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An Assessment of the Long-Term Efficacy of an Undergraduate Curriculum-Embedded Weight Bias Intervention in Practicing Registered Nurses

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ABSTRACT

Background: Individuals with obesity often experience weight bias in healthcare, which may negatively impact health outcomes. Weight bias (WB) can be reduced by provider participation in weight bias interventions. This mixed-methods study investigated the sustainability of reduced WB in those who received a weight bias intervention.

Method: Registered nurses (RNs) who completed a weight bias intervention during their nursing education and those who did not were recruited to complete an online survey. WB scores and approaches towards caring for patients with obesity were compared.

Results: Eighty-four RNs (50 intervention; 34 control) participated. Reduced WB was sustained over 4 and 6 years compared to pre-intervention scores ($p < 0.001$). No significant WB differences were found between the groups ($p = 0.501$). Thematic analysis identified three overarching themes: *physical care differences*, *recognition of obesity's causality and controllability,* and *equal treatment of all patients.*

Conclusions: Weight bias intervention effects were sustained, but non-intervention nurses had comparable WB scores, indicating multifaceted influences on WB in clinical practice. In order for nurses to provide unbiased care for individuals with obesity, it is important to develop and implement both high-impact educational interventions that support reduced weight bias and organizational and structural supports in the practice environment.

1 | Introduction

In recent years, the number of individuals living with excess weight or obesity has significantly increased. Currently, 73.6% of American adults live with either excess weight or obesity, with at least 20% of adults identified as having obesity in every state and territory in the United States [1]. Individuals with obesity may experience *weight bias*, having adverse psychological effects due to negative social bias because of their excess weight. Weight bias (WB) often includes assumptions that the individual is to blame for their weight and that these individuals are lazy, less intelligent, unmotivated, medically non-compliant, slow, and gluttonous [2]. Researchers in the field of WB report that a lack of understanding about the causes and complexity of obesity often leads providers, including registered nurses (RNs) and nursing students, to spend less time with, provide less

patient-centered communication, and display less respect for patients with obesity [2–5]. Providers may also over-attribute symptoms to obesity by prescribing "weight loss" instead of investigating other potential causes of the symptoms [6, 7].

Individuals with obesity are likely to have increased healthcare needs due to obesity-related diseases, yet simultaneously experience WB in the healthcare setting. In a survey of 2700 patients with excess weight and obesity, 69% reported experiencing WB from their provider [8]. One scoping review found that experiencing WB in healthcare led to low trust, poor communication, "doctor shopping," and avoidance or delay in seeking care [9], leading to worse health outcomes [3].

Fortunately, a growing number of weight bias interventions aimed at reducing WB among providers generally yield positive short-term results post-intervention [10–13]. However, no known studies include long-term follow-up to determine if the intervention effect was sustained and if it impacts clinical practice. Therefore, this research extends the findings of a parent study to investigate the longevity of a weight bias intervention over a span of 4 and 6 years. The original intervention, a weight bias intervention, was provided to junior-level baccalaureate nursing students at a mid-Atlantic College of Nursing [14–17]. The parent studies were conducted in Fall 2017 and 2019, where junior-level nursing students received a 15-week educational intervention designed to mitigate WB. Employing the pre-posttest study design, the intervention involved an in-person, 1-h, didactic presentation created and delivered by the research team based on current literature regarding effective strategies to mitigate WB in healthcare. The students received the intervention during weeks one or two of the semester as part of their nursing clinical rotations—on site at their respective hospitals. Students also completed five reflective journaling exercises that included a question prompt and they each received feedback on their reflections from the research team. Lastly, each clinical group received a debriefing session to solicit intervention feedback and reinforce main concepts [14]. The Attitudes Towards Obese People (ATOP) and Beliefs About Obese Persons (BAOP) scales were used to capture changes in WB scores between baseline and post-intervention [14]. Both the 2017 and 2019 interventions showed a reduction in WB post-intervention. Thus, the purpose of this mixed-methods study was to examine the long-term effects of the weight bias intervention on present WB.

2 | Method

2.1 | Design

This study extended the WB findings of the parent studies and sought to better understand RNs' thoughts and feelings when caring for patients with obesity [14–17]. RNs who participated in the original study were recruited to serve as the intervention group, while RNs from adjacent graduating classes at the same university who did not receive the intervention served as the control group. All participants completed the ATOP and BAOP scales, used in the original study, along with standardized demographic questions and two open-ended questions. The ATOP and BAOP scales from the intervention group were first compared to the original pre- and post-intervention scores to assess for retention of the intervention, identifying if the initial reduction in WB achieved post-intervention remained, and if so, to what degree. Next, the ATOP and BAOP scores were compared between the intervention and control groups. Potentially confounding variables were also statistically assessed. Finally, the two open-ended questions were qualitatively analyzed using thematic analysis. A visual schema of the study design is provided in Figure 1. The Villanova University Institutional Review Board approval was obtained on July 25, 2023, before commencing this study (Approval IRB-FY2023-80).

2.2 | Participants

The sample consisted of RNs who graduated between 2018 and 2021 from a mid-Atlantic 4-year traditional undergraduate baccalaureate nursing program. The intervention group consisted of RNs who, as undergraduate nursing students, completed a curriculum-embedded WB reduction intervention as part of their course and were from the graduation classes of 2019 and 2021. RNs from the same university who did not participate in the intervention served as the control group and were from the graduating classes of 2018 and 2020. All nursing graduates, even if they were transfer students, were eligible to participate. Exclusion criteria included nursing graduates who were not currently practicing RNs and those who indicated a "do not contact" request to the University Advancement office.

2.3 | Procedure

Study invitation emails were deployed in July 2023, simultaneously with class champions from the 2020 and 2021 cohorts posting on the class GroupMe threads and a social media post on the university's College of Nursing alumni LinkedIn page. This returned 85 completed surveys, yielding a 22% response rate. One participant did not meet the inclusion criteria, leaving 84 participants in the study. The electronic link in the emails and social media postings opened the consent form. Those who selected the answer "yes" proceeded to question one of the Qualtrics surveys [18]. Participants were compensated for participating.

2.4 | Measures

2.4.1 | Attitudes Towards Obese Persons (ATOP) Scale

The ATOP scale consists of 20 items and asks participants the extent to which they agree with assumptions or misperceptions about persons with obesity compared to non-obese individuals [19]. Statements include topics such as *Most obese people feel that they are not as good as other people* and *severely obese people are usually untidy*. Participants choose their responses on a six-point Likert scale (−3 = *strongly disagree* to +3 = *strongly agree*). A total score is calculated following instructions provided by the author [19]. The total score can range from 0 to 120, with higher scores indicating more positive attitudes towards persons with obesity. The validity and reliability of this scale were supported in the adult population, with reliability ranging from 0.80 to 0.8 [19].

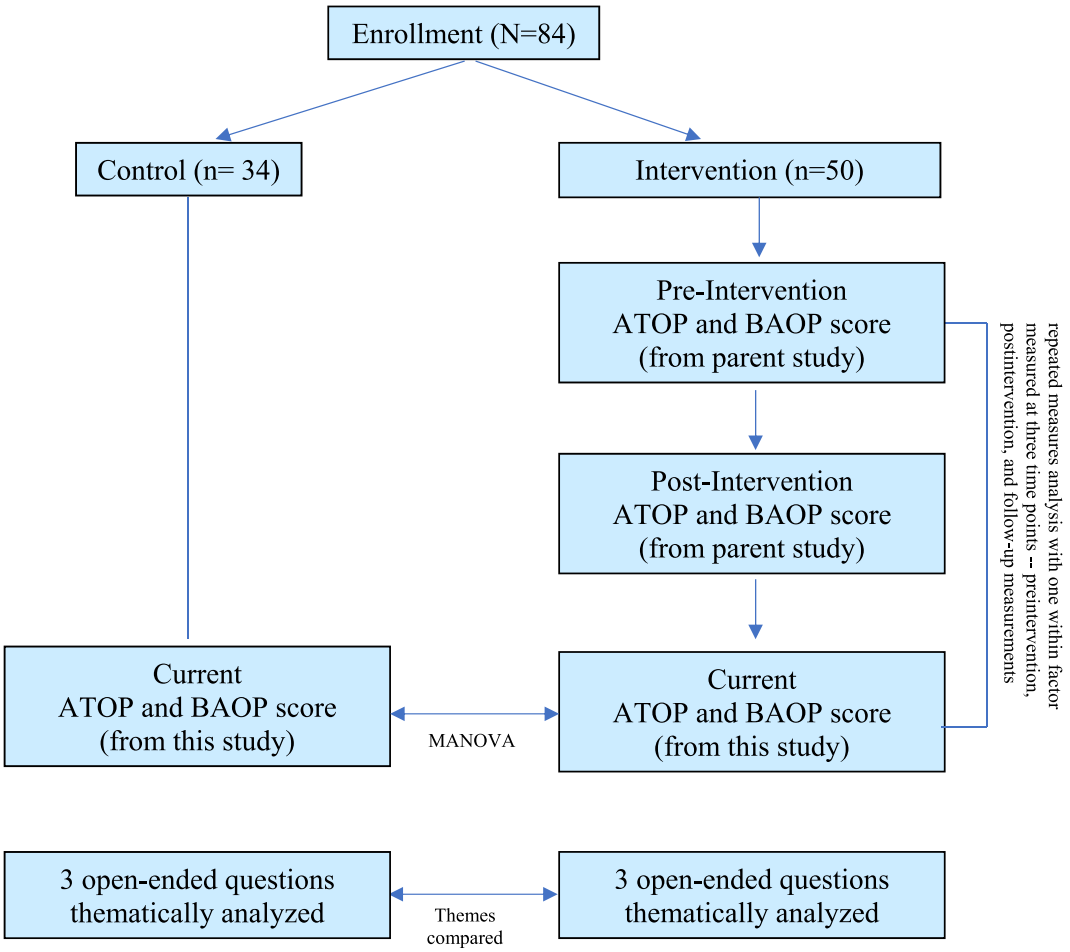

FIGURE 1 | Visual schema of study design.

2.4.2 | Beliefs About Obese Persons (BAOP) Scale

The BAOP scale has eight items and explores the extent to which the participant believes that obesity is within one's control. For example, *obesity is caused by overeating or lack of self-control versus genetics or hormones*. The BAOP scale uses the same six-point Likert scale (−3 = *strongly disagree* to +3 = *strongly agree*) and is scored similarly to the ATOP scale. Total scores range from 0 to 48, with higher scores indicating a stronger belief that obesity is not under one's personal control [19]. The BAOP scale has yielded a reliability range of 0.65–0.82 in the adult population [19].

2.4.3 | Demographic Data Collection

Sample characteristics, such as current age, sex, self-reported height and weight, current enrollment in a graduate program, ethnicity, and current workplace setting (in-patient or out-patient and specialty area), were assessed by a standardized socio-demographic questionnaire. Additionally, questions about other variables, such as having friends or family with obesity, the age and weight of their patient population, having access to bariatric equipment, and workplace weight bias training, were included in the questionnaire. See Table 1.

2.4.4 | Qualitative Data Collection

Two open-ended questions, created by the authorship team, were included at the end of the survey so that participants can share in detail how the weight bias intervention may or may not have influenced their current biases and nursing approach to patients with obesity. These questions included:

1. Describe your thoughts and feelings when you have been assigned a patient with obesity?
2. How does your practice reflect your attitudes towards working with patients with obesity?

2.5 | Analyses

2.5.1 | Quantitative Analysis

Data were analyzed using IBM SPSS Statistics Version 29. First, all data were analyzed for data distribution using descriptive and visual analysis for each outcome variable and for each covariate. ATOP and BAOP items were transformed into composite scores based on the ATOP and BAOP scoring algorithms. Data were assessed for comparability of the intervention and control groups for multiple potential confounding variables. These variables

TABLE 1 | Demographic characteristics of participants.

Variables	Total (84)	Intervention group (n = 50)	Control group (n = 34)	p value (two-sided t-test)
Graduation class				
2018		—	12 (35%)	
2019		18 (36%)	—	
2020		—	22 (65%)	
2021		32 (64%)	—	
Gender				
Male	5 (6%)	2 (4%)	3 (8.8%)	0.644
Female	79 (94%)	48 (96%)	31 (91.2%)	
Age		24.54 (M)	26.21 (M)	0.001[a]
		(SD 1.34)	(SD 2.99)	
Race				
White/Caucasian	72 (85.7%)	42 (84%)	30 (88.2%)	0.754
Not White/Caucasian	12 (14.3%)	8 (16%)	4 (11.8%)	
Current weight (self-reported)				
Underweight	3 (3.6%)	2 (4%)	1 (2.9%)	0.153[b]
Healthy weight	65 (77.4%)	36 (72%)	29 (85.3%)	
Overweight	11 (13.1%)	8 (16%)	3 (8.8%)	
Obesity	5 (6%)	4 (8%)	1 (2.9%)	
Friends or family with obesity				
Yes	75 (89.3%)	44 (88%)	31 (91.2%)	0.733
No	9 (10.7%)	6 (12%)	3 (8.8%)	
Participated in workplace WB education				
Yes	20 (23.8%)	15 (30%)	5 (14.7%)	0.086
No	64 (76.2%)	35 (70%)	29 (85.3%)	
Do you feel you have access to enough bariatric equipment?				
Yes		31 (63.3%)	20 (48.8%)	0.037
No		18 (36.7%)	14 (41.2%)	
Do you feel like your *NUR 3115 Practicum in Nursing Care of Adults and Older Adults* course prepared you to work with patients with obesity?				
Yes		46 (94%)	21 (62%)	< 0.001
No		3 (6%)	13 (38%)	
Pre-intervention ATOP		74.8 (M)		
		(SD 12.78)		
Post-intervention ATOP		85.5 (M)		
		(SD 16.27)		
Follow-up ATOP		79.48 (M)	76.79 (M)	0.427
		(SD 13.64)	(SD 17.12)	
Pre-intervention BAOP		19.61 (M)		
		(SD 7.76)		
Post-intervention BAOP		22.43 (M)		
		(SD 7.76)		
Follow-up BAOP		24.86 (M)	22.65 (M)	0.247
		(SD 8.58)	(SD 8.46)	

Abbreviations: ATOP, Attitudes Towards Obese Persons scale; BAOP, Beliefs About Obese Persons scale.
[a]Statistically significant due to outlier, no correlation with outcomes.
[b]Linear-by-linear association, exact sig. (1-sided).

were transformed into binary variables: having friends and family with obesity, race, sex, and if the participant received WB training in their workplace (yes/no). No statistical differences or correlations were found between the intervention and control groups, except for age, which was not significantly correlated with outcomes; therefore, there was no need to control for any confounding variables.

To assess the magnitude of changes in WB scores in RNs who completed the weight bias intervention, a repeated measures analysis was conducted with one within factor measured at three-time points—pre-intervention, post-intervention, and follow-up measurements. First, Mauchly's Test of Sphericity was significant for both ATOP and BAOP, and other assumptions were met before conducting the repeated measures test. The level of significance was set at 0.05.

Next, descriptive statistics (mean) and a one-way multivariate analysis of variance (MANOVA) using participants' ATOP and BAOP scores were completed to determine if WB differed between RNs who completed the weight bias intervention as an undergraduate student and those who did not. Assumptions were tested using Box's Test of Equality of Covariance Matrices and Levene's Test of Equality of Error Variances; both were significant, indicating assumptions were met.

Descriptive statistics were used to report continuous variables in the sample characteristics (e.g., age, follow-up ATOP and BAOP scores), and frequencies and percentages were used for categorical variables (e.g., race, current weight, gender, and whether WB education was received at work). A correlation matrix was used to assess possible correlations between ATOP and BAOP scores and potentially confounding variables.

2.5.2 | Qualitative Analysis

Two qualitative open-ended questions were analyzed using thematic analysis [20, 21]. First, the answers to each question were separated based on whether the registered nurse participated in the intervention or not, creating six groupings of comments (e.g., question 1 intervention group comments were analyzed for themes separate from control group question 1 comments). The two coders independently read and reread the open-ended responses to identify themes before mutually discussing and agreeing on themes. Any discrepancies were discussed. Finally, the identified qualitative themes were compared between the intervention and control groups and matched per question to identify similarities and differences in participant responses. Trustworthiness was addressed through discussions about data credibility and confirmability to identify any biases that might have influenced the analysis process. Dependability and confirmability were supported by maintaining an audit trail through outlines and Excel tables.

3 | Results

The study included 84 participants, 50 in the invention group and 34 in the control group. The majority of the sample were female (94%), white/Caucasian (85.7%), and considered themselves to be of healthy weight (77.4%). Mean age was 25.91 years, and most (94%) worked in the in-patient setting. Of the sample, 24% participated in additional WB education in their workplace. The Cronbach's Alpha of the ATOP scale was 0.848, and the BAOP scale was 0.801, indicating good reliability. Factor analysis was also conducted to ensure the use of the correct tool. Demographic characteristics of the sample are presented in Table 1.

3.1 | Quantitative Results

3.1.1 | Repeated Measures ATOP Scale for Intervention Group

The repeated measures conducted at pre-intervention, post-intervention, and follow-up time points revealed a statistically significant difference among the three intervals ($F(2, 90) = 12.65$, $p < 0.001$). While there was improvement observed between the pre- and post-intervention time points, a portion of this improvement dissipated between the post-intervention and follow-up time points. Pairwise comparison of time points showed a difference between pre- and post-intervention ($p < 0.001$), post-intervention and follow-up ($p = 0.031$), and pre-intervention and follow-up ($p = 0.005$) time points. Significance was set at 0.05. See Figure 2.

3.1.2 | Repeated Measures BAOP Scale for Intervention Group

The repeated measure analysis for the BAOP scale similarly demonstrated a statistically significant difference across the three times points ($F(2, 90) = 9.91$, $p < 0.001$). However, in contrast to the ATOP scores, the intervention effect continued to increase at the same interval observed between all three-time points. Pairwise comparison of time points showed a difference between pre- and post-intervention ($p = 0.013$), post-intervention and follow-up ($p = 0.071$), and pre-intervention and follow-up ($p < 0.001$) time points. The level of significance was set at 0.05. See Figure 3.

3.1.3 | Comparison of ATOP and BAOP Between Intervention and Control Group

ATOP scores for the intervention group ($M = 79.48$, SD 13.64) were slightly higher than those for the control group ($M = 76.79$, SD 17.12), indicating slightly more positive attitudes, with a mean difference of 2.69; however, this difference did not reach statistical significance ($p = 0.427$; Cohen's $d = 0.177$). The ATOP scale ranges from 0 to 120, where higher scores reflect more favorable attitudes [19].

Similarly, BAOP scores in the intervention group ($M = 24.86$, SD 8.6) were slightly higher, indicating more favorable beliefs, in comparison to the control group ($M = 22.65$, SD = 8.5), resulting in a mean difference of 2.21. However, this difference was not statistically significant ($p = 0.247$, Cohen's $d = 0.259$). The BAOP

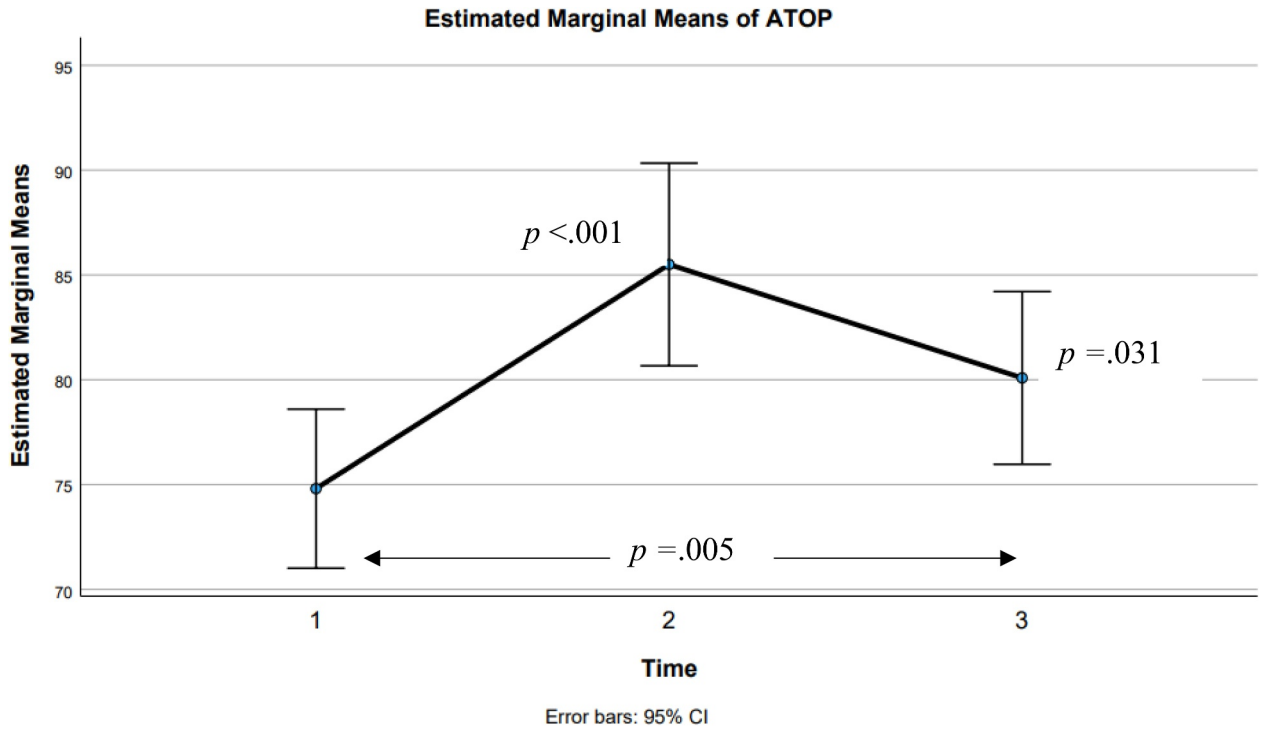

FIGURE 2 | Profile plot of ATOP means over three time points for intervention group. ATOP, Attitudes Towards Obese Persons scale.

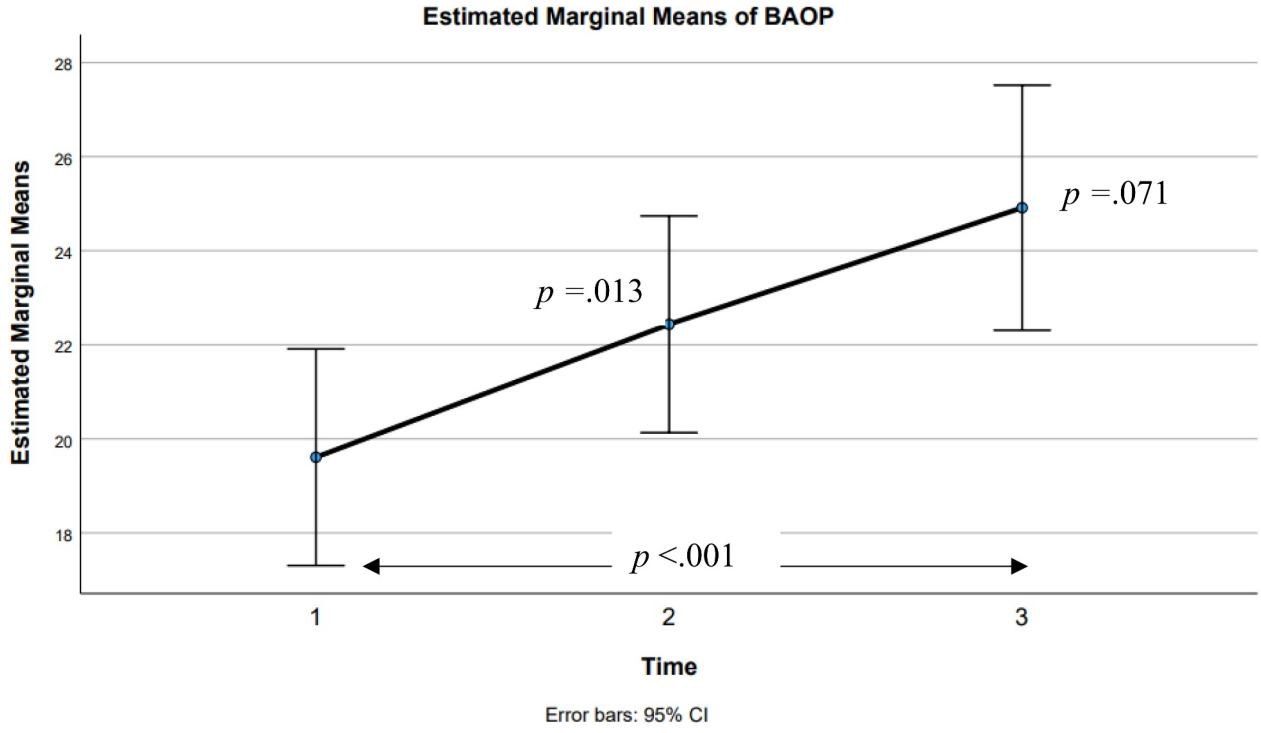

FIGURE 3 | Profile plot of BAOP means over three time points for intervention group. BAOP, Beliefs About Obese Persons scale.

scale ranges from 0 to 48; higher scores indicate a stronger belief that obesity is not under one's personal control [19].

MANOVA, which assesses for differences between the intervention and control groups across both ATOP and BAOP scores, showed no statistical difference between the two groups ($V = 0.02$, $F(2, 81) = 0.70$, $p = 0.501$). See Figures 4 and 5.

3.2 | Qualitative Results

Thematic analysis included 217 comments: 135 comments from the intervention group and 82 from the control group. Three primary themes emerged from both the intervention and control groups: Theme 1. *Physical care differences;* and Theme 2. *Recognition of the causality and controllability of obesity*.

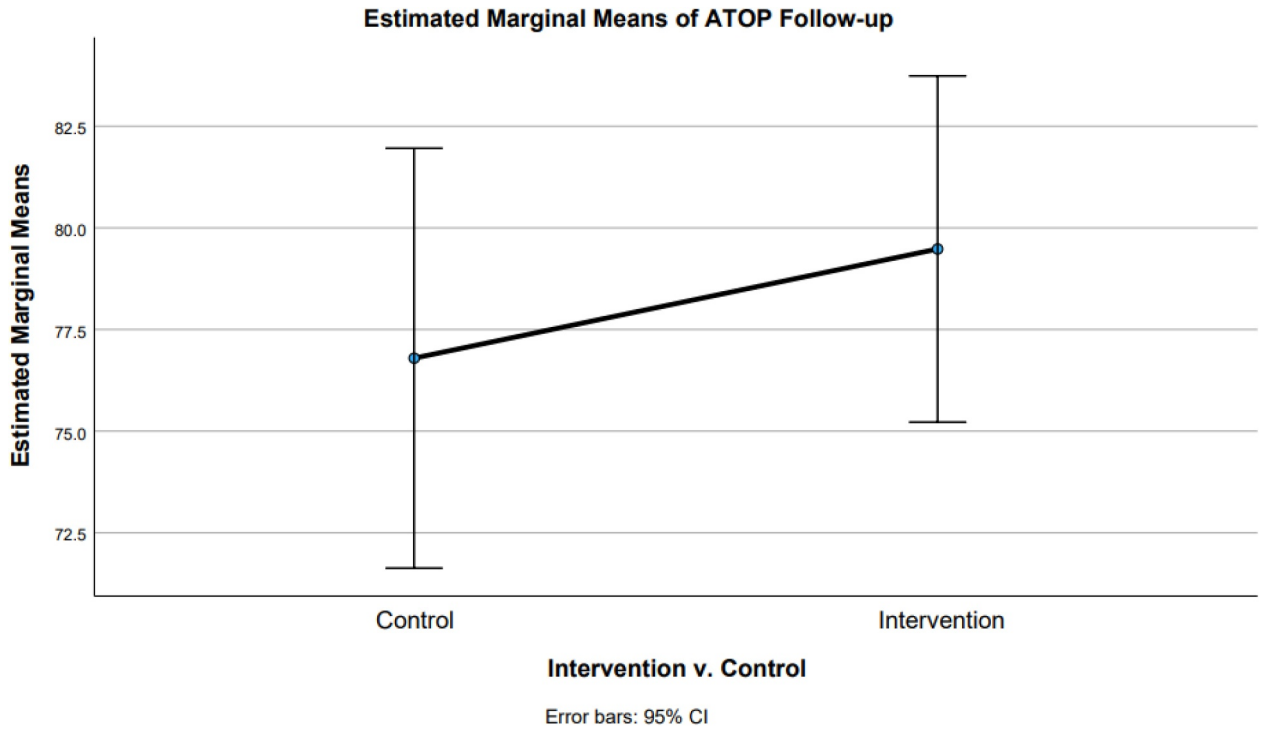

FIGURE 4 | Profile plot demonstrating results for control and intervention ATOP scores. $p = 0.427$; Cohen's $d = 0.177$. ATOP, Attitudes Towards Obese Persons scale.

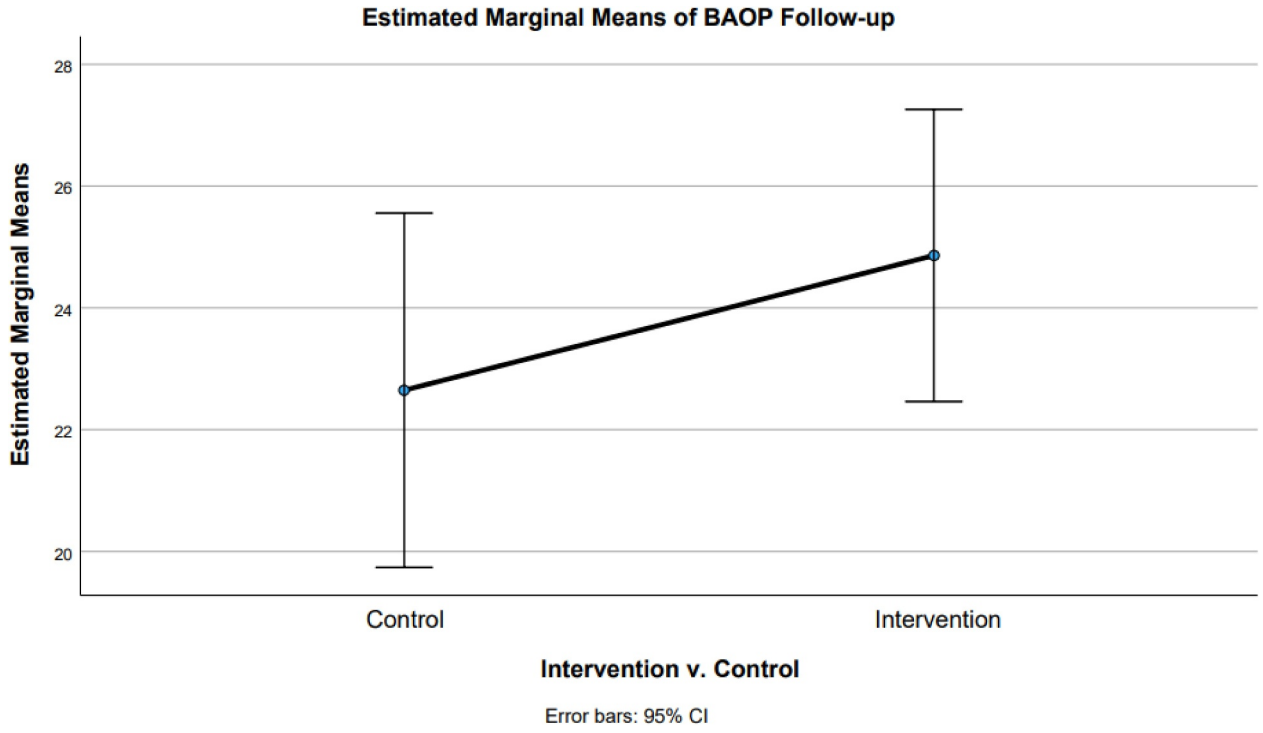

FIGURE 5 | Profile plot demonstrating results for control and intervention BAOP scores. $p = 0.247$, Cohen's $d = 0.259$. BAOP, Beliefs About Obese Persons scale.

Theme 3. *Equal treatment of all patients*; Exemplars representing each theme are provided for context below as well as whether the participant was part of the intervention or control group.

3.2.1 | Theme 1: Physical Care Differences

Participants emphasized that providing care for patients with obesity poses physical challenges, often requiring additional

person-power, time, and resources. These increased demands contribute to increased stress with depletion of resources. The comments were not inherently negative towards patients; rather, RNs acknowledged a difference in essential requirements to deliver an equal level of care to patients with obesity. This theme was dominant in the first question, voiced in 67% of the intervention and 55% of the control group comments, although many participants noted trying to conceal the additional strain from their patients.

> I have often felt like it will be more work for me. To clean and turn them/transfer, you need more help.
>
> (Control Group RN #17, pre-op/OR/PACU nurse)

3.2.2 | Theme 2: Recognition of the Causality and Controllability of Obesity

As the participants responded to each question, it was clear that they acknowledged how a patient's background, socioeconomic status, education level, concomitant comorbidities and social determinants of health play a role in the development of obesity. There appeared to be an underlying sense of understanding that obesity is complex and not inherently the fault of a patient's lifestyle choices from both groups (11% intervention comments, 13% control comments). Some comments further conveyed empathy or sympathy for their patients with obesity.

> I often feel sad because I know that most of my patients with obesity have obesity due to their physical limitations and access to nutritious food.
>
> (Intervention Group RN #34, neuro/orthonurse)

3.2.3 | Theme 3: Equal Treatment for All Patients

Many RNs emphasized their commitment to treating all patients equally, regardless of size. Some comments explicitly conveyed this theme, while others included phrasing that suggested that, although some bias may be present, the registered nurse was intentional to prevent it from influencing patient care. This was the most prominent theme for question number two, garnering 42% of the intervention group comments and 54% of the control group comments.

> I don't feel any differently when I'm assigned a patient with obesity because I do my best to treat all of my patients in the same way. I feel as though I've received plenty of weight bias training from all of my education and feel I have all of the resources I might need to safely and empathetically care for this population.
>
> (Control Group RN #26, ICU nurse)

4 | Discussion

Findings from this study suggest that a WB reduction intervention delivered to undergraduate nursing students in a traditional baccalaureate program may be sustained at 4 and 6 years, as evidenced by statistically significant improvement in both ATOP and BAOP scores from pre-intervention to follow-up. While some decline in attitudes was seen since the completion of the intervention, the beliefs about the causality and controllability of obesity continued to improve. One possible reason for this outcome stems from the first two qualitative themes: *Physical care differences* and *Recognition of the causality and controllability of obesity*. RNs articulated an appreciation of the complex etiology of obesity while concurrently recognizing the increased time, energy, and resources associated with caring for patients with obesity. This dual recognition might explain the improved beliefs concurrent with poorer attitudes toward patients with obesity. The RNs often highlighted the physical toll placed on them, emphasizing the challenges to turn, clean, ambulate, and care for patients with obesity. Only 63% of the intervention and 59% of the control group reported access to adequate bariatric equipment. This suggests that the work environment plays a significant role in how nurses feel about caring for patients with obesity.

Hospitals and health clinics are required to provide accommodations for patients with obesity to remain in compliance with the Emergency Medical Treatment and Labor Act (EMTALA), the Americans with Disabilities Act (ADA), or the Rehabilitation Act [22]. However, simply having the bariatric equipment may not suffice; it is essential to have adequate time, energy, and resources needed to support the increased nursing care demands for patients with obesity. These aspects of patient care are not included in the policy but greatly impact a nurse's shift. These factors appear to influence RNs' attitudes towards their patients with obesity. However, many noted that they try to conceal this additional strain in the presence of their patients with obesity.

Another observation from this research is the comparable low levels of WB in both groups, with no discernible differences in thematic responses between the two groups. This finding is inherently positive. Possible contributors to this low WB include factors such as 24% of participants having received workplace WB education, residency programs, participation in continuing education (CEUs) on WB, the influence of work culture, cultural competence training, or implementation of diversity, equity, and inclusion (DEI) initiatives. The societal shift towards embracing DEI may also contribute to the acceptance of patients with obesity.

Furthermore, *Social Determinants of Health* (SDoH), which encompass social, economic, and environmental factors that significantly influence health and health outcomes, have been identified as significant contributors to obesity development [23]. As the role of SDoH in contributing to weight gain is emphasized in education and healthcare, nurses may develop a more compassionate and holistic approach to patients with obesity, recognizing that societal factors play a significant role in the development of obesity. This could account for the higher BAOP scores in the control group, the uptick in BAOP scores in the intervention group, and the prominence of Theme 2: *Recognition of the causality and controllability of obesity.*

4.1 | Strengths

This extension study allowed us to examine long-term effects similar to a longitudinal study, but in a shorter timeframe, as participants had already received the intervention during the parent study in 2017 or 2019. This study had a clearly defined sample and setting; used valid and reliable instruments to capture the concept of interest, plus open-ended questions to add richness and depth to the data; and used appropriate statistical and qualitative analysis measures [24]. Measuring the differences between the control and intervention groups further added to the rigor of this study.

4.2 | Limitations

There were several primary threats to internal validity. First, there is a lack of a true control group. We were only able to compare the follow-up time points between groups. Additionally, as RNs gained life experience and met more diverse individuals throughout their nursing career, their attitudes and assumptions about individuals with obesity may have changed. Furthermore, self-reported answers risk social desirability bias. RNs may have inaccurately reported a more "socially desirable" response that reflects less bias rather than reporting their actual bias. Additionally, the study only measured explicit bias, which may be easier to change than implicit bias. *Implicit bias* is bias that the person is unaware they have. By not measuring implicit bias, this research could not capture whether the underlying WB exists.

This study highlights the lasting impact of a weight bias intervention on attitudes toward patients with obesity among traditional undergraduate nurses. The sustained reduction in WB, even after 4 and 6 years, is significant. Equally notable is that nurses without the intervention showed similar levels of bias. This underscores the importance of ongoing WB research, aiming for lower WB to ensure equitable treatment for all patients regardless of size. Future studies should continue assessing WB among RNs and explore the extent of obesity and WB education in nursing and medical curricula. Additionally, research should investigate how weight bias reduction in nurses impacts patients' perceptions of their nursing care and health outcomes. Understanding the factors behind reduced bias can guide initiatives promoting better attitudes toward patients with obesity.

Author Contributions

Caroline Hallen Moore: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, supervision, validation, visualization, roles/writing – original draft, writing – review and editing. **Tracy L. Oliver:** conceptualization, data curation, investigation, methodology, project administration, resources, supervision, validation, visualization, roles/writing – original draft, writing – review and editing. **Elizabeth B. Dowdell:** investigation, methodology, project administration, resources, supervision, validation, visualization, roles/writing – original draft, writing – review and editing. **Justus Randolph:** data curation, formal analysis, methodology, resources, validation, writing – review and editing. **Amanda Davis:** formal analysis, resources, validation, writing – review and editing.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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