An Evaluation of an Internet-delivered Eating Disorder Prevention Program for Adolescents and Their Parents

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Purpose: To evaluate the effectiveness of Student Bodies, an Internet-delivered eating disorder prevention program for adolescents, and a supplemental program for their parents.

Methods: One hundred fifty-two 10th grade females completing a health course at a private sectarian school, and 69 of their parents were assigned to either the Internet-delivered intervention group or to a comparison group (students) or wait-list control group (parents). Student participants completed subscales of the Eating Disorder Inventory, Eating Disorder Examination-Questionnaire, and a content knowledge test. Parents completed the Parental Attitudes and Criticism Scale.

Results: The main effects of the intervention were assessed pre- to post- and post- to follow-up using ANCOVA, with the baseline assessment of the independent variable as the covariate. Students using the program reported significantly reduced eating restraint and had significantly greater increases in knowledge than did students in the comparison group. However, there were no significant differences at follow-up. Parents significantly decreased their overall critical attitudes toward weight and shape.

Conclusion: The program demonstrates the feasibility of providing an integrated program for students and their parents with short-term positive changes in parental attitudes toward weight and shape. © Society for Adolescent Medicine, 2004

KEY WORDS: Internet Eating disorders Prevention Parent

Unhealthy dieting behaviors and dieting concerns are common in children and adolescents. By middle school, 20% to 50% of American girls say they feel too fat [1], and 20% to 40% of girls feel overweight and are trying to lose weight [2]. In a recent large sample, Field et al found that 32% of preadolescent and adolescent girls were trying to lose weight although less than 20% were overweight according to their body mass index (BMI) scores [3].

Over-concern with weight and shape has been shown to be a risk factor for the development of eating disorders [4,5]. For example, 9th and 10th grade girls (aged 13–16 years at baseline) were followed for up to 3 years [6]. Of those without subclinical or clinical eating disorders at baseline but with the highest weight concerns, approximately 10% developed partial- or full-syndrome eating disorders in the course of follow-up. Those with low weight concerns did not develop such disorders, suggesting that weight and shape concerns may be topics to address when trying to reduce a young woman's risk of developing eating disorders in the future [7]. Full-syndrome eating disorders affect 1%
to 10% of young women, depending on sample and diagnostic criteria, and many more women suffer from “partial-syndrome” eating disorders [8,9].

Given the high risk for eating disorders among female high school students, as well as the adverse psychological and medical consequences of subclinical and clinical eating disorders, educational and school-based eating disorder prevention interventions have been strongly recommended [10,11]. A variety of curricula have been developed [12]. Research on existing eating disorder prevention programs has yielded a picture of consistent significant increases in knowledge, but with limited effects on eating disordered attitudes and behaviors [13].

In assessing the lack of efficacy of prevention programs, it has been suggested that more comprehensive approaches be developed, including those involving parents and families [14]. An extensive theoretical and clinical literature suggests that familial factors contribute to the development of eating problems, including anorexia nervosa and bulimia [15,16]. Family teasing, criticism, and maternal eating patterns all have been shown to contribute to the development of eating disordered attitudes and behaviors [17,18]. In addition to the potentially harmful effects of parental teasing and criticism, Stice et al found that social reinforcement of the “thin body ideal” by family predicted onset of bulimic symptoms [19]. Similarly, Taylor et al found that the risk for bulimia is relatively increased in girls whose families place heavy emphases on appearance and thinness [20].

Although many studies have investigated parental factors in the development of eating disorders, to our knowledge none have introduced an educational intervention for parents to address individual risk factors and familial factors that might influence the development of eating disorders.

The goal of this study was: (a) to evaluate the effectiveness of Student Bodies when provided to an entire high school class and (b) to determine the efficacy of a component addressing parents of students participating in the program. It was hypothesized that students using the prevention program would adopt healthier body image, eating and dietary practices, and would decrease their level of weight and shape concerns. For the parent intervention, it was hypothesized that parents would decrease critical behaviors and attitudes toward their daughters’, their own, and others’ weight and shape.

Methods

Subjects

Students. One hundred fifty-three female high school sophomores were recruited from a private, sectarian school in Northern California. Active informed consent was obtained from students and their parent or guardian in accordance with the Stanford Committee on Human Subjects. Student participants were assigned to the intervention or comparison group based on enrollment in one of two mandatory courses, Physical Education/Health and Religion. Students enrolled in the courses were asked by a female research assistant to participate in the study. Four students declined to participate. Both Physical Education/Health and Religion were offered during four class periods each day so that the likelihood of a student being assigned by school officials to either class remained the same. Three students reported symptoms suggesting that they might have clinical eating disorders and were referred to their school counselors for further evaluation.

Parents. Parents (n = 153) of the sophomore students were sent consent forms and baseline questionnaires asking for their willingness to participate in the intervention. Sixty-nine parents agreed to participate in the study.

Procedures

Participants in the student intervention completed measures at three time points: October 2000 (baseline), December 2000 (postintervention) and March 2001 (follow-up). Parent participants completed baseline assessments in October and postintervention assessments in December of 2000. Students completed the Eating Disorder Inventory [21], Eating Disorder Examination—Questionnaire [22], Weight Concerns Scale [23], and a knowledge test. Parents completed the Parental Attitudes and Criticism Scale. All participants completed a demographic survey.

Parent and student participants who had been assigned to the intervention groups were provided with written instructions on the use of Student Bodies. Both the student and parent wait-list groups were given the opportunity to use the Student Bodies program after the follow-up period.

Students participated in their intervention 1 hour per week during class for a period of 8 weeks. To ensure that the effects of the intervention were not
affected by other activities in the health class, all nutrition, eating disorder, and body image curriculum content typically covered in the course was incorporated into the Student Bodies program. Parent participants could use the intervention at any time over a 4-week period from any personal computer connected to the Internet. To reduce potential cross-contamination, students in the intervention were instructed not to discuss it with other students.

Description of Student Bodies Interventions

The Student Bodies program for students is a structured 8-week psychoeducational intervention designed by the authors and delivered through the Internet. It includes an asynchronous discussion group (i.e., bulletin board embedded in the program) to provide a forum for participants to discuss their reactions to the program content and to provide and receive emotional support. The program is modeled after the cognitive/behavioral body image interventions developed by Cash [24], the psychoeducational intervention for bulimia of Davis and Olmsted [25], and the healthy weight regulation guidelines suggested by the authors of eating disorder prevention studies [7].

The program begins with a description of the risk of eating disorders and a primary focus of each session relates to improving body image. Key features include the use of documentary style audio and video, personalized feedback, self-quizzes, self-monitoring, goal-setting, weekly reading and writing assignments, and participation in the Internet discussion group. There are four main sections of the Internet intervention. The first section on eating disorders assesses each participant's attitudes and behaviors surrounding weight and shape, and provides students with feedback regarding whether their attitudes and behaviors may put them at risk for developing an eating disorder. Next, the body image portion of the intervention asks the user to keep a journal in which she explores her body image concerns and cultural pressures to adopt an unnaturally thin body image ideal. It also helps the user identify her current body image and understand the psychological factors that produce and maintain a negative body image. Finally, the healthy nutrition and exercise sections focus on regular eating, nutrition, and exercise basics that are relevant to young women, including misconceptions regarding nutritional and exercise needs.

For the current study, participants were given multiple assignments to complete each week and were expected to post a number of assignments and personal messages to the discussion group each week.

To protect confidentiality, participants logged on using an alias. Group discussions were moderated by research assistants who followed a moderator manual and were supervised by a licensed psychologist. The role of the moderator is to monitor and read all postings by participants and to encourage major points of the discussion. For each session, participants were asked to read through content, complete the exercises and journals, and post a message to the group discussion.

Student Bodies Parent Intervention

The Student Bodies parent program is an unstructured web-based intervention designed by the authors. Parents had 4 weeks to complete the program. Parents could log on to the website at any time, as the program was designed to allow users to explore the website’s content freely. Similar to the student group, the parent program includes an online discussion group, providing a forum for participants to ask questions, discuss and react to the content of the program, or simply to interact with other parents. To protect confidentiality, parent participants logged on using an alias.

The program encourages parents to accept variations in weight and shape and to discourage negative attitudes and behaviors that might affect their daughters. Specific exercises and educational materials are provided to help parents determine whether or not they might be contributing to unhealthy attitudes about weight and shape and how they can recognize the signs and symptoms of unhealthy eating behaviors. In addition, the program assists parents in identifying how miscommunication may occur between themselves and their children. Parents can view hypothetical scenarios demonstrating common behaviors and their potential implications. Parents are also given guidelines to help them determine whether their daughters might need to diet and are educated about using supportive communication skills to begin a dialogue with their daughters about weight- and shape-related issues.

Measures

Eating Disorder Inventory (EDI). The EDI is a 64-item instrument designed to assess a variety of psychological and behavioral characteristics com-
mon to anorexia and bulimia [21]. The Drive for Thinness and Bulimia subscales were used for this study. The Drive for Thinness subscale reflects an intense need to be thinner and a fear of gaining weight. The Bulimia subscale examines behaviors related to bingeing and purging. Cronbach alphas for each subscale have been found to range from .72 to .92 for female college students, indicating adequate internal consistency [26]. The subscales were scored as a continuous measure to provide greater sensitivity [27]. The scores range from 7 to 42, with higher scores indicating greater levels of disturbance.

**Eating Disorder Examination—Questionnaire (EDE-Q).** The EDE-Q is a self-report measure designed to assess and quantify specific eating disordered attitudes, behaviors, or symptoms [22]. The Weight, Shape and Restraint subscales of the EDE-Q were used in this study. The Weight and Shape subscales of the EDE-Q are correlated with $r = .79$ and $r = .80$ of the corresponding EDE subscales, respectively. Scores on the EDE-Q subscales range from 0 to 6, with higher scores indicating greater levels of concern.

**Weight Concerns Scale.** The Weight Concerns Scale was developed by Killen et al to identify students at risk for developing eating disorders [23]. The scale includes five questions that assess worry about weight/shape, fear of gaining 3 pounds, the last time the student went on a diet, importance of weight, and feelings of fatness. The items were derived from a principal components analysis of a set of self-report questions used to assess eating disorder symptoms [28]. It is significantly correlated with overall EDI and body dissatisfaction [21]. It has test-retest reliability of about 0.85, a 1-year stability of about 0.75, and demonstrates predictive validity to later risk factors [6,23] Scores range from 0 to 100, with higher scores indicating greater weight and shape concerns.

**Knowledge test.** A 50-item knowledge test was designed to assess the participants’ knowledge of the basic contents of the Student Bodies program; it includes questions about the causes and consequences of eating disorders, healthy eating and nutrition, exercise, and body image. The test consists of true/false, multiple choice, and fill-in-the-blank questions.

**Parental Attitudes and Criticism Scale (PACS).** Created for this study, the PACS is an 18-item questionnaire to assess critical parental attitudes and behaviors associated with thinness, dieting, weight, and shape. The scale yields four subscale scores: Critical to Self, Critical to Daughter, Critical to Others, and Healthy Outlook. Individual item scores range from 1 to 6, with higher scores indicating more critical attitudes; scores on each subscale range from 6 to 30 and 6 to 24, respectively. Cronbach alphas were 0.84 and 0.71, indicating good internal reliability.

**Statistical Analysis**

Baseline differences between the two groups were compared by analysis of variance. The main effects of the intervention were assessed at pre- to post- and post- to follow-up, using an analysis of covariance with the baseline assessment of the independent variable as a covariate. When baseline differences were found, post hoc tests were used to determine differences. An alpha level of .05 was used for all statistical tests. For analyses of the effect of the parent groups, the two parent groups that did not receive the intervention were combined.

**Results**

**Student Intervention**

Of the 153 student participants who completed baseline measurements, 55.6% identified themselves as white, whereas 16.4% were multi-ethnic or members of other groups, 16% were Asian, 10.6% Hispanic, and 1.4% African-American. The average age of the participants was 15.1 years (SD 0.4, range 14–16 years). No significant differences were found at the baseline time period between the intervention and comparison group on any of the primary or secondary outcome measures.

**Intervention Effects: Baseline to Postassessment**

Table 1 provides the means and standard deviations of each group at each assessment period for the main outcome variables. During the intervention phase (baseline to postassessment), significant group differences were found on the EDE-Q Restraint subscale ($F [1,137] = 5.01, p = .027$) and on the overall knowledge test ($F [1,137] = 28.1, p = .001$). None of the other differences were significant.

During the postassessment to follow-up time period, no significant group differences were found between the comparison and intervention groups. Scores on the EDE-Q Restraint subscale had returned to baseline levels at follow-up. The pre-post con-
trolled effect size for the EDE Q Restraint subscale was 0.29.

Parent Intervention

Sixty-nine parents completed the baseline assessments. Of these, 49 had daughters who were in the Student Bodies intervention and the remainder (n = 20) had daughters who were in the student comparison group. Parents of the daughters in the Student Bodies intervention were assigned on the basis of their daughter’s class period to either the Student Bodies parent intervention (intervention group, n = 22) or the wait-list control group (n = 27). The percentage of parents who agreed to participate was similar for those whose daughters were in the intervention (40%) and for those whose daughters were not in the intervention (39%). Of the 69 parents in the sample, 58.5% were white, 19.7% Hispanic, 12.7% Asian, and 9.1% were multi-ethnic or members of other groups. Over 96% (n = 67) were female, 3.4% (n = 2) were male, and most (86%) were married. No significant differences were found between the intervention (n = 22) and control (n = 47) groups at baseline.

Intervention effects. From baseline to postintervention, significant differences were found between the intervention and control groups on the subscale assessing critical attitudes and behaviors toward others (F [1,51] = 7.60, p = .008) (Table 2). Effect sizes for the parent intervention were 0.48 for Critical to Self, 0.59 for Critical to Daughter, 0.57 for Critical to Others, and 0.61 for Healthy Outlook.

Qualitative analysis. Eleven of twenty-two intervention group parents logged on to the Student Bodies parent program. Most (8 of 11) parents reported reading over 80% of the content; two parents indicated that they read between 50% and 80%. Of the parents who read the material on the website, 10 of 11 responded that they found the site helpful and interesting and reported that they talked to others about the content. Overall, parents posted a total of nine messages over the 1-month period.

Exploratory Analyses

To examine if students in the intervention whose parents were randomized to the parental intervention did better than students in the intervention whose parents were not, changes in students’ primary and secondary outcomes were compared at baseline to post- and baseline to follow-up. No significant differences were found.

Table 1. Means and SD of all Baseline Measures for Intervention and Comparison Groups

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intervention (n = 102)</th>
<th>Comparison (n = 51)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sept Dec March</td>
<td>Sept Dec March</td>
</tr>
<tr>
<td>EDI Bulimia</td>
<td>11.0 (6.2) 10.5 (3.9)</td>
<td>10.4 (3.7) 11.3 (4.5) 11.1 (5.5) 10.5 (3.2)</td>
</tr>
<tr>
<td>EDI Thinness</td>
<td>18.1 (8.6) 17.1 (8.9)</td>
<td>17.6 (8.8) 18.5 (8.5) 17.6 (8.8) 17.2 (8.0)</td>
</tr>
<tr>
<td>EDE-Q Weight</td>
<td>1.6 (1.4) 1.5 (1.3)</td>
<td>1.6 (1.4) 1.8 (1.3) 1.5 (1.2) 1.6 (1.4)</td>
</tr>
<tr>
<td>EDE-Q Shape</td>
<td>2.0 (1.5) 1.7 (1.4)</td>
<td>1.8 (1.4) 2.1 (1.4) 1.7 (1.3) 1.8 (1.3)</td>
</tr>
<tr>
<td>EDE-Q Restraint</td>
<td>1.1 (1.2) .78** (1.0)</td>
<td>1.0 (1.1) 1.1 (1.0) 1.1 (1.1) 1.1 (1.1)</td>
</tr>
<tr>
<td>WCS</td>
<td>33.4 (23.9) 30.3 (23.5)</td>
<td>30.8 (24.8) 34.6 (22.3) 32.5 (23.1) 3.0 (22.5)</td>
</tr>
<tr>
<td>Knowledge</td>
<td>32.2 (6.5) 37.1** (3.7)</td>
<td>— 33.4 (5.0) 34.2 (5.9)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.
Note. EDE-Q = Eating Disorder Examination Questionnaire; EDI = Eating Disorder Inventory; WCS = Weight Concerns Scale.

Table 2. Means and SD of All Baseline Measures for Intervention and Control Parent Groups

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intervention (n = 22)</th>
<th>Control (n = 47)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline Post</td>
<td>Baseline Post</td>
</tr>
<tr>
<td>PACS Critical to Self</td>
<td>20.6 (6.7) 17.8 (7.3)</td>
<td>18.1 (6.5) 18.5 (6.6)</td>
</tr>
<tr>
<td>PACS Critical to Daughter</td>
<td>1.8 (.77) 1.4 (.61)</td>
<td>1.3 (.59) 1.3 (.60)</td>
</tr>
<tr>
<td>PACS Critical to Others</td>
<td>6.4 (2.2) 5.2** (1.4)</td>
<td>5.7 (2.0) 5.7 (2.0)</td>
</tr>
<tr>
<td>PACS Healthy Outlook</td>
<td>9.8 (3.1) 12.6* (4.4)</td>
<td>10.9 (4.1) 11.5 (3.3)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.
Note. PACS = Parental Attitudes and Criticism Scale.
Scores representing students’ perceptions of parental comments and concern regarding their daughters’ weight and shape were calculated based on responses to four questions from the McKnight Risk Factor Study-IV (MRFS-IV) [5]. Daughters’ perception that parents find thinness important and that the parents made more comments about weight and shape was positively correlated with higher levels of daughters’ restrained eating behaviors (R = .37, p < .01); no other correlations were significant.

Discussion

To our knowledge, this is the first study to evaluate an Internet-based eating disorder program reaching all students as part of their high-school curriculum while simultaneously introducing an intervention for their parents. In the student sample, during the treatment phase (baseline to postassessment), significant group differences were found on the EDE-Q Restraint subscale and on the overall knowledge test, but these results were not maintained at follow-up. In the parents’ intervention, the intervention group showed significant decreases on a measure reflecting critical attitudes and behaviors toward others’ weight, shape, or appearance. Although other measures did not reach statistical significance, the intervention effect sizes were promising.

There are several potential explanations for the minimal effects found in the student intervention. First, the baseline scores on the outcome measures were considerably lower than those reported in other studies that have focused on higher-risk populations [28,29,30]. As others have suggested, interventions shown to be beneficial for women with high weight and shape concerns or partial-syndrome eating disorders may be ineffective with women with lower levels of concern or behaviors [20,28].

It may also be that negative body image and eating attitudes are so ingrained and resistant to change that longer and more intensive interventions are required. An alternative possibility is that adolescence may be too late for prevention programs of this nature. By middle school, 30% to 50% of American girls already say they feel too fat [1], and 20% to 40% of girls feel overweight and are trying to lose weight [2]. Therefore, these types of programs might be better targeted to younger children whose attitudes and behaviors are still developing. Finally, students were assigned to the comparison group based on class schedule rather than randomization. Although the baseline measures were similar, some undetected but important differences between the two groups might have existed.

Results of the parent intervention are positive and provide further support for creating comprehensive eating disorder prevention programs. Nonetheless, it is important to consider several issues related to the implementation of the program.

First, only half (11 of 22) of the intervention group parents logged on to the website and completed the intervention. Thus, it is unclear how participation in the program produced changes in critical parental attitudes and behaviors. Of those parents who did participate, however, 8 of 11 indicated that they read over 80% of the program’s content. This suggests that the intervention group parents who did log on to the program had reasonably high levels of interest or motivation to participate in the study. From the rates of change, we might also infer that high levels of participation were not necessary in order for the program to be helpful. It is possible that the willingness of parents to engage in the program was enough to motivate some change and to inform them about the existence of certain potentially harmful behaviors. It may also be that parents responded to the questionnaire in a socially desirable manner.

Another important point is that, although parents in the intervention group improved their scores on all measures, the parents’ improvements seem to have had no effect on their daughters’ scores. It is clear that the program did help many parents begin a dialogue with their daughters about eating disorders and related issues, as 19 of 22 parents (86%) indicated that they spoke to their daughters about the program. It might be that the effects of the parent intervention would not be apparent for a couple of months or that our measures would not be sensitive to these changes.

Limitations

Minimal statistical power may have limited the ability to detect significant differences in the parent intervention. Our sample size of 22 had 80% power to detect an effect size of 0.89 using a two group Student’s t-test with a .050 two-sided significance level. Although strong effect sizes and positive trends in the statistical results suggest that the program was effective at reducing potentially harmful parental attitudes and behaviors, caution should be exercised in drawing firm conclusions from these data. Additional limitations include a self-selected parent sample from higher income and education levels. To the extent that parents understood the
goals of the program, they may have been hesitant to admit to having critical attitudes toward their daughters’ weight.

Overall, this research supports the argument that eating disorder prevention programs can be helpful, while extending further the argument that preventative efforts should focus not only on individual factors but should also be integrated into an individual’s cultural, environmental, and familial context. In light of this, more comprehensive eating disorder prevention programs are needed, coupled with research approaches that examine the role of parents, schools, and communities in decreasing disordered eating attitudes and behaviors.

This is the first intervention that has attempted to change students’ family environment. Future programs must continue to encourage students to resist harmful messages, but they also must begin to help actively create healthier norms within the school and family environments. Prospective studies might use the encouraging results from this study as a starting point for integrating student and parent prevention interventions.

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References