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Rosanna P. Watowicz

Case Western Reserve University, rpw39@case.edu

Harrine Ramesh

Case Western Reserve University, hxr139@case.edu

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Short-Term Improvement in Self-Perceived Knowledge and Weight Bias Following a 15-Week Course on Pediatric Obesity

Rosanna P. Watowicz, Case Western Reserve University
Harrine Ramesh, Case Western Reserve University

ABSTRACT

Registered dietitian nutritionists (RDNs) are an integral part of weight management teams; however, previous research indicates that RDNs may hold weight-related biases. Additionally, there may be a gap between what RDNs learn about weight management during their education and training and the competencies that RDNs should achieve before working in weight management. The objective of this study was to examine whether a 15-week graduate course on pediatric obesity led to a short-term increase in self-perceived knowledge of 13 Obesity Medicine Education Collaborative competencies, as well as a short-term decrease in weight bias. Nutrition graduate students enrolled in the course completed a survey before and after the course. The survey asked students to indicate their confidence in each of the 13 knowledge-related obesity competencies using a five-point Likert scale. Weight bias was assessed using the 14-item Fat Phobia Scale. Sixteen students completed both the pre- and post-course questionnaire, and results indicated a significant increase in self-perceived knowledge and decrease in weight bias. A graduate course on obesity may be a strategy for increasing knowledge and decreasing weight bias for dietetic trainees, though additional, larger studies are necessary. A strength of this study is that a standardized set of competencies was used to assess change in self-perceived knowledge; use of standardized competencies in future research will allow studies to be pooled.

KEYWORDS

pediatric obesity, dietetic education, weight bias, obesity education

INTRODUCTION

Roughly 19% of U.S. children ages 2 to 18 years are considered to have obesity¹ and strong evidence indicates that registered dietitian nutritionists (RDNs) should be an integral part of multidisciplinary obesity interventions² when intervention is appropriate and desired. In fact, the Accreditation Council for Education

in Nutrition and Dietetics (ACEND) calls out obesity as part of the required competencies for both accredited didactic education and accredited supervised practice programs, stating that, “learning activities must prepare students for professional practice with patients/clients with various conditions, including...overweight and obesity”.^{3,4} The Academy of Nutrition and Dietetics (AND)

supported the development of the 2017 Provider Competencies for the Prevention and Management of Obesity, a set of interprofessional competencies intended to standardize the minimum level of obesity-related training that is provided to healthcare professionals.⁵ AND also supported the development of the Obesity Medicine Education Collaborative (OMEC) Obesity Competencies, published in 2019.⁶ The degree to which these obesity-related competencies are met in RDN education and training has yet to be studied, however evidence from other healthcare professions is not encouraging. For example, studies of medical students and residents have demonstrated a deficiency in obesity education when measured using published medicine-specific obesity competencies.⁶⁻⁸

Further, weight stigma has been identified as an important problem in the U.S., particularly for healthcare workers.⁹ Weight stigma, also called weight bias, has been defined as “negative attitudes and discrimination toward individuals based on their body weight.”¹⁰ In dietetics specifically, weight stigma has been observed among practicing RDNs¹¹⁻¹³ as well as dietetic trainees,^{14,15} both in the U.S. and internationally. Weight stigma from healthcare professionals can affect care and patient outcomes in many ways, including low patient trust in the healthcare professional, avoidance or delay of healthcare, patronizing and disrespectful treatment from the healthcare professional, increased physiological stress, and poorer weight loss compared to individuals with the same baseline characteristics who have not experienced bias.^{16,17}

Likely in recognition of this call for obesity training, as well as the evidence of weight stigma among healthcare professionals, several obesity-related education and training interventions have been implemented with various healthcare professionals, leading to the publication of multiple reviews.¹⁸⁻²¹ However, gaps in the literature remain: few studies

primarily targeted RDNs or dietetic trainees,²²⁻²⁵ critical members of the obesity-related healthcare team. Additionally, to our knowledge, none of the interventions related to increasing obesity-related competency and decreasing bias have focused on a pediatric population, despite the fact that assessment and treatment of obesity is different for children than for adults.²⁶

At Case Western Reserve University, we offer a 15-week elective graduate course on pediatric obesity open to MS students in the Department of Nutrition, as well as graduate or pre-professional students across the University. The objective of this exploratory study was to understand whether a 15-week, seven module, graduate-level pediatric obesity course that is integrated into an existing curriculum is related to 1) short-term changes in self-perceived knowledge about pediatric obesity, and 2) change in measured anti-fat bias.

METHODS

This study was designed to evaluate short-term change in self-perceived knowledge and weight bias following enrollment in an inter-professional graduate-level course on pediatric obesity.

Description of the course

Pediatric Obesity was first developed as a course in the Department of Nutrition in the Spring of 2018. The course was developed by a faculty member with expertise in obesity (RPW) and has been taught by this faculty member each Spring since its inception. Because, at the time, the Department was working to develop additional online education options, the course was developed as an online, synchronous course and has been delivered in this format ever since. The course is an elective open to master’s students in the Department of Nutrition, including students completing a combined dietetic internship/master’s degree, as well as any other graduate or medical students at the University.

Figure 1. Pediatric Obesity Course Objectives

By the end of this course, students will be able to:

- Describe the process of clinically assessing pediatric obesity
- Explain the principles of energy homeostasis and weight regulation
- Describe nutritional, individual, and environmental factors that contribute to the development of pediatric obesity
- Explain the contribution of pediatric obesity to physical and psychological co-morbidities
- Apply knowledge of obesity prevention and treatment guidelines, nutritional interventions, and behavioral interventions to develop an obesity management plan for a patient
- Summarize the expected outcomes for pharmacological and surgical treatment of pediatric obesity
- Interpret scientific evidence related to pediatric obesity
- Use nonbiased, nonjudgmental, respectful, and empathetic language when communicating to or about patients with pediatric obesity

The course curriculum is divided into seven modules delivered over the course of a seven-module, 15-week semester, with one 2.5-hour synchronous, virtual meeting per module. The course objectives are listed in Figure 1 and a list of module topics is provided in Table 1. At the beginning of each module, students are assigned one to three brief (typically <15 minute) recorded lectures, delivered by the instructor, that introduce the major concepts in the module. Students are also assigned approximately 8-12 readings from the scientific literature, and occasionally additional readings from the lay literature. The readings are accompanied by an instructor-developed note-taking guide which directs students towards the most important concepts in each paper (based on the course objectives). Ahead of each synchronous session, students are required to view the recorded lectures, read the assigned literature, and complete the note-taking guide, which is submitted ahead of class for a grade based on completion (as opposed to correctness). Of note is the fact that, at the time of the most recent course delivery, the 2023 American Academy of Pediatrics Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity had not yet been published, so the course structure was informed by previous

guidelines which suggest a staged approach to obesity management.^{26,27}

During the virtual, synchronous session, time is spent discussing the most important or confusing topics from the note-taking guide, as well as several instructor-developed discussion questions that attempt to promote critical thinking and encourage students to link concepts to prior learning. Students then break out into small groups of three to four students to work through an instructor-developed activity

or case study that relates to the module's topic.

In addition to the regular work assigned with each module, students are required to present twice throughout the semester. One presentation, called Current Topics in Pediatric Obesity, is a brief (3-5 minute), informal presentation of a recently-published study related to obesity, followed by discussion or questions from classmates. Students take turns giving these presentations at the beginning of the synchronous class sessions. The second presentation, called Putative Causes of Pediatric Obesity, is a final, approximately 15-minute research presentation, requiring students to present a non-systematic summary of the literature around one purported cause of childhood obesity. In this presentation, students are required to discuss the purported mechanism of the relationship, as well as evidence for and against the relationship, remaining gaps and questions, and the student's conclusions.

This course was designed under the guidance of an instructional design expert from the University's Office of Teaching and Learning Technologies. We used a backwards-design process, beginning with the objectives of the course and working backwards to develop module objectives, assignments and materials to reach those objectives, and assessments to ensure the objectives were met.

This study was deemed exempt by the Case Western Reserve University Institutional Review Board.

Study questionnaire

A questionnaire was developed for the purpose of assessing whether this course improved perceived knowledge of pediatric obesity and weight bias. All students enrolled in the course in the Spring of 2021 (n=17) and 2022 (n=21) were invited to participate in the study. The survey was emailed to students ahead of the semester start date and students who chose to participate were required to submit their responses prior to the first class period. Following the final class period, the post-test survey was emailed to all students who completed the pre-test survey. Participants were compensated with a \$5 electronic Amazon gift card for each survey that was completed.

For the knowledge portion of the questionnaire, students were asked about their self-perceived knowledge of the 13 knowledge-based Obesity Medicine Education Collaborative competencies, adapted to ask about pediatric obesity specifically.⁶ These competencies, published in 2018 as part of a broader set of 32 obesity-related competencies, were developed by members of the Obesity Medicine Association, The Obesity Society, and the American Society for Metabolic and Bariatric Surgery to be used by educators to guide obesity education. In addition to the knowledge domain competencies (which were included in our questionnaire), the Obesity

Table 1. Description of pediatric obesity course modules and structure

Module topic and subtopics	Number of weeks spent on module
Course introduction	1
Definitions, epidemiology, and energy homeostasis <ul style="list-style-type: none"> • Definitions and epidemiology of pediatric obesity • Clinical assessment of anthropometrics, dietary intake, and energy expenditure • Principles of energy homeostasis 	2
Development of pediatric obesity <ul style="list-style-type: none"> • Nutritional factors • Individual factors • Environmental factor 	3
Comorbidities related to pediatric obesity <ul style="list-style-type: none"> • Physiological co-morbidities and the effect of weight loss • Psychosocial co-morbidities 	2
First stages of pediatric obesity intervention <ul style="list-style-type: none"> • Prevention and community interventions • Stage 1 and 2 interventions: Primary care 	2
Stage 3 interventions <ul style="list-style-type: none"> • Introduction to Stage 3 interventions • Dietary interventions in a multidisciplinary setting 	2
Stage 4 interventions and weight bias <ul style="list-style-type: none"> • Pharmacotherapy and surgery • Obesity stigma and bias • Expert panel 	2

Medicine Education Collaborative competencies also contain domains related to procedural skills, interpersonal and communication skills, and professionalism, among others.

The prompts on the study questionnaire asked participants to rate their confidence in their knowledge of each competency; response options were a five-point Likert scale ranging from “not at all confident” to “extremely confident”. To measure weight bias, participants completed the validated 14-item Fat Phobia Scale.^{28,29} The Fat Phobia Scale was originally developed in 1993 as a 50-item scale and was later shortened and validated as the

14-item scale used for this study. The Fat Phobia Scale was developed to measure a “pathological fear of fatness” that manifests as negative attitudes and stereotypes about people with obesity.²⁹ These negative attitudes and beliefs align with our modern definition of weight bias.

In addition to self-perceived knowledge and bias, the questionnaire also contained demographic questions and a question about the student’s planned career. Because the questionnaire was primarily comprised of existing tools and measures, pilot testing was no conducted prior to study commencement.

Statistical analysis

For each individual, mean total score on the self-perceived knowledge questionnaire and Fat Phobia Scale were calculated by averaging the responses for each item both at baseline and follow-up. Descriptive statistics were used to analyze mean and standard error of the total self-perceived knowledge score and total Fat

Phobia Scale score at baseline and at follow-up. Fat Phobia Scale scores on individual items were reverse coded as necessary, per the Fat Phobia Scale scoring instructions²⁸, so that a lower score (both total score and scoring on individual items) represented *less* fat phobia. Mean and standard error were also calculated for the individual items on both the self-perceived knowledge questionnaire and the Fat Phobia Scale. Paired samples t-tests were used to test for statistically significant differences between pre- and post-test scores on both the self-perceived knowledge mean total score and the Fat Phobia Scale mean total score. All analyses were conducted in SPSS (v. 28, IBM Corporation).

RESULTS

Twenty-two students (58% of enrolled students) completed the pre-test questionnaire and 16 students (42% of enrolled students) completed both the pre- and post-test questionnaires. Of the students who completed

Figure 2. Pre- and post-test mean (SE) scores on individual items on measure of self-perceived knowledge. Questions are based on obesity competencies from the Obesity Medicine Education Collaborative.

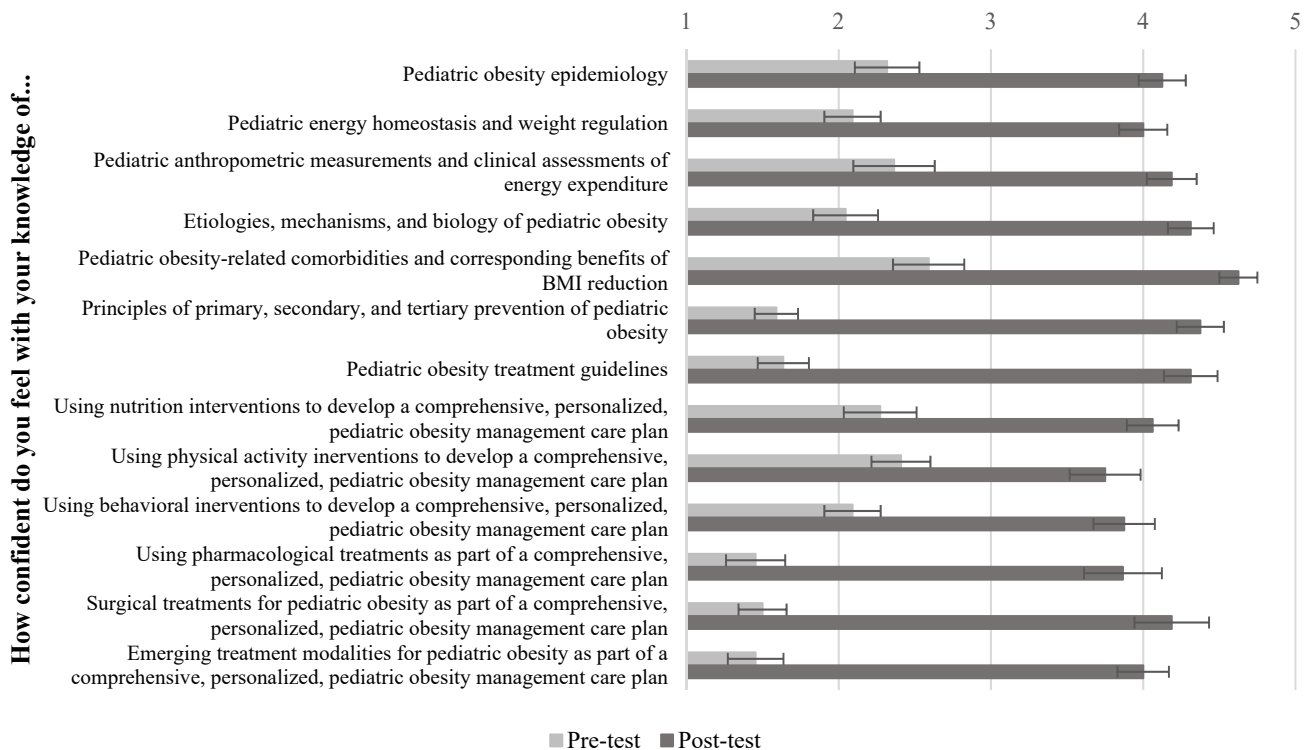
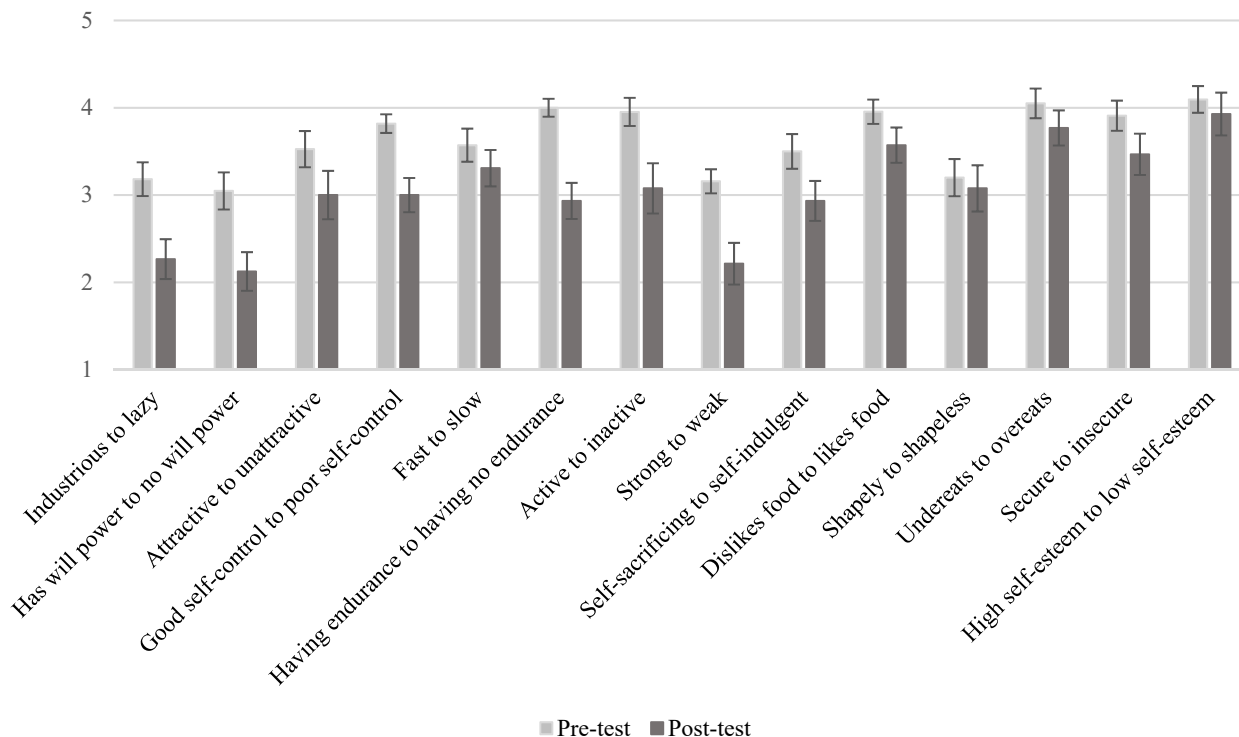


Figure 3. Pre- and post-test mean (SE) scores on individual items of the Fat Phobia Scale. All items coded so that a lower score indicates less bias.



the baseline survey, 13 (59%) were planning on a career in dietetics, 8 (36%) were planning on a career in medicine, and the remainder were planning careers in another field.

Change in self-perceived knowledge

Mean total score on perceived knowledge of obesity increased significantly ($p < 0.001$) from 2.04 (SD = 0.72) at baseline to 4.13 (SD = 0.50) following the intervention, resulting in a mean increase of 2.09 between the pre- and post-test (standard error of the mean difference = 0.18). Pre- and post-test scores for each question are presented in Figure 2.

Change in weight bias

Mean score on the Fat Phobia Scale decreased significantly ($p < 0.001$) from 3.36 (SD = 0.55) at baseline to 3.01 (SD = 0.47) following the intervention, resulting in a mean decrease of 0.62 (standard error of the mean difference = 0.13). Pre- and post-test scores for each question are presented in Figure 3.

DISCUSSION

This study demonstrated that a 15-week graduate level course with a focus on pediatric obesity was related to short-term increases in self-perceived knowledge around obesity as well as short-term decreases in weight stigma. It is notable that overall weight stigma decreased despite the emphasis on pediatrics versus an adult population.

Previous studies have failed to identify any consistent or best approach to reduce weight stigma or increase obesity-related knowledge.^{18,19} In their review of interventions to provide education around managing patients with obesity, Katz et al. suggested that brief interventions may be sufficient; 53% of the interventions included in their review involved 3 hours or less of education.¹⁹ However, none of the studies included the 13 Obesity Medicine Education Collaborative knowledge-based competencies in their learning objectives, nor did they assess

knowledge around all 13 knowledge-based Obesity Medicine Education Collaborative competencies. It seems unlikely that these competencies could be adequately incorporated in a short time period. In order to effectively train future healthcare professionals in the area of obesity and meet published interprofessional competencies, more intensive interventions may be needed.

Weight bias, as opposed to knowledge, may be easier to address in a short period of time, and interestingly, one of the ways to combat bias may be education about the pathophysiology of obesity. A systematic review by Alberga et al.¹⁸ demonstrated that many interventions for weight bias incorporate attribution theory, the theory that stronger bias is held toward conditions that are thought to be controllable. According to attribution theory, teaching about the non-modifiable factors that contribute to the pathophysiology of obesity would lead to a decrease in weight bias.¹⁸ Several previous studies that incorporated attribution theory and some measure of explicit bias, have demonstrated a decrease in at least some component of explicit bias following the intervention.^{22,30–33} Similarly, Katz et al. found that teaching about the genetic and hormonal precursors to obesity was related to a decrease in bias.¹⁹ This was also the case in one of the only long-term studies of interventions for weight stigma from healthcare professionals—Gayer et al. demonstrated that education around obesity pathophysiology was related to a decrease in weight stigma which was sustained over four years of medical school.³⁴ One reason we may have seen a decrease in weight bias in the present study is because several weeks were spent on discussion of the etiology and pathophysiology of obesity. Interventions based on attribution theory have the potential to increase knowledge and decrease weight bias simultaneously.

To our knowledge, a study by Werkhoven et al. is the only other published study examining a semester-long (versus short-term) obesity education intervention for healthcare trainees.²⁴ In this study, the authors examined

change in knowledge using the General Nutrition Knowledge Questionnaire, which has the advantage of measuring change in knowledge objectively (versus measuring self-report of perceived knowledge change), however the General Nutrition Knowledge Questionnaire assesses broad nutrition knowledge, rather than obesity-specific knowledge.³⁵ Nonetheless, this intervention was related to a significant increase in knowledge, with the largest increase in the subscale measuring knowledge of the link between diet and disease. Weight bias, as measured by the Crandall's Antifat Attitudes questionnaire³⁰, also decreased significantly.

Limitations and next steps

This study was not without limitations. The small sample limits the generalizability of our conclusions. Additionally, long-term outcomes and objective measures of knowledge (rather than measures of self-perceived knowledge) are necessary. Ideally, these objective measures of knowledge would be standardized and would be based on published competencies so that results can be compared across studies. Further, although self-assessment has been suggested as a potential application of the OMEC competencies, to our knowledge formal pilot testing of this application has not been published. Further studies of self-perceived knowledge may benefit from formal pilot testing prior to future data collection.

Though we attempted to target those training to be registered dietitians, ultimately this study included students who were pursuing other careers. Students in different fields may require tailored interventions (for example, graduate students in nutrition have a strong foundation in introductory nutrition contents, while those pursuing medicine may not), however, since RDN trainees made up the majority of our sample, we feel confident that the changes in self-perceived knowledge and weight bias were present for the RD trainees and not only those seeking different careers.

For many programs, developing an entire course is unrealistic and incorporating something like a case or simulation into the existing curriculum is more feasible. Though different than dietetic education, a systematic review of interventions in medical education indicate that even brief interventions may be effective.¹⁹ This review found that interventions as short as 90 minutes could be effective in changing attitudes around obesity. If time is limited, educators may consider focusing on the pathophysiology of obesity, including genetic and hormonal factors, as teaching pathophysiology has been linked to reduced negative attitudes towards obesity.^{18,19} It is important to note, however, that systematic reviews have not demonstrated that any particular intervention strategy is superior.

Alternatively, developing a full elective course that may bring tuition money into a department may be a more sustainable and realistic option than attempting to fit a large amount of obesity-related content into an existing course, or providing a one-off intervention outside of the standard curriculum. In order to reduce weight stigma within the dietetics profession, and to adequately train RDNs who are on the front line of obesity treatment, we encourage dietetic programs to consider including an obesity-related course based on published obesity-related competencies.

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