

Eating and Weight Disorders

Studies on Anorexia, Bulimia and Obesity

Vol. 13 - No. 3 - September 2008

PRINT CONTENTS

Original Research Papers

- 111 *M.C. Escoto Ponce de León, J.M. Mancilla Díaz, and E.J. Camacho Ruiz*
Eating disorder prevention
- 119 *T. Yanover, and W.P. Sacco*
Eating beyond satiety
- 129 *B. Roth, S. Munsch, A. Meyer, E. Isler, and S. Schneider*
Obese children and mothers' psychopathology
- 137 *D. Hambrook, and K. Tchanturia*
Machiavellianism in anorexia nervosa
- 142 *G.M. Ruggiero, S. Bertelli, L. Boccalari, F. Centorame, A. Ditucci, C. LaMela, A. Scarinci, P. Vinai, S. Scarone, and S. Sassaroli*
Stress, cognitive variables and measures of eating disorders
- 149 *Z.L. Tao, and W.F. Zhong*
Chinese mothers' and children's attitudes

ELECTRONIC CONTENTS

Proceedings of the Symposium "Advancements in Neuroendocrine and Autonomic Control of Metabolic Functions and their Pathological Significance"
Verona, Italy, September 27, 2007

- e40 *A. Bartolomucci, A. Moles, and E.E. Müller*
Introduction
- e42 *S. Gaetani, W.H. Kaye, V. Cuomo, and D. Piomelli*
Acylethanolamides and eating disorders
- e49 *A. Bartolomucci, A. Moles, A. Levi, and R. Possenti*
Pathophysiological role of TLQP-21
- e55 *R. Coccarello, F.R. D'Amato, and A. Moles*
Olanzapine delayed feeding termination
- e61 *E.E. Müller*
Control of metabolic functions
- e67 *E. Bresciani, L. Tamiasso, A. Torsello, I. Bulgarelli, D. Rapetti, S. Caporali, D. Perrissoud, A. Moulin, J.A. Fehrentz, J. Martinez, and V. Locatelli*
Non-peptide ligands of ghrelin receptor



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**CONTENTS OF
VOLUME 13,
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PRINT CONTENTS

Original Research Papers

- 111 *M.C. Escoto Ponce de León, J.M. Mancilla Díaz, and E.J. Camacho Ruiz*
A pilot study of the clinical and statistical significance of a program to reduce eating disorder risk factors in children
- 119 *T. Yanover, and W.P. Sacco*
Eating beyond satiety and body mass index
- 129 *B. Roth, S. Munsch, A. Meyer, E. Isler, and S. Schneider*
The association between mothers' psychopathology, childrens' competences and psychological well-being in obese children
- 137 *D. Hambrook, and K. Tchanturia*
A pilot study exploring Machiavellianism in anorexia nervosa
- 142 *G.M. Ruggiero, S. Bertelli, L. Boccalari, F. Centorame, A. Ditucci, C. La Mela, A. Scarinci, P. Vinai, S. Scarone, and S. Sassaroli*
The influence of stress on the relationship between cognitive variables and measures of eating disorders in healthy female university students: A quasi-experimental study
- 149 *Z. Tao, and W. Zhong*
The correlation of Chinese mothers' eating attitudes and psychological characteristics with their children's eating attitudes, as well as the gender effect on eating attitudes of children

ELECTRONIC CONTENTS

Proceedings of the Symposium "Advancements in Neuroendocrine and Autonomic Control of Metabolic Functions and their Pathological Significance"
Verona, Italy, September 27, 2007

- e40 *A. Bartolomucci, A. Moles, and E.E. Müller*
Advancements in neuroendocrine and autonomic control of metabolic functions and their pathological significance
- e42 *S. Gaetani, W.H. Kaye, V. Cuomo, and D. Piomelli*
Role of endocannabinoids and their analogues in obesity and eating disorders
- e49 *A. Bartolomucci, A. Moles, A. Levi, and R. Possenti*
Pathophysiological role of TLQP-21: Gastrointestinal and metabolic functions
- e55 *R. Coccarello, F.R. D'Amato, and A. Moles*
Chronic administration of olanzapine affects Behavioural Satiety Sequence and feeding behaviour in female mice
- e61 *E.E. Müller*
Neuroendocrine and autonomic control of metabolic functions: Recent advances
- e67 *E. Bresciani, L. Tamiazzo, A. Torsello, I. Bulgarelli, D. Rapetti, S. Caporali, D. Perrissoud, A. Moulin, J.-A. Fehrentz, J. Martinez, and V. Locatelli*
Ghrelin control of GH secretion and feeding behaviour: The role of the GHS-R1a receptor studied in vivo and in vitro using novel non-peptide ligands

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A pilot study of the clinical and statistical significance of a program to reduce eating disorder risk factors in children

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ABSTRACT. *The current study used clinical and statistical significance tests to investigate the effects of two forms (didactic or interactive) of a universal prevention program on attitudes about shape and weight, eating behaviors, the influence of body aesthetic models, and self-esteem. Three schools were randomly assigned to one, interactive, didactic, or a control condition. Children (61 girls and 59 boys, age 9-11 years) were evaluated at pre-intervention, post-intervention, and at 6-month follow-up. Programs comprised eight, 90-min sessions. Statistical and clinical significance tests showed more changes in boys and girls with the interactive program versus the didactic intervention and control groups. The findings support the use of interactive programs that highlight identified risk factors and construction of identity based on positive traits distinct to physical appearance.*

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INTRODUCTION

There is consensus that eating disorders are multifactorial and reflect the accumulative effect of multiple genetic, psychological, familial, and sociocultural risk factors (1). Prevention of eating disorders involves an intervention that can interrupt accumulation of these factors, decreasing the likelihood of developing an eating disorder. The modifiable risk factors include diet, negative body image (2), low self-esteem (3), thinness idealization (4), drive for thinness, avoidance of fatty foods (5), and body dissatisfaction (6).

It has been suggested that men and their evaluation, should be included in eating disorder prevention programs, because they are part of the social environment that creates and maintains unhealthy diet norms and exerts pressure for thinness (7). Additionally, males comprise 9-10% of the eating disordered population (8, 9). However, few universal prevention programs have included prepubertal adolescent males (10-12).

Didactic programs, which introduce information to participants using an expository method, have achieved changes in participants' knowledge but not in attitudes

or behaviors. However, changes in attitudes and unhealthy behaviors using interactive programs, which include discussion, guided discovery, cognitive techniques, and cognitive dissonance, have been accomplished (13).

Usually, the effectiveness of prevention programs has been evaluated using statistical significance tests. Comparisons between pre-post treatment data to determine whether a prevention program is responsible for change in functioning relative to a control or comparison group are common. Such tests evaluate the change in likelihood but do not evaluate the effectiveness of an intervention in terms of the number of participants for whom risk is reduced, that is, whether the results of the intervention are clinically significant. Jacobson et al. (14) proposed a method to evaluate and compare the clinical significance of treatments: the reliable change index. Moreover Kendall et al. (15), proposed an additional approach known as normative comparisons. The evaluation of clinical significance represents an important proceed in the assessment of therapy outcome research, which extends to prevention as well (16).

The purpose of this study was to use clinical

Key words:

Prevention, school-based intervention, early intervention, children, eating disorders.

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cal and statistical tests of significance to evaluate the effects of two forms (didactic or interactive) of a universal eating disorders prevention program for fifth-grade boys and girls. We hypothesized that the interactive program would decrease inappropriate attitudes and behaviors, related to feeding, body shape, and weight, and increase self-esteem in comparison to didactic program and a control condition.

METHOD

Participants

The sample (61 girls and 59 boys; age 9-11 years, $M=9.93$, $SD=0.44$) was recruited from three elementary public schools in the northern part of Mexico City. The three schools had three classes of fifth graders. In each school, one of three classes was randomly assigned to each condition. First school received interactive program (21 girls and 20 boys); second school received didactic program (19 girls and 21 boys); and last school was the control condition (21 girls and 18 boys). The study started at the beginning of the school year, and the attrition rate was 0% at post-intervention and follow-up.

Intervention

The intervention comprised the application of the body image program designed and published previously (17). This program is based on Social Cognitive Theory (SCT), which states that behaviour is influenced by the interaction between cognitive and emotional processes within the person. Within the eating disorder literature, particular attention is given to the sociocultural factors that create or maintain disordered eating. The focus of SCT-driven prevention programs is on decreasing risk factors associated with disordered eating (using cognitive-behavioural techniques), while also nurturing protective factors (18). From this perspective, the program focuses on changes of adolescence, sociocultural pressures for thinness, coping to adverse comments about weight and shape, dissatisfaction with body shape, self-esteem, and healthy eating. The program includes eight units, each one delivered in a 90-min weekly session. There were two versions of the intervention. In the interactive version, extensive use of discussion, guided discovery, role-play, guided meditation, and free-write exercises was made. The didactic version offered the same topics and contents using a primarily didactic expositive approach and included questionnaires, analysis, discussion, and homework (Appendix 1). The first author administered the interventions.

Measures

Eating disorder symptoms

The Children's Eating Attitudes Test (ChEAT) (19) was used to assess eating disorder symptoms. This 26-item test is a well-established scale designed to assess maladaptive or problematic attitudes and behaviors among children (19, 20). Each item is rated on a Likert scale from 1 (always) to 6 (never), and for each question, the most symptomatic response is recoded to score of 3, the next to 2, and the next to 1. The next choices receive a score of 0, so ChEAT's scores range from 0 to 78. Maloney et al. (19) found an adequate test-retest reliability (0.81) and internal reliability (0.76) for a sample of 3rd-6rd graders. Smolak et al. (20) also found adequate internal reliability (0.87) and demonstrated an acceptable concurrent validity. A ChEAT's Spanish version showed internal reliability and concurrent validity acceptable for a Mexican sample (21). To assess eating disorder symptoms, ChEAT's total score was used. Cronbach's alpha for the present study was 0.82.

Body dissatisfaction

Total score on Body Shape Questionnaire (BSQ) was used to assess body dissatisfaction (22). Each item is rated on a Likert scale from 1 (never) to 6 (always), and for each question, the most symptomatic response is recoded to score of 6, so BSQ's scores range from 34 to 204. Higher BSQ scores reflect greater body shape dissatisfaction. This 34-item test was adapted for the Spanish population (23), and it has been used with 12-year (24) and 10-year Mexican children (5). BSQ has a Cronbach's alpha of 0.98 for México (25) and 0.97 for Spain (26). Internal consistency in this study was 0.93.

Overeating

The Bulimia Test's (BULIT) (27) Overeating Subscale proposed by Álvarez et al. (28) was used. Cronbach's alpha for the present study was 0.85 for this subscale.

Influence of body aesthetic models

The Influence of the Body Aesthetic Models Questionnaire (CIMEC) (29) is a 40-item instrument. Each item is rated on a Likert scale from 1 to 3, so CIMEC's scores range from 40 to 120, and higher scores reflect greater influence of the models. CIMEC has been used in Mexican children with a mean age of 10 years (5), and adolescents from 11 to 18 years (30). The alpha reliability coefficient of 0.94 indicates that the CIMEC has satisfactory internal consistency in a sample of 14 to 33-year females (5). We used the total score, and Cronbach's alpha for the present study was 0.92.

Self-esteem

The Children's Self-Esteem Inventory (PAI) (31) evaluates one's self-perception and ideal. The 21-item inventory was validated in Mexico by Caso (32), who found a good reliability ($\alpha=0.82$). In this study, we used the total score, with a Cronbach's alpha of 0.84.

Procedure

Before beginning of the study, children and their parents were informed of nature of program and provided signed consent to participate and allow anonymous use of data. All participants completed the instruments as part of the class curriculum in three times: Before the intervention, 1 week after completing the intervention, and at a 6-month follow-up. Children were asked to provide sociodemographic data required for the study at the first time point only. The instructions for each instrument were read aloud to participants. Once everyone understood how to answer the questions using a Likert scale, the researcher read and slowly repeated each question in the scale. Each participant received a white sheet of paper as a guide to identify the line corresponding to each question. At the end of each page, they were asked to check that they had answered all the questions and then, to continue reading on the following page. Each questionnaire was administered in a session in the next order: ChEAT, CIMEC, BSQ, PAI, and the BULIT Overeating subscale. The same procedure was used in pre-intervention, post-intervention, and at follow-up.

The interventions were delivered 1 week after participants first completed the instruments, in presence of the children's teacher. We asked teachers not to discuss the content of the program in between sessions or after finishing it. To prevent communication between participants, a different school for each condition was selected.

Data analysis

SPSS 10.0 was used for statistical analyses. To determine if participants in the intervention programs experienced reductions over time in comparison to control group, repeated measures ANOVA were applied to each dependent variable (self-esteem, body dissatisfaction, overeating, influence of body aesthetic models, and ED symptoms) using the within-subjects factor time (pre-intervention, post-intervention, and follow-up) and the between-subjects factor condition (interactive, didactic, and control). The Bonferroni test ($p<0.05$) for post hoc comparisons was used. Power analysis was performed using G*Power Software (33).

The clinical significance of change was examined in two ways. First, we calculated the Reli-

able Change Index (RCI) (14); a RCI >1.96 indicates that the change was due to a nonrandom treatment effect, with 95% reliability. Second, we performed normative comparisons of treatment effects using the procedures proposed by Kendall et al. (15). Normative comparisons included only those participants who surpassed ChEAT's cut-off (score ≥ 15) (19) at pre-intervention.

RESULTS

Preliminary analysis

One-way ANOVA at pre-intervention indicated no significant group differences ($p>0.05$) in age, nutritional index, body dissatisfaction, overeating, the influence of body aesthetic models, and self-esteem scores for girls and boys, separately.

Statistically significant changes

Table 1 shows participants' mean scores on dependent measures at the three times. There were no gender effects on any variable at post-intervention or follow-up ($p>0.05$).

Changes in girls

For body dissatisfaction scores, there were main effects of group, $F(2, 58) = 7.51$, $p=0.001$ only. There was a small decrease in body dissatisfaction scores from pre-intervention to post-intervention and follow-up for the interactive group, while there was no change in scores for didactic and control groups.

For overeating scores, there were main effects of group, $F(2, 58) = 3.39$, $p=0.04$, only. Overeating scores decreased from pre-intervention to follow-up in the interactive group but did not reach significance. There were no changes for the didactic and control groups.

A main effect of Time x Group interaction, $F(2, 58) = 2.71$, $p=0.03$, was observed for the influence of body aesthetic models. In the interactive group, there was a significant decrease in the scores from pre-intervention to follow-up, while there were no changes for didactic and control groups.

For self-esteem, there were main effects of group, $F(2, 58) = 4.03$, $p=0.02$, and Time x Group interaction, $F(2, 58) = 7.60$, $p=0.001$. However, scores did not reach significance for the interactive and didactic groups.

For ChEAT' scores, there were main effects of group, $F(2, 58) = 5.66$, $p=0.006$ only. Scores decreased from pre-intervention to post-intervention and follow-up in the interactive group but did not reach significance. There were no changes for the didactic and control groups.

TABLE 1
Mean scores of groups on pre-treatment, post-treatment, and follow-up.

Scale/ group	Boys				Girls			
	Time			F	Time			F
	Pre M (EE)	Post M (EE)	Follow-up M (EE)		Pre M (EE)	Post M (EE)	Follow-up M (EE)	
Body dissatisfaction								
Interactive	73.15 (6.84)	55.70 (5.14)	55.90 (4.23)	3.31*	58.67 (5.63)	45.67 (2.72)	47.43 (2.54)	3.27*
Didactic	73.19 (7.21)	60.00 (5.47)	62.24 (4.98)	1.40	75.84 (5.74)	66.53 (6.72)	69.00 (5.11)	0.67
Control	76.56 (7.17)	71.72 (7.27)	69.89 (8.09)	0.21	73.33 (6.05)	74.24 (6.77)	75.33 (7.45)	0.02
Overeating								
Interactive	21.50 ^a (1.91)	18.95 ^b (1.47)	15.00 ^b (0.98)	4.75*	17.14 (1.16)	15.86 (1.59)	13.95 (1.01)	1.57
Didactic	19.43 (1.30)	21.38 (2.03)	16.52 (0.99)	2.65	19.58 (1.40)	20.74 (2.04)	17.63 (1.55)	0.87
Control	20.11 (1.50)	17.33 (1.21)	21.11 (1.18)	2.25	19.76 (1.27)	18.43 (1.70)	20.62 (1.16)	0.63
Body aesthetic models influence								
Interactive	19.20 (3.81)	14.35 (3.96)	10.85 (2.44)	1.46	15.29 (4.02)	9.9 (2.78)	7.05 (1.14)	2.09
Didactic	17.57 (3.68)	15.24 (2.86)	8.90 (2.10)	2.30	21.42 (3.55)	16.32 (2.85)	18.58 (4.12)	0.52
Control	16.00 (2.49)	18.50 (3.23)	14.33 (2.82)	0.54	14.33 (2.21)	19.05 (2.92)	17.29 (2.94)	0.77
Self-esteem								
Interactive	54.05 ^a (1.53)	55.25 ^b (1.62)	59.50 ^b (0.78)	4.42*	60.10 (0.98)	56.67 (1.83)	60.69 (0.77)	3.09
Didactic	54.10 (1.50)	52.62 (1.79)	57.29 (1.31)	2.39	54.95 (1.63)	54.84 (1.67)	58.68 (1.08)	2.17
Control	55.11 (1.94)	53.61 (2.03)	56.78 (1.50)	0.74	55.10 (1.25)	54.05 (1.62)	56.38 (1.33)	0.69
Eating disorder symptoms								
Interactive	11.75 (2.27)	9.40 (2.14)	5.30 (1.18)	2.88	7.24 (1.26)	4.81 (1.32)	4.43 (0.97)	1.64
Didactic	9.43 (1.72)	10.29 (1.96)	5.95 (2.16)	1.38	8.79 (2.28)	10.32 (2.88)	6.84 (1.83)	0.54
Control	11.28 (2.56)	7.28 (2.82)	7.44 (2.12)	0.81	11.76 (2.04)	15.57 (2.38)	11.43 (2.04)	1.13

M=mean; SE=standard error. Means within the same row with different subscripts were statistically significantly different ($p < 0.05$). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Changes in boys

For body dissatisfaction scores, there were main effects of time, $F(2, 56) = 9.15$, $p = 0.0001$ only. There was a decrease in body dissatisfaction scores from pre-intervention to post-intervention and follow-up for the interactive group, while there was no change in scores for didactic and control groups.

For overeating scores, there were main effects of group, $F(2, 56) = 5.09$, $p = 0.01$, and Time x Group interaction, $F(2, 56) = 6.07$, $p = 0.0001$. There was a significant decrease from pre-intervention to follow-up in the interactive group. There were no changes for didactic and control groups.

A main effect of time, $F(2, 56) = 8.14$, $p = 0.001$, was observed for the influence of body aesthetic models. Both, in the interactive and didactic group, there were a decrease in the scores from pre-intervention to post-intervention and follow-up however did not reached significance.

For self-esteem, there were main effects of time, $F(2, 56) = 9.18$, $p = 0.0001$ only. Scores significantly increased from pre-intervention to follow-up for interactive group.

For ChEAT' scores, there were main effects of group, $F(2, 56) = 5.66$, $p = 0.006$ only. Scores decreased from pre-intervention to post-intervention and follow-up in the interactive group

but did not reach significance. There were no changes for didactic and control groups.

Clinically significant changes

Reliable change index (RCI)

Table 2 indicates the percentage of subjects who showed a positive change, above a RCI of 1.96 at post-intervention or follow-up. Deterioration effect was not found in any cases. A number of relatively higher positive RCI percentages were found for intervention groups in comparison to control. In contrast, no cases in control group showed reliable change (omitted data). Boys in interactive group showed reliable change on all variables whereas in didactic group improvement was found in all scales except for overeating. Changes in girls were almost the same in all scales, except for overeating and ED symptoms.

Normative comparisons

Normative comparisons of the effects of treatments were made for participants who surpassed ChEAT's cut-point. In girls interactive intervention promoted significant clinically changes in scores on all scales, whereas didactic intervention promoted changes in self-esteem only. In boys, both interactive and didactic intervention promoted changes in all scales except in eating disorders symptoms. In all cases, changes were maintained to follow-up. It is important to establish that there were no wrong outcomes.

TABLE 2

Participants that showed an improvement (Reliable Change Index >1.96) from pre-treatment to post-treatment and pre-treatment to follow-up.

Scale	Interactive % participants		Didactic % participants	
	Girls (n=21)	Boys (n=20)	Girls (n=19)	Boys (n=21)
Body dissatisfaction				
Post	19.05	40.00	26.32	23.81
Follow-up	9.52	40.00	26.32	19.05
Overeating				
Post	0.00	10.00	0.00	4.76
Follow-up	4.76	25.00	10.53	9.52
Body aesthetic models influence				
Post	14.29	15.00	26.32	14.29
Follow-up	23.81	35.00	26.32	38.10
Self-esteem				
Post	9.52	40.00	31.58	19.05
Follow-up	14.29	50.00	52.63	47.62
ED symptoms				
Post	4.76	15.00	5.26	4.76
Follow-up	9.52	20.00	10.53	23.81

Note: Improvement in control group was 0% in all variables.

DISCUSSION

This study focused on development, implementation, and evaluation of a universal eating disorder prevention program for fifth-grade boys and girls in a school environment. Participants reported decreases in scores on overeating and influence of body aesthetic models. These results are consistent with those for focused prevention aimed at adolescent women (34-36) and partially support the idea that interactive programs, emphasizing social competences and instruction of social ability, promote more changes than do didactic programs emphasizing transmission of information (13). We did observe some changes in behaviors of boys and girls in didactic group. This can be explained by the program content and the inclusion of tasks such as questionnaires, interviews, and reflections, which probably promoted self-reflection.

Tests of clinical significance determined that the most widespread improvement occurred in the interactive group. These changes are attributable to intervention, which in the literature has been shown to decrease identified risk factors, including social idealization of thinness, which leads to body dissatisfaction and recurrent restrictive dieting to lose weight (37).

Of the participants with eating disorder symptoms before the intervention, a higher percentage of girls in the interactive group than in the didactic group showed improvement. These results are in accordance with those reported by Stice et al. (13), who found that interactive interventions promoted more changes than did didactic interventions. It is relevant to point out that equivalence tests indicated that the scales had sufficient statistical power to determine the effectiveness of the interventions.

We did not find evidence of harmful effects of the interventions (38). Our results are attributable to the fact that program content did not include information about eating disorders or methods for weight control.

Previous studies on eating disorder programs, evaluated the effects of only one modality, interactive or didactic. Thus, our study makes an important contribution in this sense. In addition, our participants were boys and girls aged 9-11 years, and our goal was to establish an authentic scenario in order to reflect the natural social environment of children, because the literature indicates that men are part of a subculture that supports the idealization of thinness (7).

Our results support the idea that lessons directed to develop a sense of identity based on

competencies rather than physical appearance, increase self-esteem by confronting participants with idea that it is necessary to be slender to achieve health, success, and good interpersonal relationships. This may have a positive effect on the unhealthy and unreal attitudes that culture promotes.

The sample size was small, so results should be interpreted with caution. Because the groups were small, random assignment is of limited utility. However, statistical power was between 0.59 and 1.00 for all scales except self-esteem, where it was 0.24.

In future investigations, it is important that in addition to self-report questionnaires, also blind diagnostic interviews be used to evaluate

eating disorder symptoms, because they offer a more precise evaluation. It is necessary to replicate the study with a larger sample size including students from both, public and private schools. This would increase the statistical power and generalizability. In addition, it will be important to conduct investigations with a longer follow-up, in order to verify if effects continue.

The two programs were administered by the author of the study. Unfortunately, the design of the study did not include any instrument to evaluate the fidelity of the program administration (e.g., to record the intervention and to have a blind supervisor that evaluate the recorded prevention sessions).

APPENDIX 1.

Activities used in programs. (cont).

Unit/Content	Interactive	Activities/techniques	Didactic
I. Program Introduction. Interpersonal relationships.	Modeling, role-play with verbal self-instruction, feedback, and reinforcement: Dealing with others. Free-writing: Interpersonal feelings. Homework: Start a conversation with a neighbor and a partner of another group.	Script information, brainstorm, reading and free-writing: Interpersonal relationships. Homework: Same as interactive.	
II. Positive self-affirmations. Qualities unrelated to appearance.	Modeling, role-play with verbal self-instruction, feedback, and reinforcement: positive self-affirmations. Homework: Identify qualities of oneself unrelated to appearance, increasing every day a positive thing.	Script information, brainstorm, and free-writing. Scramble: Self-affirmations. Homework: Same as interactive.	
III. Changes in adolescence. Prejudices about shape and weight. Fat myths.	Guided discovery: Changes in adolescence. Cognitive restructuring and feedback: Prejudices about obese and thin people using clips from magazines. Homework: Elaborate a family album, commenting on changes that have happened in their lives.	Script information, reading, brainstorm, and free-writing: Changes observed in partners or familial adolescents, prejudices about shape and weight, and fat myths. Homework: Same as interactive.	
IV. Assertiveness in situations related to shape and weight.	Role-play and partners as tutors that model (using verbal self-instruction) assertive, passive, and aggressive answers to sociocultural pressure toward shape and weight. Free-writing: Overweight. Homework: Approach somebody whom you judged for their aspect and write how he/she really is. Do not include aspects of his/her appearance.	Script information, discussion, reading, and scramble: Assertive, passive, and aggressive answers. Free-writing: Overweight. Homework: same as interactive.	
V. Resistance to sociocultural pressures for thinness.	Comparing personal values vs. media values that magazines promote. Modeling and role-play: Resistance to media messages. Role-play using verbal self-instruction: Teasing Homework: Disagreement letter about magazine messages. Record eating habits.	Script information and free-writing: Media messages and values. Brainstorm: Magazine content. Case study: Teasing Homework: Same as interactive.	

APPENDIX 1.
Activities used in programs

Unit/Content	Interactive	Activities/techniques	Didactic
VI. Healthy feeding.	Food classification. Menu preparation. Compare preferred foods (record) to nutritional pyramid. Homework: Interview the person that prepares meals at home; ask about healthy foods that he/she included in the menu.		Script information, brainstorm and scramble: Healthy/unhealthy feeding. Questionnaire: Feeding preferences. Homework: Same as interactive.
VII. Feeding and handling emotions.	Description of situations where they have felt different emotions and how to respond to them. Role-play with reinforcement and feedback: Expression of different emotions. Guided meditation: Management of emotions. Homework: Ask other people in which body part they feel different emotions.		Script information: Appropriate expression of emotions. Reading, case study and free-writing: Emotional hunger and ways to answer to it. Homework: Same as interactive.
VIII. Healthy relationships. Conflict solving.	Elaboration of a social constellation. Identification of interpersonal problems. Role-play with expression of emotions and feelings related to interpersonal problems. Closure: Agreement to apply what was learned.		Script information, case reading, and free-writing. Closure: Same as interactive.

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