Reported Eating Behavior and Attitudes Improvement After a Nutrition Intervention Program in a Group of Young Female Dancers

Mary Yannakoula, Marietta Sitara, and Antonia-Leda Matalas

The aim of the study was to evaluate the effectiveness of an intervention program that combined nutrition education and prevention of disordered eating in a group of female professional dance students. Thirty-two dancers, aged 19–25 years, took part in the program. Evaluation was done by a series of questionnaires that participants were asked to complete on 3 occasions. Assessments of body composition and dietary intake were also performed. Significant improvements in nutrition knowledge as well as a decrease in abnormal eating behavior and dietary restraint were observed at post intervention. At 6-month follow-up, the positive effects were maintained and further benefits were recorded; only nutrition knowledge showed a minor decline. Participants who were at higher risk for adopting abnormal eating behavior benefited the most from the program. These findings encourage the implementation of intervention programs in groups of young women that experience particular pressures for controlling body weight.

Key Words: athlete, disordered eating, nutrition education, assessment

Introduction

Several studies have been carried out on the eating habits of dancers and their practices to lose weight and control dietary intake (1, 8, 10, 14, 16, 20). Results indicate that dancers use abnormal eating behaviors, such as severe food restriction, fasting, excessive exercise, binge eating, vomiting, and use of laxatives, and are at higher risk than non-athletes for developing eating disorders (23).

Dance is a very special subculture with values, behaviors, and attitudes at variance with the general culture (15). The demand for an ultra-slim body shape and the consequent wish of thinness is an important contributor to the increasing evidence of abnormal eating behavior. Pressures from instructors, directors, choreographers, and peers; the competitiveness and anxiety for performance; and the need for control are among the factors that make dancers, both students and professionals,

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overconcerned with their body shape and size, and vulnerable to the development of abnormal eating practices (8, 15).

Evidence from previous studies show that, in general, dancers consume diets low in energy and several nutrients, make irrational use of dietary supplements, and are vulnerable to food misconceptions and nutrition-related fads (2, 4, 6, 10). Consequently, it is deemed essential that dancers receive a sort of nutrition education and become aware of the need for adequate energy and nutrient intake. Scientific research on dancers needs to be expanded and then translated into recommendations and intervention programs, based on a close liaison between the arts and the medical community. The aim of a nutrition intervention program would be to improve dancers’ health, prevent further complications related to inappropriate nutrition, and modify attitudes towards body and food. In this context, the nutrition education of dancers should be coupled with the primary prevention of eating disorders, as any nutrition issue may eventually involve some aspects of abnormal eating behavior (25). Primary prevention of eating disorders should aim to reduce their incidence, facilitate the adoption of healthful eating habits, and make the act of eating pleasurable again.

The aim of the present study was to implement and evaluate a nutrition intervention program in a group of professional dance students. Specific objectives of the program were to increase nutrition knowledge, facilitate the adoption of healthful eating habits and, at the same time, prevent incidence of eating disorders by improving eating behavior and developing positive attitudes towards food and body.

Methods

Thirty-two students, aged 19–25 years, of the Greek State School of Dance participated in this nutrition intervention program. The study protocol was approved by the Ethics Committee of Harokopio University, and subjects gave their consent to conduct this study. Complete data for the first assessment (right after the program/post-intervention) were obtained from 29 subjects (91%), whereas for the second assessment (6 months later/follow-up), from 23 subjects (72%). Descriptive characteristics are shown in Table 1. The intervention consisted of 12 weekly 2-hour lessons, including lectures, facilitated group discussions, and workshops. Issues addressed fall into three categories, namely nutrition education, primary prevention of eating disorders, and applied nutrition for dancers. The full content of the program has been described elsewhere (25).

The impact of the program on eating behavior and body dissatisfaction was evaluated by a series of questionnaires that participants were asked to complete on three occasions (pre-intervention, post-intervention, follow-up). The following questionnaires were used: the Eating Attitudes Test (EAT-26), the Dutch Eating Behavior Questionnaire (DEBQ), a Nutrition Knowledge Test (NKT), a Body Part Dissatisfaction Questionnaire (BDQ), and a Weight Dissatisfaction Scale.

EAT-26, a tool that has been widely used and validated, provides standardized self-report measures for assessing symptoms, concerns, and attitudes associated with abnormal eating behavior (7, 9). It consists of 26 items forming three individual subscales, characterized as Dieting (related to the avoidance of fattening foods and the preoccupation of being thinner), Bulimia and Food Preoccupation (involving items reflecting thoughts about food and those indicating bulimia), and Oral Control (relevant to the self-control of eating and the perceived pressure from
Table 1  Descriptive Characteristics of Dance Students Before the Intervention Program

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>32</td>
<td>20.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Age starting dancing (years)</td>
<td>32</td>
<td>6.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Age starting professional dancing (years)</td>
<td>32</td>
<td>14.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Hours of dancing per week</td>
<td>32</td>
<td>24.1</td>
<td>5.9</td>
</tr>
<tr>
<td>EAT-26 total</td>
<td>32</td>
<td>16.3</td>
<td>12.5</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>28</td>
<td>55.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>28</td>
<td>20.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Fat-free mass (kg)</td>
<td>28</td>
<td>43.7</td>
<td>4.0</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>28</td>
<td>20.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Energy intake (kcal/day)</td>
<td>26</td>
<td>1483</td>
<td>530</td>
</tr>
<tr>
<td>Protein intake (g/kg body weight)</td>
<td>26</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Protein intake (% in the total energy intake)</td>
<td>26</td>
<td>15.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Carbohydrate intake (% in the total energy intake)</td>
<td>26</td>
<td>47.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Fat intake (% in the total energy intake)</td>
<td>26</td>
<td>35.5</td>
<td>8.7</td>
</tr>
<tr>
<td>Alcohol intake (% in the total energy intake)</td>
<td>26</td>
<td>2.7</td>
<td>2.6</td>
</tr>
</tbody>
</table>

others to gain weight). Total score at or above 20 in the EAT-26 indicates abnormal eating behavior. DEBQ is a 33-item questionnaire designed to measure cognitive restraint of eating, eating in response to emotional states, and eating in response to external food-related stimuli (24). It consists of three corresponding subscales, namely Restrained Eating, Emotional Eating, and External Eating. Each scale reaches a score ranging from 1 to 5. The higher the score, the higher the degree of the eating behavior in question. NKT, a 25-item questionnaire, works as a measure of the dancers’ knowledge and misconceptions on nutrition matters. It was specifically designed for the purpose of the study, after reviewing relevant literature, interviewing dancers on their food habits and nutrition beliefs, and analyzing dancers’ 3-day food records (as a part of a previous study). Weight dissatisfaction was assessed by a 5-point scale (from \textit{my weight is well above from the one I wish} = 1 to \textit{my weight is well below from the one I wish} = 5) that subjects were asked to complete. Likewise, subjects completed a BDQ, where 10 parts of the body were listed, and respondents graded their feelings about one of them, from \textit{strongly like} = 1 to \textit{strongly dislike} = 5. Their sum measured body dissatisfaction, with high scores reflecting greater body dissatisfaction. BDQ, which is a modified version of the Body-Cathexis scale (21), has been previously used for measuring body dissatisfaction in young women (5).

Dietary intake was assessed by 3-day food records. Subjects were asked to record the type and amount of food and beverages consumed for 2 consecutive weekdays and 1 weekend day, using standard household measures (cups, tablespoons, etc). No Greek Food Composition Tables are available, so food intake data were analyzed using the Nutritionist V diet analysis software (FirstDataBank Inc., San Bruno, CA, U.S.) and the U.S. Food Composition Tables. Provided that the
micronutrient content of foods depends on the origin of the foodstuff and the fortification policy, the authors decided that reliable information could only be reported for macronutrient intake and not for vitamin and mineral intake.

Weight and height were measured using a spring scale and a wall-mounted stadiometer to the nearest 0.5 kg and 0.5 cm, respectively. BMI was calculated as weight/height$^2$ (kg/m$^2$). Body composition of dancers was estimated pre- and post-intervention using the bioelectrical impedance method and prediction equations specifically developed for dancers (26). Fat-free mass (FFM) and percent body fat (%BF) were determined. Complete pre- and post-intervention data on dietary intake were obtained from 22 subjects, whereas on body composition, from 24 subjects.

**Statistical Analysis**

Descriptive characteristics of the subjects are expressed as mean values (± standard deviations). The Anderson-Darling test has been used for the normal distribution of eating behavior and body image variables. Changes between the several assessment periods were evaluated by applying (a) for normally distributed variables, the paired-samples $t$-test procedure ($t$ statistic), and (b) for the non-normally distributed variables, the Wilcoxon signed-rank test ($z$ statistic). Stepwise multiple regression analysis was performed to identify possible predictors of the positive changes of the intervention program. (When each predictor variable was selected, the significance of its contribution to the $R^2$ of the equation was evaluated, $p_{entry} < .05$.)

**Results**

Descriptive characteristics of dance students in relation to their age, dance training practices, body composition, eating behavior, and diet before the initiation of the intervention program are presented in Table 1. Their mean age was 20.5 years (±1.6). They started dancing at the age of 6.3 years (±2.8), but their involvement in the world of professional dance started, on average, 8 years later. BMI values ranged between 17.6 and 23.2 kg/m$^2$. Their FFM was determined by BIA as 20.3 kg (±1.4); BF represented 20.7% (±3.5) of their body weight. On average, the daily caloric intake was 1483 kcal (±530), distributed as 15.4% from protein (±3.5), 47.9% from carbohydrate (±3.5), 35.5% from fat (±3.5), and 2.7% from alcohol (±3.5, range from 0 to 11%). Body composition, dietary intake, and eating behavior (scores in EAT-26 and DEBQ) were assessed in dancers who did not participate in the follow-up ($n=9$), and these values were compared with those of dancers who did. Drop-outs did not differ in the above mentioned parameters compared to the rest of the group.

The mean EAT-26 total score of the subjects before the intervention was 16.3 (±12.5). A significant decrease in the number of students who scored at or above 20 in the EAT-26 post-intervention compared to the pre-intervention scores was detected (13.8 vs. 34.5%; McNemar test, $p = .016$); this effect was maintained at follow-up. Scores on the assessment tools at pre-intervention, post-intervention, and 6-month follow-up are shown in Table 2. By the end of the intervention, scores of the total EAT-26 as well as of the Dieting scale decreased significantly ($p = .001$ and $p = .003$, respectively). There was no change in these parameters at 6-month follow-up, and scores were still significantly lower than those reported at pre-intervention (see Table 2). In the DEBQ, a statistically significant reduction was observed in the Restraint scale ($p = .001$); this improvement in eating behavior was
Table 2  Scores on the Assessment Tools Pre- and Post-intervention, and at 6-Month Follow-Up

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-intervention (n = 32)</th>
<th>Post-intervention (n = 29)</th>
<th>6-month follow-up (n = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAT-26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>16.25 ± 12.25</td>
<td>11.86 ± 10.56***</td>
<td>10.13 ± 7.9**</td>
</tr>
<tr>
<td>Dieting</td>
<td>9.16 ± 18.54</td>
<td>6.52 ± 7.37**</td>
<td>5.43 ± 5.72**</td>
</tr>
<tr>
<td>Oral control</td>
<td>4.16 ± 3.47</td>
<td>3.17 ± 2.96</td>
<td>1.74 ± 2.47*</td>
</tr>
<tr>
<td>Bulimia and food preoccupation</td>
<td>2.94 ± 3.17</td>
<td>2.17 ± 2.48</td>
<td>2.96 ± 2.87</td>
</tr>
<tr>
<td>DEBQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>3.00 ± 0.52</td>
<td>2.86 ± 0.59</td>
<td>2.67 ± 0.55***</td>
</tr>
<tr>
<td>Restraint</td>
<td>3.22 ± 1.03</td>
<td>2.84 ± 0.95***</td>
<td>2.69 ± 0.94</td>
</tr>
<tr>
<td>Emotionality</td>
<td>2.61 ± 0.77</td>
<td>2.59 ± 0.85</td>
<td>2.41 ± 0.73</td>
</tr>
<tr>
<td>Externality</td>
<td>3.29 ± 0.58</td>
<td>3.23 ± 0.52</td>
<td>3.00 ± 0.57***§</td>
</tr>
<tr>
<td>Weight dissatisfaction</td>
<td>4.06 ± 0.76</td>
<td>3.81 ± 0.79</td>
<td>3.83 ± 0.65</td>
</tr>
<tr>
<td>BDQ</td>
<td>24.75 ± 6.87</td>
<td>24.29 ± 5.21</td>
<td>22.09 ± 6.27**</td>
</tr>
</tbody>
</table>

Note. Values expressed as mean ± SD. EAT-26: Eating Attitudes Test; DEBQ: Dutch Eating Behavior Questionnaire; BDQ: Body part Dissatisfaction Questionnaire.

*Significantly different from the pre-intervention scores at p < .05. **Significantly different from the pre-intervention scores at p ≤ .01. ***Significantly different from the pre-intervention scores at p ≤ .001. §Significantly different from the post-intervention scores at p < .05.

maintained at the follow-up. No significant changes were detected on the Emotional Eating (eating in response to emotional states, especially anxiety and depression) or External Eating (eating in response to external food-related stimuli) subscales at post-intervention. Nevertheless, a significant improvement on the External Eating subscale was measured 6 months after the completion of the intervention (p = .011). At 6-month follow-up, mean total DEBQ score was lower than at pre-intervention (p < .001), reflecting the additive effect of lesser changes that occurred in the scales of DEBQ.

The analysis was repeated after subjects were divided into two groups according to their pre-intervention total EAT-26 score, namely those who scored at or above 20 (high-scorers) and those who did not (low-scorers) (n = 11 vs. n = 21). Most of the above findings were also observed in the separate analysis. Besides, some variant changes became evident. Positive changes in the Dieting scale reached significance only in the high-scorers group (p = .02), whereas, 6-months later, Dieting scores were further decreased (p = .026). Additionally, only in this group a significant improvement on the External Eating subscale was observed at follow-up (p = .045).

A marked improvement in nutrition knowledge (mean scores before and after the intervention: 14.8 and 23.7, respectively; p < .0001) was noticed for all program
participants. However, at 6-month follow-up, nutrition knowledge declined to a small, but statistically significantly, extent (mean value: 22.50, \( p = .011 \)). Additionally, it was shown that, although nutrition knowledge of low-scorders for the EAT-26 decreased slightly during the follow-up period (\( p = .013 \)), no such trend was observed for dance students who scored at or above 20 in the total EAT-26 (\( p = .522 \)).

Regarding weight and body dissatisfaction, there was a marginally significant improvement in the way dancers were feeling about their body weight after the intervention (\( p = .052 \)). Moreover, changes in the body dissatisfaction questionnaires did not reach a level of significance (\( p = .062 \)). No further changes were measured at follow-up.

Intake of most nutrients did not change throughout the study, either in the whole group or when low and high scores were examined separately. However, alcohol intake, both as absolute intake and as percent of total energy intake, decreased; daily alcohol consumption was 5.8 g per person pre-intervention as opposed to 1.4 g post-intervention (\( p = .009 \)). In other words, alcohol provided 2.5% of the total dietary intake pre-intervention as compared to 0.8% post-intervention (\( p = .004 \)). Body weight and fat-free mass did not exhibit any significant change either statistically or physiologically at the end of the program (\( p = .64 \) and \( p = .058 \), respectively).

Stepwise multiple regression analysis has been used to identify predictor variables of the program outcomes. Post-intervention changes in the total EAT-26 score and the NKT were treated as dependent variables, whereas pre-intervention scores in the total EAT-26, in the NKT, BMI, age, and training patterns were treated as independent variables. Pre-intervention score in the total EAT-26 and age were the only parameters that entered both models, explaining 43% and 55% of the variance in the total EAT-26 and in the NKT changes, respectively.

Discussion

The results of the study suggest that nutrition knowledge and reported eating behavior of dancers can be improved even after a short-term nutrition intervention program, which aimed not only at the provision of information, but also at changing the way young dancers view and behave towards eating and food, and how they feel about their body. Nutrition knowledge, however, was reduced a few months after the completion of the program, and a further reduction may be expected down the road. Behavioral changes, on the contrary, seem to have a more permanent character; not only did reported improvements in eating behavior persist after the completion of the study, but eating attitudes, such as emotional eating, were also positively modified during the follow-up period.

Importantly, body weight and body composition of the dancers were not affected by the behavioral changes. This finding is in discordance with the popular belief among dancers that reducing their restraint towards food will seriously affect their body weight. Similarly, calorie and nutrient intake did not change in response to this nutrition intervention program. This was a rather expected outcome. The program primarily aimed at changing behavior towards food and eating; after normalizing this behavior, long-term changes would also be expected in food intake. Follow-up analysis at a food level would be interesting in order to detect changes in 1 or 2 years.
Participants who were at high risk to adopt abnormal eating attitudes (i.e., high-scorers at pre-intervention) were the ones who benefited the most from the program. This is in agreement with the finding of a previous study aiming to prevent dieting-induced disorders (12). There is evidence that prevention programs may exacerbate eating and weight concerns of vulnerable or high-risk individuals and may encourage the adoption of abnormal symptomatology (3). For avoiding this undesirable outcome, in the present program, there was no direct reference to eating disorders and their symptoms. Rather, discussions were conducted on the complications of rapid weight loss, weight cycling, fasting or severe food restriction, and avoidance of “high-calorie or fattening” perceived foods. Most of the messages were given in the positive direction: Emphasis was put on developing positive attitudes towards body, accepting natural diversity of body shapes, reevaluating societal and dance body standards, changing views towards fat, reconsidering food misconceptions and, importantly, rejecting the classification of food items as “bad” and “good.” The role of exercise (especially aerobic exercise, which is not part of their daily training) and the importance of maintaining regular meal patterns were underlined. As proposed by Shisslak et al. (22), desensitization to personal comments about body shape by dance instructors and other significant people was also incorporated into the program. Bearing in mind that dance instructors are in a very critical position to provide positive, health-enhancing messages to young dancers, the professional staff of the school was informed of the scope of the program and familiarized with the philosophy and approaches used.

Among the primary aims of the present study was to induce positive changes in the reported eating behavior of dancers and thus prevent abnormal eating. Previous studies attempting to change eating behavior have come up with inconsistent results (3, 11–13, 17, 18). Study outcome, however, is highly dependent on the follow-up period and the evaluation tools that have been used, attributes that varied greatly among the aforementioned studies. Moreover, the characteristics of the target group (i.e., age), as well as its propensity for developing abnormal eating behavior, may also explain the outcome diversity.

Few prevention programs have targeted young adult females and even fewer, at a high risk setting for the development of eating disorders. Piran (19) reports the positive results of an ongoing prevention program in a competitive ballet school focusing on creating systemic changes within the school. Significant reductions were observed in restrictive eating and disturbed attitudes towards body and food in this group of adolescent dancers. Nevertheless, moving to adult dancers, and bearing in mind the high-risk setting of a dance school or company, circumstances may become more complicated. The present study is the first that attempted to intervene in a group of young adult women, exposed to considerable pressures to reach and maintain an ethereal silhouette at great cost to their health.

The absence of a control group in the study poses the question of whether the observed changes are the outcome of the intervention or the normative effects of dance students’ maturation during a school year. Considering that this program was incorporated in their weekly training program, it was not possible to randomly exclude students from this so-called “seminar” in order to be used as controls. Additionally, recognizing that in every dance school or company various factors may predispose or disfavor the appearance of abnormal eating attitudes, it would be inappropriate to use as controls dancers from another school of dance. In that case, other factors would interfere with the program outcome. On the other hand, it is
highly unlikely that the positive results observed were due to the maturation during a school year. The program began at the start of the school year and ended 3 months later. An increase in abnormal eating practices would be normally expected as time passes, not a decrease. Furthermore, the follow-up assessment occurred just before final examinations, a stressful period that hardly supports beneficial changes in eating behavior. Dance students managed to resist the intense environment, and no reversal of the changes was detected.

Response rate in the follow-up was somewhat lower than at post-intervention, giving ground for a concern that the dropouts magnified the positive changes. The fact that no differences in the EAT-26 scores were observed between dancers who were included in the follow-up and those who were not indicate that drop-outs did not differ from the overall group, at least in their general eating behavior.

In conclusion, results of the present study indicate that young women, who are experiencing particular pressures to maintain a slim body shape and control dietary intake, may benefit from intervention programs that aim to prevent disturbed eating. Implementation of such programs is therefore encouraged. Their effectiveness was evaluated for a 6-month period; further studies, however, are required in order to assess the long-term impact on the nutritional status of young women at high risk for disturbed eating patterns. Particularly for dancers, long-term multi-disciplinary programs are of major importance and therefore should be incorporated in the weekly training schedule to assure the permanence of effects in the way young dancers view eating and food, and how they feel about their bodies.

References


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