____ Obese people are as happy as nonobese people.
2. _____ Most obese people feel that they are not as good as other people.
3. _____ Most obese people are more self-conscious than other people.
4. _____ Obese workers cannot be as successful as other workers.
5. _____ Most nonobese people would not want to marry anyone who is obese.
6. _____ Severely obese people are usually untidy.
7. _____ Obese people are usually sociable.
8. _____ Most obese people are not dissatisfied with themselves.
9. _____ Obese people are just as self-confident as other people.
10. _____ Most people feel uncomfortable when they associate with obese people.
11. _____ Obese people are often less aggressive than nonobese people.
12. _____ Most obese people have different personalities than nonobese people.
13. _____ Very few obese people are ashamed of their weight.
14. _____ Most obese people resent normal weight people.
15. _____ Obese people are more emotional than nonobese people.
16. _____ Obese people should not expect to lead normal lives.
17. _____ Obese people are just as healthy as nonobese people.
18. _____ Obese people are just as sexually attractive as nonobese people.
19. _____ Obese people tend to have family problems.
20. _____ One of the worst things that could happen to a person would be for him to become obese.

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Scoring instructions for ATOP survey

Step 1: Multiply the response to the following items by -1: items 1-6, 10, 12, 14-16, and 19-20.

Step 2: Sum the responses to all items

Step 3: Add 60 to the value obtained in step 2. This value is the ATOP score (Allison et al., 1991).

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Appendix C**Copy of Invitation Email**

Dear Undergraduate and Graduate Students,

I am writing to request your help with an important project. I am conducting a survey of current students at the University of Lynchburg to examine the effects of viewing obesity as a chronic disease on pre-existing attitudes.

You were selected to be part of this project because of your affiliation with the University of Lynchburg.

To complete the survey online, please go to the Google Form link below and then follow the survey instructions.

Your answers will be completely confidential. Moreover, the results of the survey will be reported in a summary format, so again no one will link you to your responses.

Thank you in advance for your participation in this important project.

Please review the informed consent below for a complete explanation of this project. If you agree to participate, you can access the survey from the link below the informed consent.

Sincerely,
Sloane Kelly
Westover Honors Fellow
Health Promotion, major, & Vocal Performance, minor

Tonya Price, DHed, MS, RDN, CHES
Department of Health Promotion, Chair
University of Lynchburg

Appendix D

Informed Consent Agreement

Please read this consent agreement (or listen carefully if it is being read to you) before you decide to participate in the research study. Please keep a copy for your records.

Project Title: *The Effect of Educational Intervention on Attitudes towards Obesity in University Students*

Purpose: The purpose of this research study is to *examine the effects of an educational intervention pertaining to attitudes towards obesity as a chronic disease among undergraduate and graduate university students.*

Participation: As a participant in this study, you will be asked to *complete a 28 question pre-test followed by reading an educational article about obesity as a disease. Upon completion of reading the article, you will complete a 28 question post-test. Following the post-test, you will be asked to complete a short set of demographic questions.*

Time Required: Your participation is expected to take *15 to 25 minutes.*

Voluntary Participation: Please understand that participation is completely voluntary. You have the right to refuse to participate and/or answer any question(s) for any reason, without penalty. You also have the right to withdraw from the research study at any time without penalty. If you want to withdraw from the study please tell the researcher or a member of the research team who is present during your participation.

Potential Risks: The potential risks associated with this study include discomfort due to the subject nature discussed within the study. The educational reading topic may bring forth negative feelings that may render the participant unable to finish their participation within the study. Participants will be informed that they can remove themselves from the study at any time by exiting the electronic delivery platform. In the event of psychological distress during or following participation in the study, participants are directed to the University of Lynchburg's Health Center Counseling Services (434.544.8357).

Potential Benefits: The potential benefits associated with this study are an improved knowledge on the issue of obesity being viewed as a chronic disease. Participants will be better equipped to formulate personal opinions as a result of participation in this study. Benefits to society may include an improved understanding of how interventions and knowledge can change attitudes and, potentially, behaviors.

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Compensation: You will not receive compensation for participation in this study.

Confidentiality: Your individual privacy will be maintained throughout this study. In order to preserve the confidentiality of your responses, all survey responses will be maintained confidentially on password-protected servers associated with the University of Lynchburg.

Whom to Contact with Questions: If you have any questions or would like additional information about this research, please contact Sloane Kelly at kelly_se@lynchburg.edu. You can also contact my faculty research sponsor, Dr. Tonya Price, at price.t@lynchburg.edu, who is the Principal Investigator (PI) for this project and is supervising my work on the study. The University of Lynchburg Institutional Review Board (IRB) for Human Subjects Research has approved this project. This IRB currently does not stamp approval on the informed consent/assent documents; however, an approval number is assigned to approved studies – the approval number for this study is **LHS2122007**. You may contact the IRB Director, Dr. Sean Collins, through the Office of the Associate Provost at the University of Lynchburg at 434.544.8367 or irb-hs@lynchburg.edu with any questions or concerns related to this research study.

Agreement: I understand the above information and have had all of my questions about participation in this research study answered. By signing below I voluntarily agree to participate in the research study described above and verify that I am 18 years of age or older.

If you agree with the above Informed Consent, proceed to the survey via the link below.

[SURVEY LINK](#)