

## Web-Based Intervention for Changing Attitudes of Obesity among Current and Future Teachers

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### ABSTRACT

**Objective:** To evaluate attitude change among student teachers and schoolteachers when exposed to a Web-based educational module promoting size acceptance.

**Design:** Subjects were randomly assigned to a control group or 1 of 4 treatment groups to evaluate the effect of module, presenter credibility, and/or image on attitudes of obesity and processes of change using the Elaboration Likelihood Model (ELM) testing cognitive and psychological cues. On-line assessment occurred at the pretest, posttest, and 6-week follow-up.

**Setting:** Web-based.

**Participants:** 258 adults, mean age 26.8 ± 10.2 years.

**Intervention:** Module content included factors related to obesity, implications of weight loss efforts, classroom activities, and bias-free intervention techniques.

**Main Outcome Measure(s):** Attitudes of obesity by the Anti-Fat Attitudes Test and the effect of the presenter using a bipolar rating scale.

**Analysis:** One-way repeated measures analysis of variance, analysis of covariance, and general post hoc analysis.

**Results:** Negative attitudes decreased in treatment groups between pretest to posttest ( $P < .001$ ) and pretest to follow-up ( $P \leq .006$ ). Unlike the credible “nonfat” presenter, exposure to the credible “fat” presenter positively influenced attitude change ( $P = .031$ ).

**Conclusions and Implications:** On-line communication of size acceptance improved attitudes of obesity long term. The findings support the ELM. The module demonstrates promise for teacher training in size sensitivity.

**KEY WORDS:** attitudes, obesity, size acceptance, Elaboration Likelihood Model, schoolteachers

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### INTRODUCTION

The school setting can be a highly stigmatized environment for overweight children.<sup>1,2</sup> Negative attitudes of obesity, reported among both schoolteachers<sup>3-5</sup> and children,<sup>6,7</sup> can promote size discrimination toward large children and body dissatisfaction in children who view their body size as unacceptable.<sup>8</sup>

Fear of social stigma and body dissatisfaction often result in inappropriate weight loss efforts.<sup>9-11</sup> Children as young as 7 years have dieted to avoid being stigmatized as lazy, dirty, stupid, or mean.<sup>8</sup> Weight loss efforts, such as chronic dieting, have been associated with numerous deleterious effects, including delayed puberty and “short stature” syndrome,<sup>10</sup> impaired concentration and social withdrawal,<sup>11</sup> low self-confidence,<sup>10,12</sup> preoccupation with food,<sup>9,10</sup> and increased risk of eating disorders.<sup>10,13</sup>

Educational programs, designed to address the complex etiology and treatment of obesity, as well as the dietary and psychosocial effects associated with the stigma of obesity, may help decrease negative attitudes.<sup>7,14,15</sup> Through education, blame that is frequently directed toward an obese condition and the resulting prejudice can be diminished.<sup>16</sup> Few researchers have used educational interventions to alter negative attitudes toward obesity.<sup>17</sup>

The theoretical framework used in this study was the Elaboration Likelihood Model (ELM).<sup>18</sup> Attitudes and their change processes are highly predicted by the ELM,<sup>18,19</sup> and it is recognized as a dominant theoretical approach to message-based persuasion.<sup>20</sup> Based on the ELM, 2 dominant theoretical orientations—central route processing and peripheral route processing—are used to help explain the underlying psychological antecedents and consequences of attitude change. When central route processing is used to evaluate a persuasive message, attitude change is mediated by argument-

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based thinking. Attitude change will occur via central route processing when an individual is motivated by the relevance of the message and/or likes to think about, and has the ability to think about, and scrutinize the persuasive message. Considerable cognitive effort, or elaboration, is required for the individual to critically examine pertinent information in the message to evaluate the merit of the position advocated.<sup>19,21</sup> Unlike central route processing, attitude change via peripheral route processing is not mediated by scrutiny of the message. Instead, attitude change is mediated by peripheral cues, such as a cursory review of the message length, the number of arguments, or the attractiveness of the message presenter.<sup>19</sup> Although scrutiny of the message is most important, variables that can add merit to a persuasive message, such as the credibility and/or attractiveness of the message presenter, have a greater impact on attitudes via central versus peripheral route processing.<sup>21</sup> Attitude change occurs peripherally when an individual does not perceive the message as relevant, does not enjoy thinking, or is not able to scrutinize the message owing to distractions.<sup>18</sup> Attitude change via peripheral route processing is weaker and less durable than attitude change via central route processing primarily because little cognitive effort is associated with the persuasive effect.<sup>21</sup>

The intervention, delivered via the World Wide Web, was an educational module based on the nondiet, health-centered rather than weight-centered approach to obesity. Using the nondiet approach, a large body size is destigmatized by promoting normalized eating, healthy lifestyles, and social acceptance of size diversity or "size acceptance."<sup>14,22-25</sup> For the purposes of this study, the term "fat" was used as a descriptive trait, much like the word short, tall, or thin. Although society generally views the term "fat" as derogatory, the size acceptance paradigm frequently uses the term simply as a non-derogatory adjective. Furthermore, unlike a predetermined definition of obesity, such as the biomedical definition of obesity, use of the term "fat" does not influence subjects' perception of excess body weight, thereby decreasing the potential for confounding results in the measure of attitudes.

The purpose of this study was to examine attitudes and processes of attitude change toward obesity among future and current teachers. It was hypothesized that the scrutiny of the message (intervention) would result in favorable attitudes using central route processing; the credibility and attractiveness of the presenter would add merit to the persuasive message, enhancing central route processing; the credibility of the message presenter and a "nonfat" appearance would be more persuasive than a credible "fat" presenter; and subjects would demonstrate negative attitudes toward obesity at the pretest.

## METHODS

### Overview of Research Design

The research design was a pretest/posttest/follow-up assessment with an educational intervention. The pretest, inter-

vention, and posttest occurred over a 2-week period; follow-up assessment occurred at 6 weeks postintervention. The subjects were undergraduate and graduate students majoring in the field of education from 5 campuses within the University of Maine system. Because many of the graduate students were certified teachers, other certified teachers, not in graduate school, were recruited to enlarge the sample size. Using a standardized script, subject recruitment occurred through direct contact or by response to flyers distributed to university professors and schoolteachers. The flyers described an opportunity to learn about issues pertaining to obesity and diversity in the classroom. The response rate to flyers was approximately 30%. Participation in the study was on a volunteer basis. The study was administered using WebCT, an Internet program used to deliver distance education. Subjects were randomly assigned to the control group or 1 of 4 treatment groups. They were electronically mailed instructions and passwords throughout the study to allow access to the program in the required chronological order. Approval to conduct research with human subjects was obtained from the protection of human subjects review boards of each campus.

A pilot test with 20 undergraduate students was conducted to test the protocols, instrument and module clarity, and functioning of the WebCT technology. Slight formatting changes were made following the pilot test.

**Group assignments of subjects.** Subjects were randomly assigned by rolling enrollment to one of the following groups: (1) control: instruments only; (2) treatment group 1: educational module (test effect of message); (3) treatment group 2: module with exposure to the credentials of a presenter without an image (test effect of a credible presenter); (4) treatment group 3: module with exposure to an image of a "nonfat" presenter with credentials (test effect of a credible "nonfat" presenter); and (5) treatment group 4: module with exposure to an image of a "fat" presenter with credentials (test effect of a credible "fat" presenter).

**Appearance and expertise of module presenters.** The original full-body image of the presenter was obtained from a Web-based clothing catalog for large women. The model selected was a full-figured, middle-age, white female wearing professional attire. The "fat" presenter was depicted by enlarging the original image by about 20%. The original image was digitally reduced by about 25% to depict the "nonfat" presenter. Adobe Photoshop 6.0 (Adobe Systems Inc., San Jose, Calif.) computer software was used to alter the body image size. Pilot-testing of the images was conducted to ensure that the altered images were perceived as either "fat" or "nonfat." To establish expertise, the presenters were given the same credentials—PhD, RD—and a description of extensive professional experience in the field of nutrition. Presenter expertise was described at the beginning of the module, and the presenter image for treatment groups 3 and 4 appeared at the introduction and conclusion of the module.

## Measurement Instruments

The Antifat Attitudes Test (AFAT) ( $\alpha = .941$ ) is a 47-item questionnaire (score range 47–235) measuring cognitive, affective, and behavioral disposition toward fat people.<sup>26</sup> Subjects responded on a 5-point Likert scale to such statements as “There’s no excuse for being fat” from 1 = strongly disagree to 5 = strongly agree. Subjects completed the instrument at pretest, posttest, and follow-up.

The Short Obesity Knowledge Scale (SOKS) ( $\alpha = .56$ ) is a norm-referenced, 12-item test measuring the ability of the subjects to process the message. The 5-point Likert scale, ranging from 1 = strongly agree to 5 = strongly disagree,<sup>27</sup> was scored so that 2 = strongly agree/disagree, 1 = slightly agree/disagree for true statements, and 0 = uncertain (score range 0–24). Subjects responded to statements such as, “Most obese people suffer from a hormone problem that causes them to be obese.” It was used to test the ability to process the message via the ELM. Subjects completed the instrument at pretest, posttest, and follow-up.

The Counselor Rating Form (CRF) ( $\alpha = .94$ ) is a 36-paired-item questionnaire (score range 36–252) measuring the 3 subscales of perceived expertness, trustworthiness, and attractiveness of the presenter.<sup>28</sup> Split-half reliabilities for subscales are .87, .90, and .84, respectively.<sup>29</sup> Subjects used a 7-point bipolar scale to rate presenter characteristics such as attractiveness from 1 = unattractive to 7 = attractive.<sup>30</sup> Subjects completed the instrument at posttest.

The Need for Cognition Short Scale (NC) ( $\alpha = .87$ ) is an 18-item, 5-point Likert scale, ranging from 1 = extremely uncharacteristic to 5 = extremely characteristic of the subject (score range 18–90).<sup>31,32</sup> To test the ELM, subjects indicated their motivation to scrutinize the persuasive message<sup>33</sup> by responding to such statements as “Thinking is not my idea of fun.” The instrument was completed at posttest.

Self-reported heights, weights, and demographic information, including inquiry regarding completion of a college-level nutrition course and mode of reviewing the module (monitor, downloaded print, or a combination of both), were collected at posttest.

**Intervention.** The intervention was a self-paced educational module to facilitate meaningful learning. Various resources were used to develop the nondiet, health-centered educational module, including peer-reviewed journals, textbooks, videotapes, and materials from professional groups and Web sites. Topics addressed included (a) controversy regarding the etiology of obesity; (b) treatment and health risks associated with obesity; (c) the physical, psychological, and social effects of the obesity stigma; (d) sociocultural pressures to obtain thinness among children and adolescents and the risks associated with weight loss efforts; (e) strategies to help children deal with the social stigma of obesity; and (f) intervention techniques to promote bias-free behavior in the school setting. Experts in the areas of nutrition, obesity, metabolism, nutrition education, and size acceptance

reviewed the educational module for content and construct validity. The module represented 13 Web pages or segments and was designed so that subjects viewed each page in chronological order. Completion of the module was monitored via WebCT. It was designed to be completed within 5 hours. Continuing education credits for teachers and course credit for students, per the discretion of professors, were given as incentives.

**Statistical Analyses.** One-way repeated measures analysis of variance (ANOVA) was used to compare mean scores among groups at pretest, posttest, and follow-up. Analysis of covariance (ANCOVA) was used to investigate the relationship between attitude change and rating of the counselor (presenter), knowledge of obesity, the need for cognition, and the body mass index (BMI) of subjects. Model parameters, along with Pearson correlations, were inspected to determine the direction and significance of associations. General post hoc analyses were performed to investigate significant findings from the ANOVA and ANCOVA. Two-way analysis of variance was used to examine the relationship between attitudes and selected demographic data. The Tukey test was used for post hoc analysis of significant factors from the 2-way ANOVA. Data were analyzed using Systat (version 10.2) (Systat Software, Inc., Point Richmond, Calif.) with a significance level of  $P < .05$ .

## RESULTS

The sample ( $n = 258$ ) was 85% female ( $n = 219$ ) and 15% male ( $n = 39$ ), with a mean age  $\pm$  SD of  $26.8 \pm 10.2$  years. Subjects were education majors from the United States (96%), Canada (2%), and other nations (2%). Most subjects with student status (61%) were at the junior level or above. Approximately 11% of the subjects were graduate students, and 10% were certified teachers. The majority of student subjects (71.5%,  $n = 184$ ) had education concentrations in health/fitness or elementary education. The mean BMI (BMI  $\pm$  SD) was  $23.3 \pm 5.5$  for males and  $24.0 \pm 4.5$  for females. Approximately 42% ( $n = 105$ ) of subjects had a high BMI ( $\geq 25$ ) and 8% ( $n = 21$ ) had a low BMI ( $< 20$ ). Subjects’ BMIs did not influence attitudes of obesity. The majority of subjects completed the review of the module all at one point in time.

The AFAT total mean pretest score  $\pm$  SD was  $91 \pm 22$ , ranging from 51 to 167, indicating that subjects mostly disagreed with negative attitudes about fat. The SOKS total mean pretest score  $\pm$  SD was  $10 \pm 3$ , ranging from 2 to 22, indicating that subjects were uncertain about their responses. The CRF total mean score  $\pm$  SD was  $209 \pm 27$ , ranging from 132 to 251, indicating that subjects rated the presenters high on characteristics of expertise, trustworthiness, and attractiveness. The NC total mean score  $\pm$  SD was  $63 \pm 11$ , ranging from 32 to 90, indicating that subjects were uncertain about their need for cognition. Analyses are presented

with the mean Likert scale rating rather than the total mean score for each instrument. Based on ANOVA, no significant group effect at pretest was found for the AFAT and the SOKS, indicating that there were no differences among groups at pretest.

### Antifat Attitudes

Based on ANOVA for AFAT means (all groups combined), a within-group effect ( $P = .002$ ) was noted. Post hoc analysis indicated a significant difference between pretest to posttest and pretest to follow-up for treatment groups 1 through 4 (Table 1). Negative attitudes of obesity decreased as a result of exposure to the educational module, and the more favorable change in attitude was sustained 6 weeks postintervention. Differences in AFAT means over time by treatment group were not confounded by the covariates gender, college status, having had a nutrition course, or mode of reviewing the module. Although gender and school status did not explain differences in AFAT means among treatment groups, AFAT means were associated with these factors. For instance, more negative attitudes were observed among males than females and first year students than upper class/graduate students or teachers.

### Association of AFAT with CRF

Based on ANCOVA for counselor rating mean scores with AFAT means for treatment groups 2, 3, and 4, a time by treatment interaction ( $P = .031$ ) was seen. No covariate effects were observed at pretest, but adjustments differed between groups at posttest and follow-up. As shown in Figure 1, the slopes at posttest differed between treatment group 3 (-.126), with exposure to a credible "nonfat" presenter, and treatment group 4 (-.485), with exposure to a credible "fat" presenter ( $P = .009$ ). As shown in Figure 2, the slopes at follow-up differed between treatment group 3 (-.075) and treatment group 4 (-.400) ( $P = .025$ ). Perception of the credible "fat" source had a more favorable effect on attitudes of obesity at posttest compared with perception of the credible "nonfat" source. This difference was maintained at follow-up.

### Subscale Analysis

Subscales for the CRF instrument include expertness (subscale 1), trustworthiness (subscale 2), and attractiveness (subscale 3). Based on analysis of the covariate CRF subscale 1 with AFAT means for treatment groups 2, 3, and 4, a time by treatment interaction ( $P = .015$ ) was seen. No covariate effects were observed at pretest, but adjustments differed between groups at posttest and follow-up. As shown in Figure 3, the slopes at posttest differed between treatment group 2 (-.329), with exposure to a credible presenter without an image, and treatment group 3 (-.043), with exposure to a credible "nonfat" presenter ( $P = .017$ ); the slopes at posttest also differed between treatment group 3 and treatment group 4 (-.399), with exposure to a credible "fat" presenter ( $P = .003$ ).

As shown in Figure 4, the slopes at follow-up differed between treatment group 2 (-.279) and treatment group 3 (-.026) ( $P = .045$ ) and treatment group 3 and treatment group 4 (-.295) ( $P = .034$ ). Expertise rating of the credible presenter without seeing an image of the presenter and the credible "fat" presenter had a more favorable effect on attitudes of obesity at posttest compared with the expertise rating of the credible "nonfat" presenter. This difference was maintained at follow-up.

Based on analysis of the covariate CRF subscale 2 with AFAT means for treatment groups 2, 3, and 4, a time by treatment interaction ( $P = .004$ ) was seen. No covariate effects were observed at pretest, but adjustments differed between groups at posttest and follow-up. As shown in Figure 5, the slopes at posttest differed between treatment group 2 (-.256), with exposure to a credible presenter without an image, and treatment group 4 (-.503), with exposure to a credible "fat" presenter ( $P = .030$ ) and treatment group 3 (-.120), with exposure to a credible "nonfat" presenter, and treatment group 4 ( $P = .005$ ).

As shown in Figure 6, the slopes at follow-up differed between treatment group 3 (-.103) and treatment group 4 (-.436) ( $P = .019$ ). Trustworthiness rating of the credible "fat" presenter had a more favorable effect on attitudes of obesity at posttest compared with both the trustworthiness rating of the credible presenter without an image and the

Table 1. Antifat Attitudes Test: Time by Group Mean Scores\* ( $\pm$  SE)

Group	n	Pretest Mean	Posttest Mean	Follow-up Mean
Control	51	1.939 ( $\pm$ 0.069)	1.954 ( $\pm$ 0.074)	1.923 ( $\pm$ 0.075)
Module only (treatment 1) <sup>†</sup>	50	1.949 ( $\pm$ 0.070) <sup>a</sup>	1.724 ( $\pm$ 0.072) <sup>b</sup>	1.721 ( $\pm$ 0.070) <sup>b</sup>
Module, credible presenter without image (treatment 2) <sup>†</sup>	50	1.928 ( $\pm$ 0.062) <sup>a</sup>	1.729 ( $\pm$ 0.075) <sup>b</sup>	1.747 ( $\pm$ 0.077) <sup>b</sup>
Module, credible presenter, nonfat image (treatment 3) <sup>‡</sup>	53	1.995 ( $\pm$ 0.067) <sup>a</sup>	1.815 ( $\pm$ 0.074) <sup>b</sup>	1.871 ( $\pm$ 0.078) <sup>b</sup>
Module, credible presenter, fat image (treatment 4) <sup>§</sup>	54	1.912 ( $\pm$ 0.062) <sup>a</sup>	1.753 ( $\pm$ 0.079) <sup>b</sup>	1.785 ( $\pm$ 0.075) <sup>b</sup>

\*Scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity.

<sup>†</sup> $P < .001$  negative attitudes decreased from pretest to posttest, pretest to follow-up for treatment groups 1 and 2.

<sup>‡</sup> $P < .001$  negative attitudes decreased from pretest to posttest,  $P = .006$  pretest to follow-up for treatment group 3.

<sup>§</sup> $P < .001$  negative attitudes decreased from pretest to posttest,  $P = .004$  pretest to follow-up for treatment group 4.

Means followed by a, b illustrate a within-group effect.

SE indicates standard error.

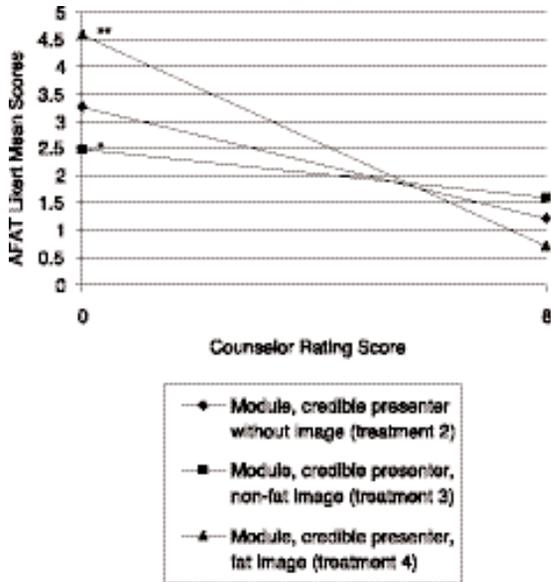


Figure 1. Effect of counselor rating on Antifat Attitudes Test (AFAT) *posttest* mean scores: treatment group slopes. Counselor Rating Form mean scores ranged from 1 = least favorable to 7 = most favorable (bipolar rating). AFAT scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity. \*\*Differences between group slopes (treatment groups 3 and 4),  $P = .009$ .

credible “nonfat” presenter. The more favorable effect of the trustworthiness rating of the credible “fat” presenter on attitudes compared with the credible “nonfat” presenter was maintained at follow-up.

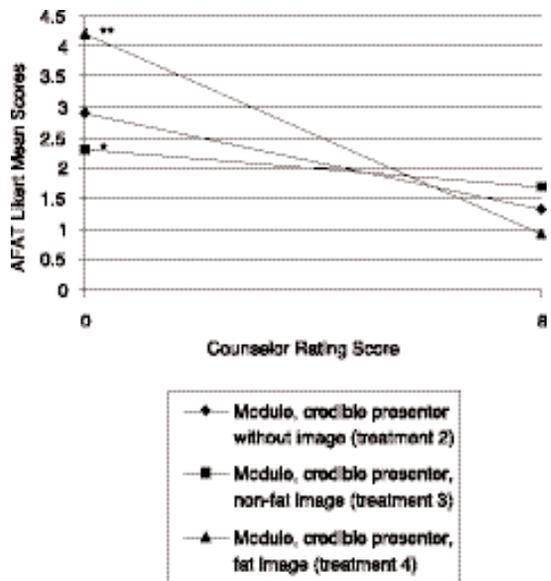


Figure 2. Effect of counselor rating on Antifat Attitudes Test (AFAT) *follow-up* mean scores: treatment group slopes. Counselor Rating Form mean scores ranged from 1 = least favorable to 7 = most favorable (bipolar rating). AFAT scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity. \*\*\*Differences between group slopes (treatment groups 3 and 4),  $P = .025$ .

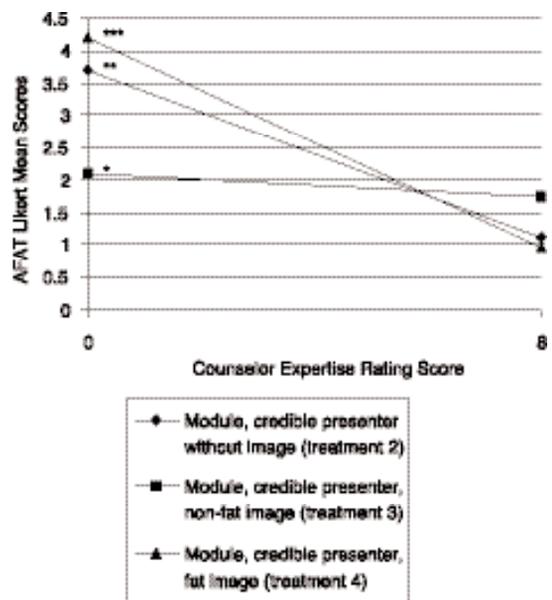


Figure 3. Effect of counselor expertise rating on Antifat Attitudes Test (AFAT) *posttest* mean scores: treatment group slopes. Counselor Rating Form mean scores ranged from 1 = least favorable to 7 = most favorable (bipolar rating). AFAT scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity. \*\*\*Differences between group slopes (treatment groups 2 and 3),  $P = .017$ . \*\*\*\*Differences between group slopes (treatment groups 3 and 4),  $P = .003$ .

Analysis of the covariate CRF subscale 3 with AFAT means for treatment groups 2, 3, and 4 indicated a within-subjects effect ( $P = .004$ ). Post hoc analysis indicated a signif-

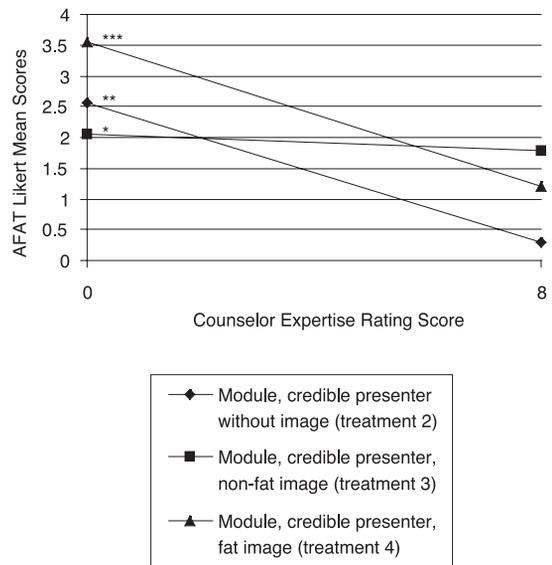


Figure 4. Effect of counselor expertise rating on Antifat Attitudes Test (AFAT) *follow-up* mean scores: treatment group slopes. Counselor Rating Form mean scores ranged from 1 = least favorable to 7 = most favorable (bipolar rating). AFAT scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity. \*\*\*Differences between group slopes (treatment groups 2 and 3),  $P = .045$ . \*\*\*\*Differences between group slopes (treatment groups 3 and 4),  $P = .034$ .

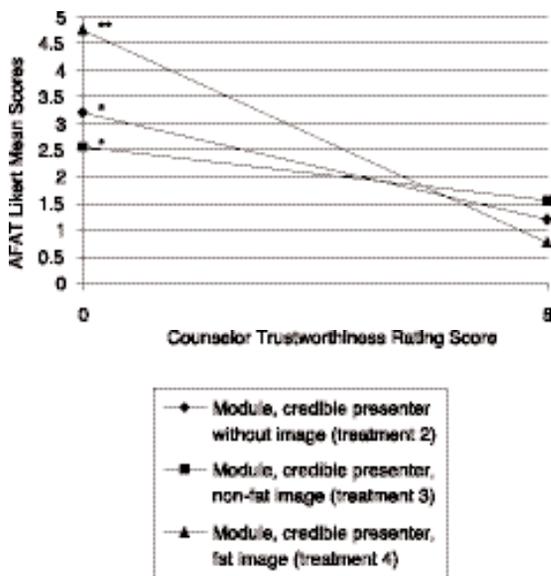


Figure 5. Effect of counselor trustworthiness rating on Antifat Attitudes Test (AFAT) *posttest* mean scores: treatment group slopes. Counselor Rating Form mean scores ranged from 1 = least favorable to 7 = most favorable (bipolar rating). AFAT scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity. \*\*\*Differences between group slopes (treatment groups 2 and 4,  $P = .030$  and treatment groups 3 and 4,  $P = .005$ ).

icant difference between adjusted AFAT pretest mean  $\pm$  standard error ( $1.949 \pm 0.063$ ) to adjusted AFAT posttest mean  $\pm$  standard error ( $1.773 \pm 0.070$ ) ( $P < .001$ ) and adjusted AFAT pretest mean to adjusted AFAT follow-up mean  $\pm$  standard error ( $1.804 \pm 0.073$ ) ( $P < .001$ ). As shown in Table 2, there was a negative correlation between the means of the attractiveness subscale and the AFAT at pretest, posttest, and follow-up. A high rating of presenter attractiveness was associated with a decrease in negative attitudes of obesity. However, a lack of group effect indicated that the subjects perceived the attractiveness of the presenters as comparable and the presenters were associated with favorable attitudes.

**Association of the AFAT with NC and with SOKS**

Based on analysis of the covariate NC mean, a measure of motivation, with the AFAT means for all groups and SOKS pretest mean, a measure of ability, with the AFAT means for all groups, no group effects were seen. The lack of group effect indicated that the subjects' motivation and ability, as measured by the selected scales, were not associated with differences in their attitudes toward obesity, as measured by the AFAT, relative to exposure to the treatment module. This finding provided evidence that central route processing was not used by treatment group subjects.

**DISCUSSION**

Negative attitudes of obesity were reduced as a result of the educational module and were sustained 6 weeks postinter-

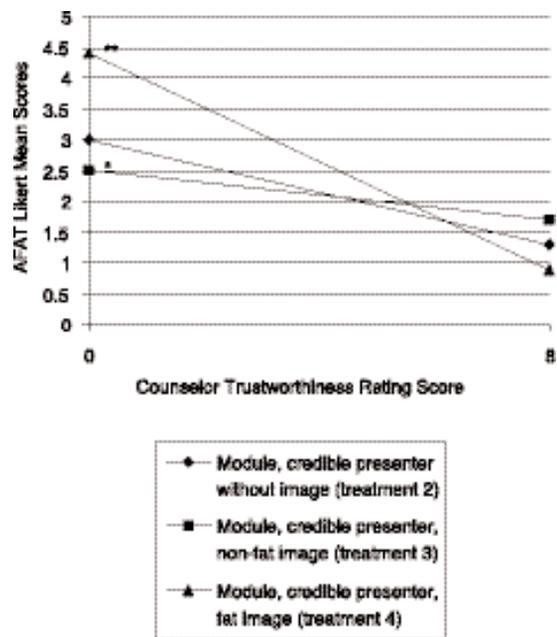


Figure 6. Effect of counselor trustworthiness rating on Antifat Attitudes Test (AFAT) *follow-up* mean scores: treatment group slopes. Counselor Rating Form mean scores ranged from 1 = least favorable to 7 = most favorable (bipolar rating). AFAT scores ranged from 1 = definitely disagree to 5 = definitely agree with negative attitudes of obesity. \*\*\*Differences between group slopes (treatment groups 3 and 4),  $P = .019$ .

vention for each treatment group. However, because motivation and ability variables failed to predict attitude change as a result of message scrutiny, it was concluded that attitude change did not occur via central route processing. Despite the favorable change in attitudes, the lack of evidence for central route processing failed to substantiate the stated hypothesis. It is unlikely that attitude change occurred via peripheral route processing because time by group (treatment group 1) interactions indicated that attitude change occurred as a result of processing the message rather than the response to just the peripheral cues of presenter expertise and/or attractiveness.

Table 2. Correlation of Rating of Counselor Attractiveness Mean (Counselor Rating Form Subscale 3) and Antifat Attitudes Test Mean Scores for Treatment Groups 2, 3,† and 4‡

	AFAT Pretest Mean <sup>§</sup>	AFAT Posttest Mean <sup>  </sup>	AFAT Follow-up Mean <sup>¶</sup>
CRF subscale 3 mean	-.308	-.426	-.335

\*Module, credible presenter without image.  
 †Module, credible presenter, nonfat image.  
 ‡Module, credible presenter, fat image.  
 § $P = .001$  CRF subscale 3\*AFAT pretest.  
 || $P < .001$  CRF subscale 3\*AFAT posttest.  
 ¶ $P < .001$  CRF subscale 3\*AFAT follow-up.  
 AFAT indicates Antifat Attitudes Test; CRF, Counselor Rating Form.

Although the present findings do not appear to support either central (high elaboration) or peripheral (low elaboration) route processing, the findings do support moderate elaboration, that is, the co-occurrence of peripheral and central route processing. Although moderate elaboration has been studied less than either high or low elaboration,<sup>34</sup> theorists have proposed that under moderate conditions, people use source factors, such as expertise, appearance, and perception of trustworthiness, to determine whether the message is worth evaluating.<sup>18,20,35,36</sup> Thus, a person may reason that it is more worthwhile to evaluate a strong message presented by an expert than by a nonexpert.<sup>18,19,37</sup>

Based on current findings, the perceived expertise and trustworthiness of the presenter influenced attitudes in that (1) the expertise of the credible presenter without an image and the credible “fat” presenter influenced attitudes more favorably than the expertise of the credible “nonfat” presenter and (2) the trustworthiness of the credible “fat” presenter more favorably influenced attitudes than the trustworthiness of either the credible presenter without an image or the credible “nonfat” presenter. Thus, it appears that nutrition expertise and trust from a “fat” presenter more favorably influenced attitudes of obesity than the presenter who was of average weight. Based on moderate elaboration, it is likely that presenter credibility and a “fat” appearance influenced attitude change by increasing attention to the size acceptance message.

Subjects were not only favorably influenced by the credible “fat” presenter, but presenter attractiveness was perceived to be the same for the “fat” and the “nonfat” presenter. These findings are not only consistent with the size acceptance message but are congruent with the more favorable attitudes observed post- rather than preintervention. Although it was hypothesized that the credible presenter without an image and the credible “nonfat” presenter would be more persuasive than the credible “fat” presenter, owing to the high prevalence of stigmatizing acts toward obese individuals,<sup>38</sup> the current findings do not substantiate the stated hypothesis. Contrary to the hypothesis, the presence of the “fat” presenter may have lent credibility to the size acceptance message and may have persuaded subjects to believe that they could trust the presenter to know what she was talking about because she was “fat.” Keating reported similar findings in which the effects of speaker characteristics—body weight and expertise—on the processing of an anti-dieting message were evaluated.<sup>39</sup> Although the overweight speakers (expert and nonexpert) were not perceived as more persuasive than the underweight speakers (expert and nonexpert), the overweight speakers were rated as more trustworthy and favorable than the underweight speakers. The researcher concluded that speaker credibility is enhanced when “a speaker’s weight-related message is congruent with a speaker’s appearance.”<sup>39</sup>

Although researchers have reported that schoolteachers demonstrate less favorable views toward obese children compared with nonobese children,<sup>3-5,40,41</sup> the current findings were that subjects had relatively favorable attitudes toward obesity at the pretest. Based on these findings, the hypothe-

sis stating that subjects would demonstrate negative attitudes toward obesity at pretest was not substantiated. The findings that more negative attitudes were observed among males than females and among first year students than upper class/graduate students or teachers are consistent with those of other researchers.<sup>42-44</sup> Thus, it appears that the unequal distribution of males (15%) to females (85%) and subjects with varying amounts of professional education may explain the unexpected favorable attitudes of obesity. The relatively favorable pretest attitudes may also have been partially explained by the self-selection of subjects and their personal interest in the topic of obesity. The authors of the ELM stipulate that when a person has predominantly favorable thoughts about an advocated position, a strong message will be relatively successful in eliciting desirable attitude change.<sup>18,45</sup> Based on the ELM, it appears that the favorable change in attitudes was attributed to the favorable thoughts expressed by subjects at the pretest and the strong size acceptance message.

The generalizability of these findings is unknown. External validity may have been threatened owing to the self-selection of subjects. It is likely that many subjects participated in the study because of personal interest in the topic and/or the incentives. The lack of ethnic diversity among the state from which the sample was drawn further limits the generalizability of the results.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

Based on current findings, the module was effective in improving relatively favorable attitudes of obesity. It is uncertain whether the module would be perceived as a strong persuasive argument when subjects have relatively unfavorable attitudes of obesity or if the module would be persuasive among subjects in fields of study other than education. Because negative attitudes of obesity have been reported among various professionals,<sup>7,17,46,47</sup> further research is needed to determine if the Web-based module, when appropriately modified, is effective in changing negative attitudes of obesity among other groups.

Although researchers have proposed that subject perception of source expertise may mask the negative stereotypes associated with obesity,<sup>48</sup> it is not known whether the message would be more persuasive when the body size of the presenter is congruent with the message despite evidence of low expertise. Further research is needed to differentiate the effect of source credibility and body size on attitudes of obesity when delivering a nondiet message.

Based on current findings, it appears that the ELM provided an effective framework for nutrition education research. Application of the theory in other areas of nutrition should be considered, as well as its use in nutrition education programming. Although the findings from the current study contribute support and understanding of moderate elaboration, more research is needed to fully

understand attitude characteristics associated with varying degrees of elaboration.

The Internet is a valid medium to conduct research.<sup>49</sup> For the purposes of this study, its numerous strengths were subject and experimenter anonymity; the opportunity to recruit an adequate sample size; the ability to monitor subject status from any computer with Internet connection; downloading of all data files, eliminating possible transfer error; and an opportunity to demonstrate the integration of education and technology for the learning purposes of student teachers and school-teachers. Although it is reported that many teacher-training programs greatly value such integration,<sup>50</sup> many teachers are only taught how to use the technology and are not adequately trained in how to use the technology to teach students.<sup>51</sup> The effectiveness of networked research demonstrated in this study should encourage other researchers to use the technology. Further research is needed to examine the effect of different Internet features, such as animation and graphics, on attitude change and various styles of presenting the information to optimize cognitive processing of the message.

The significant increase in the prevalence of childhood obesity in the United States, particularly within the past decade,<sup>52,53</sup> emphasizes the need for sensitivity training among professionals who work with children. Based on current findings, pre- and inservice teacher training on size acceptance should take into consideration the presenter's credentials and body weight. The use of technology to simulate a highly credible fat presenter may not only lend credibility to the size acceptance message but may also help breach a topic that is generally quite sensitive in nature. Based on current findings, it is evident that the pre- and inservice teacher training favorably influenced attitudes of obesity. Improving attitudes of obesity among teachers, with educational interventions, may help to facilitate school environments in which children of all sizes are respected, self-esteem and self-worth are unrelated to body size and shape, and opportunities for healthful eating and physical activity are enjoyed by all.

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