

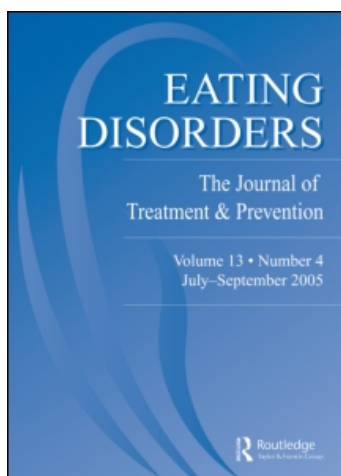
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A Controlled Evaluation of Web-Based Training for Teachers and Public Health Practitioners on the Prevention of Eating Disorders

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A Controlled Evaluation of Web-Based Training for Teachers and Public Health Practitioners on the Prevention of Eating Disorders

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The effectiveness of a web-based prevention program designed for elementary school teachers was examined in 78 elementary school teachers and 89 local public health practitioners (who provide support to schools). Participants were assigned to either the intervention (n = 95) or comparison (n = 72) study groups. All participants completed self-report online measures prior to, and following, the 60-day study period assessing knowledge about various factors that influence body image in children and efficacy to fight weight bias in the school. Information was also solicited on the feasibility of, and on the perceived benefit of the web-based program as a

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knowledge translation tool, in terms of layout and content. The Student Body program was found to be successful in improving knowledge concerning facts about dieting among the teacher participants, and in increasing efficacy to fight weight bias among the public health participants. Overall, the feedback was very positive concerning the layout and content of the Student Body. Participants reported an overall improvement in their awareness about how weight bias can be present in their teaching practices, and how this can trigger body image concerns among their students. Findings have implications for using the web to engage teachers in the prevention of disordered eating among school age children.

INTRODUCTION

Body image concerns and resulting weight-change methods are major issues facing some schools (Region of Peel, 2005). Healthy weight children as young as 10 years of age are dieting to lose weight (McVey, Tweed, & Blackmore, 2005; Region of Peel, 2005) placing them at risk for disordered eating (McVey, Tweed, & Blackmore, 2004) or unwanted weight gain (Hsu, 1997). Eating disorders and obesity share a negative cycle of body dissatisfaction, restrictive dieting, adoption of rigid and unhealthy weight loss methods, weight fluctuations and gains, and low self-esteem (Irving & Neumark-Sztainer, 2002; Neumark-Sztainer, 2003; Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002). On the one hand, drive for thinness, low self-esteem and body dissatisfaction are risk factors for eating disorders (Killen et al., 1994; Levine & Smolak, 2006; Stice, 2002). On the other hand, being overweight/obese is a risk factor for being teased and stigmatized, which in turn leads to body image concerns, social anxieties, and low self-esteem (Eisenberg, Neumark-Sztainer, & Story, 2003; Myers & Rosen, 1999; Neumark-Sztainer et al., 2002). Attempts at trying to prevent one of these public health issues can inadvertently trigger unwanted outcomes with respect to the other. For example, the widespread promotion of “healthy” and “ideal” weights, evident within health curriculum and public health messages, can inadvertently increase anxieties about body weight by ignoring the biodiversity within a population, as well as the dilemmas associated with physical development (e.g., natural increase in body fat and weight associated with puberty; Field, Austin, & Taylor, 2003). Also, classroom instruction that concentrates on students’ weight can intensify consciousness of weight and shape in the context of cultural standards, thus spurring weight-based teasing among groups of children (e.g., public display of students’ weights during the delivery of a healthy weight curriculum, or solicitation of students’ weights to explain a normal distribution). This can lead some students to engage in unhealthy weight-control practices (McVey,

Tweed, & Blackmore, 2004, 2005). Teachers are concerned about children's health in general, children's eating and weight in particular, and their own weight, shape and health. Given the natural tendency to transmit concerns about weight or shape onto children (Gusella, 2003; McVey, Tweed, & Ferrari, 2005) teachers require help to balance their messages about healthy eating and active living to avoid triggering weight or shape preoccupation among their students. Yet, many report a dearth of support or resources to effectively do so (Gusella, 2003; McVey, Tweed, & Ferrari, 2005; Piran, 2004)

Surveys reveal that teachers desire practical tools, such as videos, pamphlets or guest speakers, to help them address issues related to the prevention of eating disorders with their students (Smolak, Levine, & Thompson, 2001). Ideally, this means strategies that can fit within the confines of their classroom schedules or ones that meet government mandated curriculum objectives (Gusella, 2003). However, experts in the prevention of eating disorders urge school boards to invest time in raising teachers' awareness about the factors that influence body image in children including ways to optimize their teaching practices and their status as role models and coaches to avoid the transmission of weight bias or fat discrimination (Piran, 2004). As Piran states "the prejudice of weightism is a pervasive social prejudice about people of heavier weight and about body fat . . . teachers' ability to establish non-weightist norms in the classroom depends a great deal on their own prejudicial attitude" (Piran, 2004, p. 4).

Teachers make up an important part of the school ethos, both in how they role model and teach health promoting behaviors. Surprisingly, most teachers' awareness of the impact they have as role models is limited to healthy eating and exercise, with little or no consideration of weightism or general attitudes about weight or shape (Raymen & Piran, 2002). There is even less consideration for these issues in terms of gender and ethnicity. Yet, like their students, teachers are subjected to an unfavorable socio-cultural environment with regards to food and weight (Paquette & Raine, 2004). Current acceptable norms for women's bodies value thinness (or a bulked-up physique in the case of males) and equate that thinness/muscularity with beauty, attractiveness, success, and happiness. If teachers themselves internalize current media stereotypes about weight and shape, and this leads them to feel poorly about their own body image, then they may intentionally (in honor of culturally approved but unhealthy values and practices) and/or inadvertently role model unhealthy weight control practices to their students (McVey, Tweed, & Ferrari, 2005). Moreover, school policies designed to reduce race-, gender- and weight-based teasing—including sexual harassment in the guise of fat prejudice (Piran, 2004) while necessary, may not be sufficient if it is not identified, perceived as a serious threat to student health and well being, or intervened upon where appropriate. Such policies need to be embodied in teacher training, clear rules and regulations, and due diligence in punishing transgressions and rewarding

cooperation. Similar recommendations have been identified within the literature on the prevention of bullying (Craig, Henderson, & Murphy, 2000). Empowering teachers to build a healthy school climate, through a careful reflection of the messages they send, can go a long way in helping to promote wellness and prevent unhealthy lifestyles among both the students and the staff (Neumark-Sztainer, 1996; O'Dea & Abraham, 2000).

This type of policy formation, awareness-raising, and training could enhance teachers' proficiency to recognize or act on instances of weight-based teasing or body-based harassment. Body-based harassment (derogatory or objectifying comments towards the body) is reported by girls as young as 8 or 9 years of age, and is shown to have a direct influence on their body perceptions or practices (Rice & Larkin, 2001). It is not uncommon for children to adopt food and weight monitoring activities to help them cope with feelings of body dissatisfaction that arise from comments made to them about their weight or physical appearance (Larkin & Rice, 2005). Weight-based teasing can also trigger other forms of emotional distress such as social anxiety and depressive symptoms (Eisenberg, Neumark-Sztainer, & Story, 2003). In addition to knowledge, teachers need to believe in their own abilities to reduce weight bias before they can effectively intervene or take action. Research on teacher efficacy with respect to student learning has revealed a positive association between belief in one's ability to have a positive effect on student learning and actual student achievement (Moore & Esselman, 1995). This research reveals that teacher efficacy is further enhanced if teachers perceive that they are part of a system that supports such efforts (e.g., support from senior school administrators). Teacher efficacy to fight weight bias in the schools (and factors that enhance its improvement) remains an unexplored topic.

In addition to teachers, there is an increasing demand on public health practitioners and school-based professionals (see <http://www.nasbhc.org/site/c.jsJPKWPFJrH/b.2554077/k.BEE7/Home.htm>) to provide support and resources to schools in the form of in-service training on the topics of healthy eating, active living, or healthy weights (Ontario Ministry of Health and Long-Term Care, 2004). Issues raised previously about adult role modeling of weight bias or of negative eating attitudes or behaviors (and its negative impact on students) applies to this group of professionals as well. In light of these findings, a curriculum and training tool for teachers (and other professionals who work with students) entitled *The Student Body: Promoting Health at Any Size*, was developed for the purpose of the present study. The tool was designed to inform adult role models about the multiple factors that influence children's body image, including natural increases in weight and body fat associated with puberty, media and peer pressures to diet, weight-based teasing and sexual harassment, school climate factors such as extracurricular activities that emphasize a thin body shape over health, weight-monitoring activities and an over-emphasis on

weight as a determinant of health, and the role modeling of negative eating attitudes or behaviors by adults (Eisenberg & Neumark-Sztainer, 2003). *The Student Body* was designed to help teachers and public health practitioners promote positive body image to help prevent the onset of disordered eating in children (universal prevention) before they reach the stage of early adolescence, a vulnerable period for the development of disordered eating (Levine & Smolak, 2006). The online format was selected to make it accessible to facilitators (both inside and outside of school hours), and the classroom activities, previously shown through research to improve body satisfaction and eating behavior (McVey, Davis, Tweed, & Shaw, 2004), were matched to government mandated objectives.

The overall aim of the present study was to gain an understanding of whether or not the web-based program was a) a tool that teachers and public health professionals felt comfortable or capable using, b) a successful translation of prevention knowledge over time (e.g., alerting teachers and public health practitioners to the factors that influence body image), and c) effective in improving efficacy to fight weight bias. It was hypothesized that the participants in the intervention group would show improvements at post-intervention (lasting two months) on the following variables: knowledge about the physical changes associated with puberty that trigger body image concerns, knowledge about facts concerning restrictive dieting, knowledge about adult and peer influences on children's body image, knowledge about the influence of the media on weight loss strategies, and efficacy to fight weight bias in the school. Participants in the comparison group (no intervention) were expected to show no change over time on these variables.

METHOD

Overview: The Student Body: Promoting Health at Any Size

The Student Body: Promoting Health at Any Size is an online program consisting of six learning module topics: Media and Peer Pressure, Healthy Eating, Active Living, Teasing, Adult Role Models, and School Climate. Each module consists of four steps (see Figure 1): (1) A case study intended to introduce the topic to *the facilitator*, using a Flash animation cartoon; (2) Background information designed to provide the facilitator with information on the topic and its significance to the prevention of disordered eating (see Table 1); (3) Instructions on how to conduct a related classroom activity with students (matched to Ministry of Education learning outcomes); and (4) Topic-related supplementary resources (e.g., articles, educational videos, and external sites to explore the topic in more depth). Whereas the training topics and resources were drawn from previous research (McVey, Lieberman, Voorberg, Wardrope, & Blackmore, 2003; McVey, Tweed, & Blackmore,

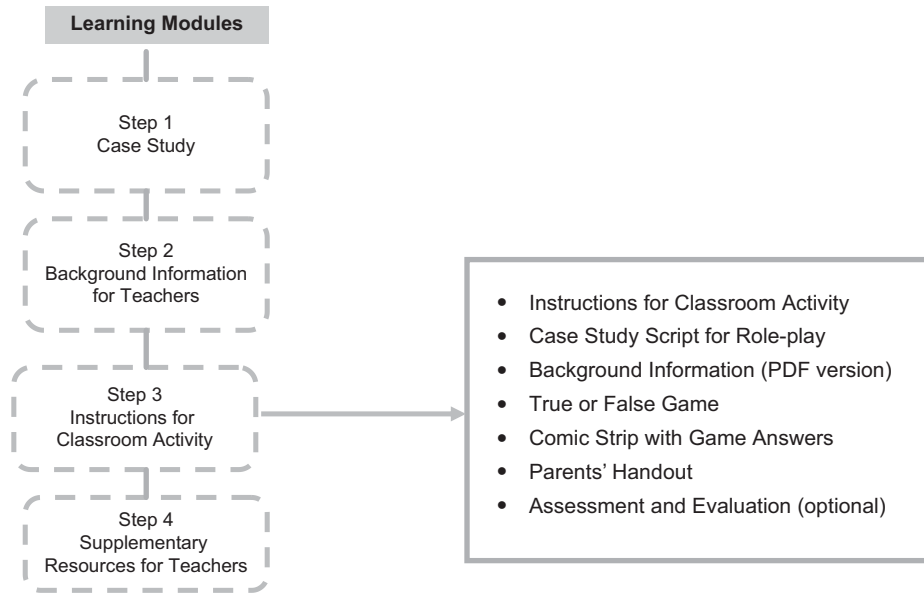


FIGURE 1 Steps Included within Each Module Topic of The Student Body: Promoting Health At Any Size

2004, 2007) the initial content was adapted to be user-friendly in an online medium (for more information on the six Learning Modules, go to www.aboutkidshealth.ca/thestudentbody). In order to have access to the online information, the following basic technology was required: an Internet connection, an Internet Browser (preferably Internet Explorer 5.5), computer speakers, and program-compatible software (i.e., Acrobat Reader; Macromedia Flash Player).

Participants

A total of 78 teachers (58 female; 20 male) and 89 (all female) public health practitioners (who are mandated to provide services to schools), drawn from two Canadian provinces, participated in the study. Students themselves were not participants. In an attempt to minimize cross-over effects of the intervention materials, participants were randomized to either the intervention or comparison group at the school and agency level, rather than at the individual level. Following this procedure, there were 95 participants in the intervention group ($n = 45$ teachers drawn from 23 schools and $n = 50$ public health practitioners drawn from 3 local public health agencies), and 72 in the comparison group ($n = 33$ teachers recruited from 16 schools and $n = 39$ public health practitioners from 6 public health agencies). Each school had between 1 and 4 teachers participate in the study, while each public health agency had between 4 and 34 public health practitioners

TABLE 1 Examples of Content Included in the Student Body: Promoting Health at Any Size

Media and Peer Pressure	Healthy Eating	Active Living	Teasing	Adult Role Models	School Climate
The influence of the media on body image (e.g., unhealthy messages in fashion magazines).	Normalized eating (e.g., eating regularly recommended servings from all food groups and not avoiding "other" foods; understand importance of family meals, and taking the time to relax, and enjoy the food and interaction).	Highlight benefits of active living (e.g., being active tends to make people pay more attention to their eating).	Bullying can take place in the form of weight or shape-related teasing.	Some adults (parents or teachers) might be overly concerned about their own physical appearance, which can inadvertently rub off on children.	The school environment can have a powerful influence on students' eating attitudes or behaviors.
Body dissatisfaction in children: data and relevance of the problem.		Encourage the participation of all students in activities regardless of their body size/weight or athletic abilities.	Weight-based teasing is correlated strongly with low self-esteem, body image concerns, restrictive dieting, and depressive symptoms.		Teachers and school staff can provide children with a school environment that promotes size acceptance, and follows through on school policies that help reduce size discrimination; by emphasizing an inclusive body-positive focus in physical education activities; providing opportunities for gym space during non-gym hours and emphasizing personal skill development in a variety of activities, as well as opportunities for extra curricular participation for both male and female students of all abilities.
Physical changes during puberty such as natural increase in body fat and weight.				Adults can benefit by reflecting on the following messages: Am I dissatisfied with my shape, size, and weight? Do I talk about this? Do I make negative comments about the way other people look?	

(Continued)

TABLE 1 (Continued)

Media and Peer Pressure	Healthy Eating	Active Living	Teasing	Adult Role Models	School Climate
The benefits of media literacy to help build resilience against negative messages about weight and shape.	High prevalence of body dissatisfaction leads many children to turn to unhealthy dieting or body change strategies. Some children interpret healthy eating messages in extreme ways.	Expecting all children to be within an ideal weight range is unrealistic and can lead to problems. It is more realistic to expect children to maintain their own natural weight for optimal growth.	Early adolescence is a vulnerable stage in a child's development for the onset of body image concerns. The use of measurement-tools (particularly those that measure weight or shape or body fat) can be problematic for this age group of children, leading some to feel more self-conscious about their shape or adopt extreme methods to cope with the feedback they receive. This can also trigger weight-based comparisons or teasing among students.		
Ways to enhance communication skills including assertiveness to help cope with media or peer pressures to diet.	Adults, including teachers, can be positive role models for students both in their eating attitudes and behaviors and by avoiding talking about dieting or making jokes about how fattening some foods are; examining personal teaching practices to ensure that body image discrimination does not occur in personal teaching methods.	Students might feel self-conscious about their appearance; which might present a barrier to their active participation in sport or active living.			

(Continued)

TABLE 1 (Continued)

Media and Peer Pressure	Healthy Eating	Active Living	Teasing	Adult Role Models	School Climate
		Promote and encourage a "health at any size" approach, which is a health-centered, rather than a weight-centered approach.			Sharing of success stories where schools adopted a comprehensive school health approach to health promotion.

participate. There was an equal distribution of teachers who taught physical education/health ($n = 40$) or primary curriculum (e.g., Mathematics, English, History) ($n = 38$). The average number of years spent teaching was 13.99 ($SD = 10.14$). Of the public health participants, more were public health nurses ($n = 62$) than nutritionists ($n = 27$), and the average number of years spent working in a public health agency was 12.72 ($SD = 10.46$). A majority of the participants identified themselves as Caucasian (84.4%), with the remaining identifying as East Asian (1.8%), South Asian (1.2%), Native Canadian (0.6%), or Other (5.4%).

Study Recruitment and Design

Approval for the study was obtained through the research ethics boards (REB) at the sponsoring agencies, as well as with the local school boards and public health agencies where data collection took place. A comprehensive database for the on-line training and evaluation program was developed in consultation with web site specialists. The About Kids Health at the Hospital for Sick Children (www.aboutkidshealth.ca) served as the domain to house the proposed web-based training modules, evaluation tools, and resources. An advisory committee was created at the outset of the study, consisting of stakeholders from a national eating disorder association, health and physical health associations, public health agencies, and school boards. Its purpose was to exchange knowledge about the content and feasibility of the program and the plans for the dissemination of study findings. Through these established community contacts, participating public health agencies with an interest in the prevention of disordered eating were identified and assigned to either the intervention or comparison group with the flip of a coin. At this time, their affiliated school boards were then targeted for teacher recruitment. Seven of these school boards provided ethics approval for the study. Managers within each of the participating public health agencies ($n = 9$) encouraged the participation of public health practitioners

who were mandated to promote healthy eating and active living among youth. Principals of each of the affiliated elementary schools ($n = 649$) within the seven participating school boards were then mailed a letter inviting their teachers to participate in the web-based study. This method of recruitment resulted in the participation of teachers from 37 schools which were each randomized to either the intervention or comparison group. Interested teachers and public health practitioners were instructed to contact a member of the research team to arrange a study orientation session. In these face-to-face orientation sessions (offered in individual and small group formats), a member of the research team: 1) explained the design and purpose of the study; 2) obtained written consent for participation; and 3) familiarized the participants with the navigation of the online program.

Following a face-to-face orientation session and registration with the website, participants in the intervention group completed an online survey at two time points: baseline (pre-program) and immediately following a 60-day access period to the online intervention. Those in the intervention group had access to the online curriculum for the 60 days immediately following their completion of the baseline survey. During the 60-day study period, intervention participants were asked to deliver the online curriculum to students in grades 4, 5, and 6 during regularly scheduled classroom time. Following the 60-day study period, access to the online program ceased and intervention participants were prompted to complete the post-program survey. Comparison participants completed a baseline survey immediately following their registration with the website and were prompted via automated e-mail reminder to take the post-program survey 60 days later. Upon completing the post-program survey, the participants in the comparison group were given access to the online curriculum for a period of 60 days. Baseline and post-survey data for both groups was automatically saved via the website to a spreadsheet format compatible with statistical packaging software. The online program was password protected throughout the duration of the study and only registered participants were provided with passwords to access the online materials.

Measures

DEMOGRAPHIC AND SCHOOL-RELATED INFORMATION

Information was collected on whether established codes of conduct concerning size acceptance, healthy eating, or active living were evident in participants' schools/agencies, as well as whether opportunities to participate in sensitivity training to learn to avoid weight bias in teaching practices were offered (van Roosmalen, Gusella, Beattie, & McVey, 2006).

KNOWLEDGE OF THE PHYSICAL CHANGES ASSOCIATED WITH PUBERTY

Five questions, using true-false response selections, were drawn from the survey "Free to Be Me" (Neumark-Sztainer, Sherwood, Collier, & Hannan, 2000) to assess participants' current knowledge about changes associated with puberty (e.g., *As girls get older, it is normal for them to gain more body fat*). One additional item, developed for the purpose of the present study, tapped body and muscle gain development during puberty, (e.g., *Boys add muscle and shoulder width during puberty, moving them closer to the "cultural ideal" for men's body shape*). Higher scores reflect higher knowledge about the changes associated with puberty. The 5-item version of the scale was validated with a sample of 226 pre-adolescent girls (Neumark-Sztainer, Sherwood, Collier, & Hannan, 2000). In that study, the reliability of the original measure was Cronbach's $\alpha = .36$, with an alpha coefficient equal to .43 in the present sample.

KNOWLEDGE ABOUT FACTS CONCERNING RESTRICTIVE DIETING

Individual items were developed for the purpose of the present study to assess participants' general knowledge about factors related to dieting. These included *Every person has their own natural weight*, *Dieting may cause weight gain*, and *As many as 27% of Canadian teen girls diet to lose weight, or practice other measures to control their weight*. Each of the three items was rated on a 4-point Likert scale ranging from 1 (*definitely*) to 4 (*definitely not*), with a reliability coefficient equal to .40, whereby higher scores reflect higher knowledge.

KNOWLEDGE ABOUT PEER AND ADULT INFLUENCES

Individual items were developed for the purpose of the present study to assess participants' general knowledge about the influence of adult and peers on children's body image. These included *Girls who have friends who diet are more likely to diet themselves*, *Boys who are teased about their size or shape might become dissatisfied with their body shape*, *Parents who are overly concerned about their children's appearance and who control their children's eating are more likely to have children who develop negative body image*, *If I diet to lose weight, or talk about dieting, my students might start to diet as well*, *My own attitudes about size acceptance will have an influence on my teaching practices*, and *My teaching practices could have an influence on my students' participation in sport or physical activity*. Each of the six items was rated on a 4-point Likert scale ranging from 1 (*definitely*) to 4 (*definitely not*) with Cronbach's alpha equal to .63., whereby higher scores reflect higher knowledge about peer and adult influences.

KNOWLEDGE ABOUT THE INFLUENCE OF THE MEDIA ON WEIGHT LOSS

A subset of items (3) drawn from the 10-item Perceived Media Influences Sub-Scale of the Perceived Sociocultural Influences on Body Image and Body Change Questionnaire (McCabe & Ricciardelli, 2001) was used to assess knowledge about the influence of the media on weight loss attempts. The Media sub-scale measures the perceived influence of the media (e.g. television, movies, and magazines and newspapers) on weight loss (e.g., *Do the media, i.e., T.V., Movies, Magazines, and Newspapers, give the idea that you should be slimmer? or . . . that you should eat less to lose weight?*). Each item was rated on a 5-point Likert scale ranging from: 1 = *strongly agree* to 5 = *strongly disagree*. Reliability coefficients for the 10-item Media subscale typically range from .84 to .95 (McVey, Lieberman, Voorberg, Wardrope, & Blackmore, 2003). The alpha coefficient for the 3-item composite scale in the present study was .52, where higher composite scores reflected greater knowledge.

EFFICACY TO FIGHT WEIGHT BIAS

A 6-item subscale drawn from the “Free to Be Me” survey (Neumark-Sztainer, Sherwood, Collier, & Hannan, 2000) and adapted for teachers was used to assess teachers’ self-efficacy expectations for fighting weight bias in their schools. Based on a 4-point Likert scale (from 1 = *definitely* to 4 = *definitely not*) participants expressed their agreement with statements such as: *I can convince my students not to tease kids about their physical appearance*. The scores range from 6 to 24, with higher scores reflecting higher efficacy. The scale was previously validated with a sample of 226 pre-adolescent girls (Neumark-Sztainer, Sherwood, Collier, & Hannan, 2000). The reliability of the scale was higher in the validation sample (Cronbach’s $\alpha = .65$) than in the current sample ($\alpha = .44$).

COMPUTER AND INTERNET USE

A 13-item self-report questionnaire developed for the purpose of the present study was administered to assess participants’ availability to, and general comfort and skill level with, computers or the internet. Example items included, *Do you have access to a computer at home? What is your level of comfort in using a computer? Have you ever downloaded files from the Internet?* and *Have you ever taken an online course?* Items were examined individually to help describe the present sample.

EVALUATION OF THE WEB-BASED PROGRAM AS A KNOWLEDGE TRANSLATION TOOL

For the purpose of the present study, 24 items were developed to assess participants’ satisfaction with the content of the web-based program (e.g.,

I was satisfied with the selection of module topics; I was satisfied with the classroom activities offered to students), as well as to evaluate whether or not the participants: (a) gained new knowledge from the program (e.g., *I gained new knowledge about children's body image from this web-based training program*); (b) experienced improvements in their delivery of body image curriculum to students (e.g., *This web-based resource will improve my delivery of body image and healthy eating curriculum to students*); or (c) modified their teaching practices to avoid the transmission of weight bias (e.g., *I now know that my teaching practices can contribute to the prevention of body image concerns*). For each item, participants responded on a 4-point, forced-choice scale, ranging from 1 = *definitely not* to 4 = *definitely*. In addition, information was collected regarding participants use of the web-based curriculum, including the number of modules implemented, the number of times each module was implemented, the grade level receiving the instruction, and the number of students instructed. All items were examined individually.

Statistical Analyses

To test the hypotheses that the online program would increase intervention participants' knowledge relative to those in the comparison group, repeated measures analyses of variance (ANOVA) were performed on each of the continuous outcome variables: knowledge of the physical changes associated with puberty; the three items tapping knowledge about facts concerning restrictive dieting, knowledge about the influence of the media on weight loss attempts; the six items tapping knowledge of peer and adult influences on children's body image, and efficacy to fight weight bias. In each analysis, condition (intervention vs. comparison) served as the two-level between-subjects factor, while time (baseline and post-intervention) served as the two-level within-subjects factor. Where appropriate, Bonferroni pair wise comparisons were used to ascertain the source of significant interactions. All analyses were conducted separately for teachers (who conducted classroom activities) and public health practitioners (who coached teachers on the use of the online program). An alpha level of .05 was used for all tests of significance. Table 2 presents the means and standard deviations for each of the dependent variables for teachers and public health participants separately by study condition (intervention versus comparison) at baseline and immediately following the 60-day study period.

RESULTS

Preliminary Analyses

To examine whether attrition-bias was present, comparisons were made between participants who completed the study and those who did not.

TABLE 2 Means and Standard Deviations for Teacher and Public Health Participants' Outcome Measure Scores in the Intervention and Comparison groups at Baseline and Post-Intervention

	Intervention						Comparison							
	Teacher			PublicHealth			Teacher			Public Health				
	Baseline	Post-Program	(SD)	Baseline	Post-Program	(SD)	Baseline	Post-Program	(SD)	Baseline	Post-Program	(SD)		
Knowledge of physical changes of puberty	4.95	5.32	(.88)	5.33	(.86)	(.50)	5.14	(.97)	5.35	(.68)	5.27	(.75)	5.47	(.77)
Knowledge of facts about restrictive dieting:														
Dieting may cause weight gain	3.33	3.64	(.49)	3.74	(.45)	(.42)	3.52	(.65)	3.32	(.56)	3.65	(.48)	3.59	(.50)
Every person has their own natural weight	3.70	3.67	(.53)	3.76	(.43)	(.33)	3.64	(.76)	3.60	(.71)	3.86	(.35)	3.92	(.28)
As many as 27% of Canadian teen girls diet to lose weight	3.61	3.73	(.50)	3.69	(.64)	(.76)	3.36	(.70)	3.52	(.51)	3.62	(.64)	3.73	(.45)
Knowledge about peer or adult influences:														
Girls who have friends who diet are more likely to diet themselves	3.73	3.85	(.45)	3.81	(.40)	(.43)	3.64	(.49)	3.48	(.51)	3.78	(.42)	3.76	(.43)
Boys who are teased about their size or shape might become more dissatisfied with their body shape	3.58	3.70	(.56)	3.86	(.35)	(.43)	3.64	(.49)	3.48	(.51)	3.86	(.35)	3.78	(.42)
If I diet to lose weight, my students may start to diet as well	3.00	3.24	(.56)	3.55	(.50)	(.50)	3.04	(.54)	3.16	(.47)	3.68	(.53)	3.62	(.49)
My own attitudes about size acceptance will have an influence on my teaching practices	3.48	3.15	(.87)	3.76	(.48)	(.51)	3.32	(.99)	3.36	(.76)	3.68	(.75)	3.68	(.78)
My teaching practices could have an influence on my students' participation in sport or physical activity	3.58	3.67	(.56)	3.76	(.43)	(.45)	3.56	(.58)	3.52	(.59)	3.73	(.45)	3.76	(.64)
Parents who are overly concerned about their children's appearance and who control their children's eating are more likely to have children who develop negative body image	3.45	3.67	(.62)	3.86	(.35)	(.42)	3.28	(.68)	3.20	(.91)	3.86	(.35)	3.84	(.37)
Knowledge of media influence	30.61	31.32	(3.97)	30.74	(4.24)	(3.86)	31.23	(2.65)	30.92	(3.48)	29.38	(3.86)	31.30	(3.20)
Efficacy to fight weight bias	20.31	20.38	(1.65)	20.21	(1.69)	(1.62)	20.22	(1.50)	20.16	(1.97)	20.50	(1.76)	20.22	(1.69)

Chi-square analyses revealed no significant differences between these two groups on province of residence, study group category (intervention versus comparison), gender, or cultural background ($p > .05$). There was, however, a significantly higher percentage of non-completers among teachers (66.7%) than public health participants (33.3%), $\chi^2(1) = 5.85, p < .05$. Using independent samples t-tests, comparisons between completers and non-completers on the dependent variables at baseline revealed no significant differences ($p > .05$).

Of the remaining participants, initial t-tests examining baseline dependent variable differences by study group yielded non-significant findings on all measures, $p > .05$. In addition, teachers from the intervention ($M = 17.20, SD = 2.43$) and comparison ($M = 16.70, SD = 2.20$) groups did not differ significantly with respect to their school's established codes of conduct concerning size acceptance, healthy eating, or active living, $t(76) = .94, p = .35$, or regarding the availability of professional development activities aimed at sensitizing teachers to the issues that influence body image in children (including school climate factors), $t(76) = .942, p = .349$, (intervention: $M = 8.38, SD = 2.33$; comparison: $M = 7.85, SD = 2.61$). Similarly, public health participants from the intervention ($M = 13.66, SD = 2.28$) and comparison ($M = 13.64, SD = 2.59$) groups did not differ significantly with respect to the established codes of conduct concerning size acceptance, healthy eating, or active living within their agencies, $t(87) = .037, p = .971$. There were also no differences between public health practitioners from the intervention ($M = 8.46, SD = 1.63$) and comparison ($M = 7.87, SD = 1.69$) groups regarding the availability of professional development activities focused on teaching body image sensitivity and improving the general climate in the work environment, $t(87) = 1.66, p = .100$.

Computer Skills at Baseline

The majority of the participants owned a computer (92.4%) with access to high speed or cable Internet connections (75.6%), reported having access to the Internet at home (51.3%) or the office/work setting (48.7%), reported more than 9 hours per week of computer (48.4%) or Internet (35.1%) use, and reported having either a very high/high (51.6%) or a medium (40.9%) level of comfort using computers, and a very high (56%) or medium (36.9%) ability to use the internet. A subset had taken an online course (27.6%). Most of the participants were able to install new programs/software (64%), download new programs/software from disks/CD-ROMs (70.2%), download files from the Internet and open them with Word, Excel, or Adobe Acrobat (81.3%), and complete registration forms or login to websites online (95.1%).

Overall Intervention Effects

KNOWLEDGE ABOUT THE PHYSICAL CHANGES ASSOCIATED WITH PUBERTY

Teachers. There was no significant interaction effect, $F(1, 56) = .155$, $p = .92$, however, a significant time effect, $F(1, 56) = 7.21$, $p = .01$, was found whereby knowledge of the changes associated with puberty increased for teachers in both the intervention and comparison groups across time (see Table 2).

Public Health Practitioners. There was no significant interaction effect, $F(1, 77) = .486$, $p = .488$, however, a significant time effect, $F(1, 77) = 13.50$, $p < .001$, was found whereby knowledge scores increased across time for public health participants in both the intervention and comparison groups.

KNOWLEDGE ABOUT FACTS CONCERNING RESTRICTIVE DIETING

Teachers. There was a significant interaction effect for the item *Dieting may cause weight gain*, $F(1, 56) = 8.78$, $p = .004$, whereby intervention participants' knowledge scores at post-intervention were significantly higher than at baseline, $p = .009$, compared to those in the comparison group (see Figure 2). There were no significant interaction or time effects for the remaining items that tapped *knowledge about dieting* (see Table 3).

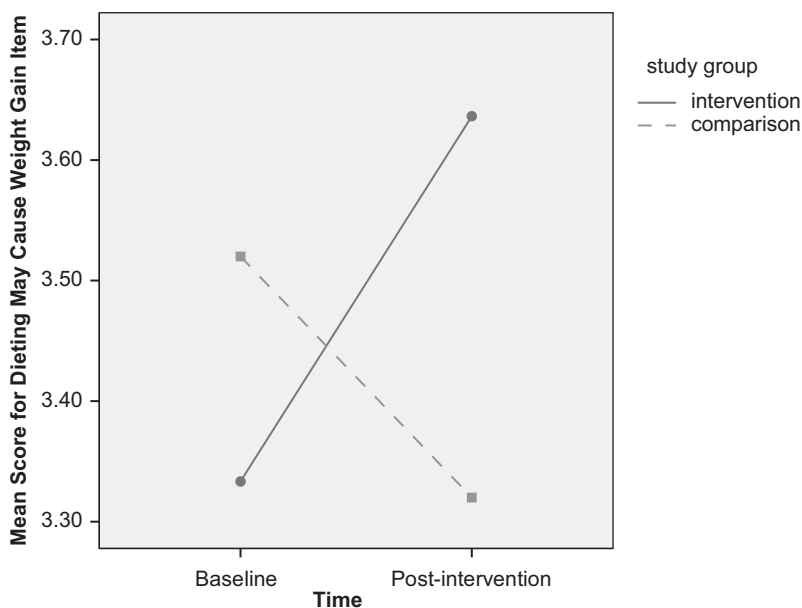


FIGURE 2 Mean Knowledge Score for *Dieting May Cause Weight Gain* Item among Teacher Participants in the Intervention and Comparison Groups at Baseline and Post-Intervention

TABLE 3 Time and Group by Time Effects on the Outcome Measures for Teachers and Public Health Participants

	Teacher				Public Health			
	Time		Group * Time		Time		Group* Time	
	F	Sig.	F	Sig.	F	Sig.	F	Sig.
Knowledge about the physical changes associated with puberty	(1,56) 7.21	.010	(1,56) .155	.920	(1,56) 13.50	.000*	(1,77) .486	.488
Knowledge of facts concerning restrictive dieting: <i>Dieting may cause weight gain</i>	(1,56) .368	.546	(1,56) 8.78	.004*	(1,77) .004	.950	(1,77) .991	.323
<i>Every person has their own natural weight</i>	(1,56) .220	.641	(1,56) .004	.949	(1,77) 3.69	.058	(1,77) .520	.473
<i>As many as 27% of Canadian teen girls diet to lose weight</i>	(1,56) 1.81	.184	(1,56) .034	.854	(1,77) .046	.831	(1,77) 1.10	.297
Knowledge about peer or adult influences: <i>Girls who have friends who diet are more likely to diet themselves</i>	(1,56) .110	.741	(1,56) 5.79	.019*	(1,77) .776	.381	(1,77) 0.059	.809
<i>Boys who are teased about their size or shape might become more dissatisfied with their body shape</i>	(1,56) .071	.791	(1,56) 3.73	.058	(1,77) 4.54	.036*	(1,77) .029	.865
<i>If I diet to lose weight, my students may start to diet as well</i>	(1,56) 5.60	.022*	(1,56) .638	.428	(1,77) .093	.761	(1,77) .618	.434
<i>My own attitudes about size acceptance will have an influence on my teaching practices</i>	(1,56) .657	.421	(1,56) 1.07	.307	(1,77) .069	.794	(1,77) .069	.794
<i>My teaching practices could have an influence on my students' participation in sport or physical activity</i>	(1,56) .132	.718	(1,56) .870	.355	(1,77) .001	.980	(1,77) .163	.687
<i>Parents who are overly concerned about their children's appearance and who control their children's eating are more likely to have children who develop negative body image</i>	(1,56) .508	.479	(1,56) 2.49	.121	(1,77) 1.07	.305	(1,77) .217	.643
Knowledge of media influence	(1,56) .537	.467	(1,56) 4.05	.049	(1,77) .535	.467	(1,77) .535	.467
Efficacy to fight weight bias	(1,56) .02*	.97	(1,56) .099	.76	(1,77) 3.13	.081	(1,77) 10.81	.002*

*p < .05.

Public Health. There were no significant interaction or time effects found for any of the items that tapped *knowledge about dieting* (see Table 3).

KNOWLEDGE ABOUT PEER OR ADULT INFLUENCES

Teachers. There was a significant interaction effect for the item *Girls who have friends who diet are more likely to diet themselves*, $F(1, 56) = 5.79$, $p = .019$, whereby participants in the intervention group had significantly higher knowledge scores than those in the comparison group at the post intervention, $p = .002$ (see Figure 3). A trend was found for the item *Boys who are teased about their size or shape might become dissatisfied with their body shape*, $F(1, 56) = 3.73$, $p = .058$. Specifically, the mean knowledge score for the intervention group at the post-intervention was higher than the mean in the comparison group, although the difference was not statistically significant, $p = .098$. While there was no statistically significant interaction effect for the item *If I diet to lose weight, or talk about dieting, my students might start to diet as well*, $F(1, 56) = .638$, $p = .428$, there was a significant time effect, $F(1, 56) = 5.60$, $p = .022$, whereby participants from both the intervention and comparison groups showed increases over time in their knowledge scores (e.g., becoming

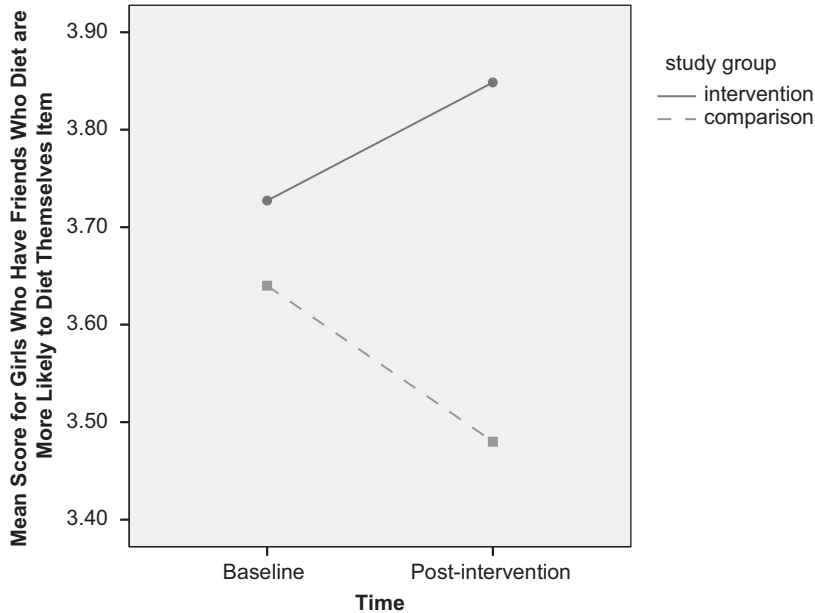


FIGURE 3 Mean Score for *Girls Who Have Friends Who Diet are More Likely to Diet Themselves* Item among Teachers in the Intervention and Comparison Groups at Baseline and Post-Intervention.

more knowledgeable about how their own dieting behavior could trigger dieting in their students). No other significant interaction or time effects were found for any of the remaining items that tapped *knowledge of peer or adult influences* (see Table 3).

PUBLIC HEALTH

There were no significant interaction or time effects for the items measuring *knowledge of peer or adult influences* (see Table 3).

KNOWLEDGE ABOUT THE INFLUENCE OF THE MEDIA ON WEIGHT LOSS

Teachers. There was a significant interaction effect found, $F(1, 56) = 4.05$, $p = .049$, whereby knowledge scores for the comparison group were significantly lower at post-intervention compared to baseline, compared to those in the intervention group, $p < .001$.

Public Health. There were no significant interaction or time effects, for the variable of media influences on weight loss (see Table 3).

EFFICACY TO FIGHT WEIGHT BIAS

Teachers. Results revealed no significant interaction, $F(1, 56) = .099$, $p = .76$, or time effects, $F(1, 56) = .002$, $p = .97$, for the variable efficacy to fight weight-bias.

Public Health. There was a significant interaction effect found for the variable efficacy to fight weight bias, $F(1, 77) = 10.81$, $p = .002$. Participants in the intervention group reported significant improvements in efficacy scores between baseline and the post-intervention periods, $p < .001$ (see Figure 4). This improvement was not reported by participants in the comparison group.

Program Participation and Fidelity

Approximately 91% of teachers reported using at least one of the online modules in the classroom, with nearly half (45.5%) using all six. An additional 15% of teachers implemented 5 activities, while 12.1%, 3.0%, and 6.1% of participants implemented 4 activities, 3 activities, or 2 activities, respectively. Of those implementing the activities, approximately 36% of teachers used the modules on only one occasion, 30.3% used the modules between two and five times, 12.1% used the modules between six and ten times, 3.0% used the modules between 11 and 15 times, 3.0% used the modules between 16 and 20 times, and 6.0% used the modules more than 20 times.

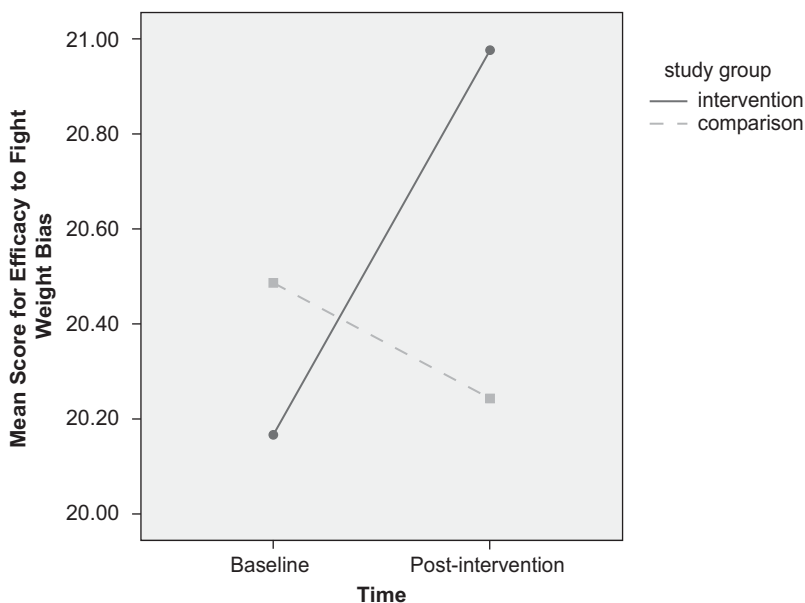


FIGURE 4 Mean Score for Efficacy to Fight Weight Bias among the Public Health Participants in the Intervention and Comparison Groups at Baseline and Post Intervention.

Evaluation of the Web-Based Program as a Knowledge Translation Tool

Almost all of the participants were satisfied with the selection of module topics (97.3%), as well as the case studies, e.g., Flash animation (90.4%), the background information for facilitators (98.7%), and the classroom activities for students (89.4%). There was a consensus (93.3%) that the activities were well matched to the Ministry of Education's learning outcomes and that the classroom activities and supplementary resources suited students of different cultural/racial backgrounds (96.4%). Among those using the modules, there was a high degree of comfort in administering the classroom activities (98.7%), and most participants planned to alert their peers to the online resource. A majority (84%) reported feeling comfortable with the on-line format of the resource. Moreover, their awareness of other web-based resources was enhanced as a result of being part of this study (80%). Interestingly, 40% of teachers felt that it should be the role of the public health practitioners to conduct the classroom activities with the students.

A majority (74.6%) of participants reported that the web-based program had positively influenced their own feelings (acceptance) about their body shape, with an even greater percentage reporting that the newly learned information would prompt them to make changes to their school environment (94.7%). The majority (72%) also positively endorsed the items *My*

teaching practices can contribute to the prevention of body image concerns and I gained new knowledge about children and body image by reading through the material in the Student Body (84%). In addition, approximately 93% of participants reported that the web-based resource improved their overall delivery of body image and healthy eating curriculum to students.

DISCUSSION

The present study examined the feasibility and usefulness of a web-based program designed to help elementary school teachers and local public health practitioners (who service the schools) with the prevention of eating disorders. We predicted that this multidimensional program would increase the participants' awareness of, and knowledge about (a) the natural increases in fat and weight during puberty that can trigger children's body image concerns, (b) facts related to the risks of calorie-restrictive dieting, (c) peer and adult influences on children's body image, (d) the influence of the media on weight loss attempts, and (e) the teachers' potential efficacy in helping to reduce the weight bias that is part of the sociocultural context of negative body image and disordered eating.

Compared to teachers in the comparison group, teachers who took part in the intervention group reported statistically significant improvements over time in their knowledge about facts concerning restrictive dieting (i.e., *Dieting may cause weight gain*), as well as in their knowledge about peer influences (i.e., *Girls who have friends who diet are more likely to diet themselves*). Somewhat surprisingly, the public health practitioners, did not show significant improvements over that of the comparison group on any of the knowledge items. Importantly, public health practitioners from the intervention group *did* demonstrate significant increases in self-efficacy to fight weight bias compared to those in the comparison group. Unlike the public health participants however, teachers in the present study did not benefit from the web-based program in terms of their perceived self-efficacy to fight weight bias (e.g., *I can stand up for students being teased about their weight*).

The increased knowledge gained by teachers in the intervention could help motivate teachers to appreciate the benefits of trying to reduce weight bias or teasing among their students, or to share with students the potential drawbacks of restrictive dieting to lose weight (Field, Austin, & Taylor, 2003). Additional support and the opportunity to learn from direct and vicarious experience (Bandura, 1977) (e.g., verbal persuasion, observational learning) may well be required in order for teachers to translate their newly gained knowledge (brought on by the intervention) into a greater belief in their own abilities to reduce weight bias. For example, public health practitioners (the group who did experience improvements over time in their

efficacy to fight weight bias) have more opportunities in their work environments than teachers to participate in professional development activities and student teaching on topics related to healthy eating, active living or the promotion of positive body image. Teachers might require a combination of such face-to-face instructional learning together with the information learned from the Student Body program prior to gaining a strong enough belief in their own abilities to fight weight bias.

An additional unexpected finding was that the mean score for *knowledge of the influence of the media on weight loss* (e.g., *Do the media, i.e., T.V., Movies, Magazines, and Newspapers, give the idea that you should be slimmer?*), was lower at post-intervention than at baseline for teachers in the intervention group. The low internal consistencies of the measures of knowledge in the present study might explain these findings. There is a need for richer, more externally valid measures of such knowledge before conclusions can be drawn.

With respect to feasibility, the findings from the present study revealed that a majority of the participants had sufficient computer and Internet use skills to access the online program. The findings can be generalized to a sample of primarily Caucasian teachers and public health professionals (mostly female) who have moderate to high levels of comfort or experience using computers or the internet.

Participants reported a high level of satisfaction with the online program in terms of the ease of navigation throughout the site, the background information, the classroom lesson plans, and the connection made between the lesson plans and the government mandated learning objectives. Participants also felt that the content of the *Student Body* helped them to appreciate the impact they have as role models on students in terms of their own eating attitudes or behaviors, and that this new knowledge would improve their delivery of body image curriculum. This might have been brought on by aspects of the web-based program that alerted facilitators about potential teaching practices that could trigger body image dissatisfaction in children, including negative comments made in front of children about their own weight or shape, public displays of students' weights during the delivery of a healthy weight curriculum, or solicitation of students' weights to explain a normal distribution. This unique aspect of the Student Body program, over and above what existing prevention curricula offer, could lead to better outcomes than previously reported in the prevention literature (Stice & Shaw, 2004). There is real benefit in helping teachers (or other adults who work closely with children) to fully appreciate the impact they have on children and youth in terms of the types of eating attitudes or behaviors they role model, all of which can influence in a positive way their delivery of general as well as health-related curricula (Raymen & Piran, 2002). *The Student Body: Promoting Health at Any Size* could prove to be an important vehicle to translate this message to teachers.

Participants in the present study also reported feeling better about their own body image following the intervention. This improved body satisfaction could rub off on students in terms of fostering a body positive culture within the school. If teachers adopt a body positive stance, they might stand a chance in helping to reduce the typical onset of “fat talk” that tends to surface among school children in late elementary school (e.g., addressing a continuum of verbal statements ranging from calorie-consciousness statements to weight/shape- based teasing and harassment).

There are limitations associated with the present study. First, the *Student Body: Promoting Health at Any Size* consisted of a static, non-interactive online program (e.g., text). Future research could explore whether or not a more interactive format, one that allows users to communicate with each other or with the researchers (e.g., chat rooms, discussion groups), might lead to different outcomes in terms of participants’ knowledge or competencies to address weight bias in their school (Heinicke, Paxton, McLean, & Wertheim, 2007; Horton, 2000). Second, the outcome measures used in the present study may not have been sensitive to changes brought on by the intervention. Replication of the study with reliable and valid measures and ones that tap other domains of competence among facilitators are warranted. Third, the post-intervention follow-up period could have been extended to determine whether improvements brought on by the intervention were maintained over a longer period of time, or led to actual changes over time in students’ body image or eating behaviors.

Still, the present study fills an important gap in the prevention literature. It is the first web-based program aimed at elementary school teachers (i.e., universal prevention). Most Internet-based intervention programs conducted in the area of eating disorders have been ones that target older adolescents, who have already begun to exhibit body image dissatisfaction or disordered eating (targeted prevention; Winzelberg, Eppstein, Eldredge, Wilfley, & Dasmahapatra, 2000; Winzelberg, Taylor, Sharpe, & Eldredge, 1998). The *Student Body* was designed to help teachers promote positive body image to help prevent the onset of disordered eating in children before they reach the stage of early adolescence. This was accomplished by raising teachers’ awareness about how their own negative eating attitudes or behaviors can trigger the same in their students. The material also cautioned against an over-emphasis on healthy weights that might inadvertently trigger weight and shape preoccupation among children, and recommends ways to invite children to be active or eat healthy without calorie-counting, weight monitoring, or fat-reducing recommendations that typically accompany obesity prevention curriculum. The *Student Body* outlined the multiple factors that can influence children’s body image, including weight-based teasing, media, peer or adult pressures to diet, weight bias in teaching practices, teaching practices or other school environmental factors that can inadvertently trigger weight monitoring or weight-comparison practices

(e.g., appearance-based sports or activities). This was further accomplished through the availability of classroom strategies that have been previously shown to decrease risk factors for disordered eating among this age group (McVey, Lieberman, Voorberg, Wardrope, & Blackmore, 2003; McVey, Tweed, & Blackmore, 2004, 2007); all of which have been conveniently matched to learning outcomes mandated by the Ministry of Education to prevent extra burden on teachers' workload. Finally, local public health practitioners who offer routine support to the schools were invited to participate in the study so that they could benefit from it directly as well as disseminate its availability beyond the scope of the research study.

In sum, the information is easily placed in web format. The teachers have sufficient resources to access the information (time, skills, background). The teachers and public health practitioners did indeed access and use the online resource as intended and this appears to have resulted in anticipated benefits in terms of increasing knowledge among teachers, as well as increasing self-efficacy among public health practitioners. Future research could explore whether or not the information learned from this online program triggers teachers or public health practitioners to search for additional ways to build a healthy and/or non-weight biased school environment.

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