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Title: Disordered eating behaviors and body image in a longitudinal pilot study of adolescent

girls: What happens two years later?

Authors: Paola Espinoza¹, Eva Penelo² & Rosa M. Raich¹

¹ Departament de Psicologia Clínica i de la Salut, Universitat Autònoma de Barcelona, Spain

² Laboratori d'Estadística Aplicada, Departament de Psicobiologia i Metodologia de les Ciències

de la Salut, Universitat Autònoma de Barcelona, Spain

Correspondence: Paola Espinoza, Departament de Psicologia Clínica i de la Salut, Universitat

Autònoma de Barcelona, Edifici B Facultat Psicologia, Campus UAB, 08193 Bellaterra

(Cerdanyola del Vallès), Spain. Tel: +34 581 31 70; fax: +34 581 21 25; email:

pegespinoza@hotmail.com

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Abstract

We assessed the prospective association of risk factors for eating and body image disturbances after a two-year follow-up in a community sample of Spanish adolescent girls. The participants included 128 Spanish girls aged 12-14, who took part in a 28-month prospective study. Aspects assessed were eating attitudes (Eating Attitudes Test), influence of the body shape model (Questionnaire on influences of the aesthetic body shape model), extreme weight control behaviors (Eating Disorder Examination-Questionnaire), body image (Body Image Questionnaire) and Body Mass Index (BMI). BMI, extreme weight control behaviors and body image problems emerged as potential predictors of an increase in eating disturbances. An increased influence of the thinness model was significantly associated with reduced body satisfaction and body image problems. Preventive programs are needed to contribute reducing the impact of sociocultural influences with regard to thinness, the use of extreme weight control behaviors and overweight in adolescents.

Keywords: body image problems; body satisfaction; eating disturbances; prospective study; thin beauty ideal; weight control behaviors

Disordered eating behaviors and body image in a longitudinal pilot study of adolescent girls:

What happens two years later?

Sociocultural pressures about being thin stem from the family, peers and media in particular. They promote the internalization of standards of female attractiveness and the overvaluation of the importance of appearance. Prospective and experimental studies suggest that sociocultural pressures about being thin and the internalization of a thin aesthetic ideal are causal risk factors of body dissatisfaction, restrictive diets and symptoms of bulimia (Stice, 2002; Thompson & Heinberg, 1999; Thompson & Stice, 2001). This aetiological model has received empirical support in adolescents (Keery, van den Berg, & Thompson, 2004; Shroff, & Thompson, 2006), and has been examined in prospective studies (The McKnight Investigators, 2003).

The media has been identified as being a substantial source of dissemination of the thin beauty ideal and contributes to a generalized overvaluation of the importance given to physical appearance (Thompson & Stice, 2001). In adolescents, exposure to certain types of magazines has been associated with an increased desire to lose weight and dieting (Field et al., 1999; Utter, Neumark-Sztainer, Wall, & Story, 2003). Currently, dieting and unhealthy weight-control behaviors are common practices in adolescent girls (Center for Disease Control and Prevention, 2005), despite their being associated with increased risk of overweight, binge eating and eating disturbances (Neumark-Sztainer et al., 2006).

The aim of the present study was to assess the prospective association of risk factors – sociocultural and individual– for eating and body image disturbances in Spanish adolescents. It has been expected that the influence of the aesthetic body shape model (ideal figure for women in western countries; see e.g. Toro, Salamero, & Martínez, 1994), weight control behaviors, BMI,

body satisfaction and body image problems would be associated with an increase in eating disturbances after two years of follow-up (Hypothesis 1). Likewise, it was expected that the influence of the aesthetic body shape model, weight control behaviors and BMI would be associated with a reduction in body satisfaction and an increase in body image problems in the same period (Hypothesis 2).

Such information is relevant given its contribution to the assessment of risk factors, the modification of which could help prevent the development of eating and body image disturbances. Moreover, such information may help to identify sub-groups with a high risk of developing such disturbances.

Method

Participants

Participants at baseline (T1) were 128 girls aged between 12 and 14 years (M = 13.5 years; SD = 0.4). They were recruited from three urban schools in Terrassa, Spain, with a primarily middle-class intake, selected by means of incidental sampling. Average BMI for the girls at T1 was 21.5 (SD = 3.9) and 32.3% of the girls met the criteria for being overweight or obese (Cole, Bellizzi, Flegal, & Dietz, 2000). The sample size in the 28-month follow-up (T2) was 79, the drop in sample size being due to absences on the day of testing. Table 1 shows the sample characteristics for T1 and T2.

Measures and instruments

Socio-biographic data and dieting: A questionnaire on developmental and personal details was administered at T1 and T2, including a question about the frequency of dieting (0: never; 6: every day).

Weight and height. Weight and height measurements at T1 and T2 were carried out in situ and the Body Mass Index (BMI = weight[kg] / height²[m²]) was calculated. Weight status was estimated in accordance with the international criteria proposed by Cole et al. (2000). Overweight and obese participants were classified as "overweight" (Neumark-Sztainer et al., 2006).

Eating Disorder Examination Questionnaire (EDE-Q). "Extreme weight control behaviors" at T1 were examined with the Spanish version of the EDEQ-4 (Fairburn & Beglin, 1994), adapted by Villarroel, Penelo, Portell and Raich (2009). They were assessed through three items referring to the use of laxatives, diuretics and the presence of self-induced vomiting. The adolescents could respond *yes* or *no* to these questions. Percentages were calculated on the basis of at least one of the three behaviors being admitted.

Eating Attitudes Test (EAT-40). We used the total score of the EAT-40 (Garner & Garfinkel, 1979) to rate disturbance of eating attitudes and behaviors at T1 and T2. The EAT-40 contains 40 questions that measure attitudes, feelings and behaviors that are characteristic of individuals with disordered eating. The items provide 6 response options ranging from *never* to *always*. Higher scores indicate more disordered eating. We applied the Spanish adaptation, which has adequate psychometric characteristics (Castro, Toro, Salamero, & Guimerà, 1991), with 91% sensitivity and 69.2% specificity for a cut-off point of 20.

Questionnaire on influences of the aesthetic body shape model/Cuestionario de influencias del modelo estético corporal (CIMEC-26). In order to assess the impact of sociocultural influences that encourage thinness at T1 and T2, we used the original Spanish version of the CIMEC-26 (Toro et al., 1994). This instrument includes 26 items to which the person responds on a Likert-type scale with 3 response alternatives, ranging from *never* to always. It has satisfactory psychometric properties, with values of 83.1% sensitivity and 64% specificity. Initially we included the five scales proposed by the authors after a Principal

Components Analysis was conducted: F1-Distress about Body Image: anxiety and discomfort with body image (e.g., "Do you envy ballet girls' bodies or gymnasts' bodies?"); F2-Influence of Advertising: interest in and acceptance of advertising for slimming products (e.g., "Are you very interested in slimming products advertised on TV?"); F3-Influence of Verbal Messages: interest in articles, books and conversations about slimming (e.g., "Are you attracted by books, magazine articles, adverts, etc., about calories?"); F4-Influence of Social Models: interest in body dimensions of models and other women in the public eye (e.g., When you are watching a movie are you especially interested in the actress's body?"); F5-Influence of Social Situations: social acceptance attributed to thinness and concerns about food in social situations (e.g., "Do you think slim girls and young women are better accepted by others than those who are not slim?").

Body Image Questionnaire/Qüestionari d'Imatge Corporal (QÜIC). We used the original Spanish version of QÜIC, developed by Gaspà and García-Tornel and validated by Miró (2006), to assess body image satisfaction and body image problems in adolescents at T1 and T2. On the basis of the figure of a girl, the participants rate the level of satisfaction for themselves of each of the 18 parts of the body that appear in the drawing (0-10) and whether each of these parts of the body constitutes a problem (yes/no). In the present study we used a global body image problems score, corresponding to the sum of the number of body parts that are considered a problem by the respondent. We also used the two scales of body satisfaction derived from a prior factor analysis (Espinoza, Penelo, & Raich, in press): satisfaction with head/chest (eyes, nose, mouth, lips, neck and breast) and satisfaction with trunk/extremities (arms, abdomen, waist, buttocks, hips, thighs, legs and feet). In the validation studies (Espinoza et al., in press; Miró, 2006) the internal consistency reliability was high (Cronbach's α from .76 to .90) and the test-retest reliability was satisfactory (Pearson's correlation .81 in a period of 15 days).

Design and Procedure

The design of this study is longitudinal and it is based on information collected by means of self-administered questionnaires. T1 for this study was during the academic year 2005-2006 and T2 during that of 2007-2008. This study was approved by the City of Terrassa Institute of Health and Social Welfare, the Ethics Committee of our own institution, the school authorities and the girls' parents. After obtaining oral consent from parents and from girls, trained interviewers carried out weight and height measures individually, in the course of the school day. Later, each participant responded to the questionnaires anonymously. They were given the chance to clear up any doubts. The same information was collected for T1 and T2, except EDEQ and the question about dieting.

Statistical analysis

The statistical analyses were carried out with SPSS 15. Differences in baseline measures between girls who completed the follow-up (non-droppers) and girls who were absent during the follow-up (droppers) were examined through *t*-test procedures. Checks for overlap among measures was conducted with bivariate Pearson's correlations. Four hierarchical multiple regression analyses were used to examine the relation between the predictors and each of the criterion variables at T2: EAT for Hypothesis 1, and body image problems and the two measures of body satisfaction for Hypothesis 2. In order to control for the temporal stability of the measures considered from T1 to T2 after 28 months of follow-up, an initial assessment of each variable (EAT, body image problems and the two measures of body satisfaction at T1) was entered at Step 1. This ensured that the analysis was measuring change over time, as opposed to initial differences in the levels of the dependent variables. The rest of the predictors at T1 were entered at Step 2: BMI, extreme control behaviors, CIMEC scale scores, dieting and QÜIC scale

scores (for the EAT analysis, Hypothesis 1), and BMI, extreme control behaviors, CIMEC scale scores and dieting (for the QÜIC analyses, Hypothesis 2).

Results

Table 1 presents the internal consistency reliability for each of the measures considered. Measures at T1 did not differ between girls who dropped-out of the follow-up and girls who took part in the follow up (results not shown). Due to the fact that some of the correlations involving CIMEC-F1 and CIMEC-F3 were higher than .60, we removed these two scales from the analyses. The rest of the predictors did not show collinearity (r < .60) (a complete Pearson's correlation matrix is available from the authors).

A summary of the findings from the four hierarchical multiple regression analyses is provided in Table 2. For all the criterion variables, the final models explained a considerable percentage of total variance (between 36% and 42%), with the exception of satisfaction with head/chest (21%). In each of these models, the effect of the criterion variable at T1 was significant at T2 (p < 0.001), which indicates the stability of the measures from T1 to T2 after 28 months of follow-up. The additional variance explained by the rest of the variables introduced into each model (difference between Step 1 and Step 2) was 14% for EAT and 10% for QÜIC-satisfaction with trunk/extremities, whilst for QÜIC-body image problems and QÜIC-satisfaction with head/chest were of 2%.

The significant predictors of an increase in eating attitude disturbances were BMI, extreme weight control behaviors and body image problems. This result partially supports our first Hypothesis. The only significant predictor for an increase in body image problems was the influence of social situations (CIMEC-F5). The influence of advertising (CIMEC-F2) was inversely related to satisfaction with head/chest, and BMI and the influence of advertising were

inversely related to satisfaction with trunk/extremities. These findings partially support our second Hypothesis.

Discussion

This study assessed the prospective association of sociocultural and individual risk factors for eating and body image disturbances in Spanish adolescent girls. In the follow-up analysis it was observed that BMI, extreme weight control behaviors and body image problems emerged as potential predictors of an increase in eating disturbances after two years of follow-up. Extreme weight control behaviors were the most potent predictor of an increase in eating disturbances. These findings are consistent with other longitudinal studies (Neumark-Sztainer et al., 2006) and suggest the necessity of guiding the efforts of prevention to avoid these behaviors in young and middle adolescents. The outcome of BMI as a predictor of some eating disturbances contradicts the results found in several longitudinal studies, which have not found this link (see a review in Stice, 2002). However, recent studies have reported a significant association between weight status and binge eating or extreme weight control behaviors (Neumark-Sztainer et al., 2007).

However, the expected longitudinal associations between dieting and an increase in eating disturbances were not observed. These results suggest the need to clarify the meaning of the term "dieting" for adolescents in self-report instruments (Neumark-Sztainer & Story, 1998) and to use surveys capable of distinguishing between healthy (e.g., eating more fruits and vegetables, less high-fat and fewer sweets) and unhealthy weight control behaviors (e.g., eating very little food, using a food substitute, skipping meals) (Neumark-Sztainer et al., 2006). By contrast, there was not support for the assertion that the influence of the thinness model results in subsequent increases in eating disturbance. Previous longitudinal studies have reported that the internalization of the thin ideal predicts dieting and bulimic symptoms (see Stice 2002, for

review). In our study, we examined disordered eating in general, without distinction between subtypes of eating disturbances. Longitudinal studies with grater samples are needed to evaluate the influence of the thinness model as a predictor of the several established diagnoses subtypes of eating disorders.

As regards body satisfaction, BMI emerged as a potential predictor of reduced body satisfaction with trunk and extremities, whereas the influence of advertising was inversely related to both measures of body satisfaction, with head/chest and with trunk and extremities. These results are aligned with the results found by Stice and Whitenton (2002) in adolescent girls. On the other hand, in this study body image problems do not present the same predictors as body satisfaction. The body satisfaction measure we used seems to be related to the evaluative dimension of body image, whereas the body image problem measures would be related to a cognitive dimension of the body image construct. Studying both components, affective/evaluative and cognitive/investment, as risk factors for body image disturbances would be helpful (Cash, Melnyk, & Hrabosky, 2004), as well as their effects on eating disturbances (Allen, Byrne, McLean, & Davis, 2008). We think it is important to distinguish between both components, in order to develop prevention programs addressed at these different dimensions of body image.

The main limitation of the present study is the borderline sample size. There is a need for longitudinal studies with larger samples of adolescents using clinical interviews to examine the prospective associations observed.

However, the results of our study suggest the necessity for preventing interventions to avoid extreme weight control behaviors and weight problems in young and middle adolescents, as well as promoting the criticism of the current aesthetic body shape model and the questioning of advertising messages that help to disseminate the thin ideal (Levine & Piran, 2004).

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Table 1: Measures for participants at baseline and follow-up periods

	T1: first	testing	T2: 28 months later			
	Mean (SD)	Internal consistency*	Mean (<i>SD</i>)	Internal consistency*		
Age	13.4 (0.4)		15.9 (0.4)			
ВМІ	21.7 (3.8)		22.6 (3.7)			
Dieting during the last month	1.0 (1.5)					
Extreme weight control behaviors	3.8%					
EAT: total score	18.3 (11.9)	.82 (.12)	15.9 (11.9)	.82 (.12)		
QÜIC: body image problems	2.0 (2.5)	.77 (.15)	2.6 (3.0)	.82 (.20)		
QÜIC-satisfaction head/chest	7.5 (1.2)	.74 (.32)	7.1 (1.2)	.78 (.39)		
QÜIC-satisfaction trunk/extremities	6.6 (2.0)	.92 (.59)	5.9 (1.7)	.90 (.52)		
CIMEC F2: Influence of advertising	2.4 (3.4)	.90 (.47)	3.2 (3.8)	.81 (.32)		
CIMEC F4: Influence of social models	2.5 (1.6)	.68 (.35)	3.0 (1.8)	.67 (.33)		
CIMEC F5: Influence of social situations	1.9 (1.3)	.50 (.24)	1.9 (1.4)	.41 (.20)		

^{*} Cronbach's α value (mean inter-item correlation); - - - not available

Table 2: Baseline predictors (T1) of follow-up measures (T2)

T2 Criterion	T1 predictors	<i>B</i> parameter (CI 95%)	β	р	sr²†	F‡	R ² §
EAT	Step 1 EAT	0.48 (0.27; 0.69)	.48	<.001	.23	21.19	.22
	Step 2 EAT	0.18 (-0.07; 0.44)	.18	.153	.02	5.17	.36
	ВМІ	0.87 (0.06; 1.68)	.28	.036	.04		
	Extreme weight control behaviors	22.86 (1.52; 44.19)	.22	.036	.04		
	CIMEC F2: Influence of advertising	0.30 (-0.65; 1.25)	.09	.528	.00		
	CIMEC F4: Influence of social models	-0.19 (-1.92; 1.53)	03	.822	.00		
	CIMEC F5: Influence of social situatio	ns 0.88 (-1.35; 3.11)	.09	.432	.01		
	QÜIC-satisfaction head/chest	-1.23 (-3.63; 1.18)	12	.313	.01		
	QÜIC-satisfaction trunk/extremities	0.64 (-1.35; 2.63)	.11	.524	.00		
	QÜIC: body image problems	1.48 (0.16; 2.80)	.30	.029	.04		
	Dieting during the last month	-1.37 (-3.38; 0.63)	16	.177	.02		
QÜIC-problems	Step 1 QÜIC: body image problems	0.76 (0.54; 0.98)	.62	<.001	.39	46.36	.38
	Step 2 QÜIC: body image problems	0.70 (0.44; 0.95)	.57	<.001	.24	8.05	.40
	ВМІ	0.00 (-0.17; 0.16)	01	.961	.00		
	Extreme weight control behaviors	0.80 (-2.82; 4.42)	.04	.662	.00		
	CIMEC F2: Influence of advertising	0.08 (-0.11; 0.27)	.09	.412	.01		
	CIMEC F4: Influence of social models	-0.22 (-0.61; 0.16)	12	.254	.01		
	CIMEC F5: Influence of social situatio	ns 0.53 (0.02; 1.04)	.23	.044	.03		
	Dieting during the last month	-0.06 (-0.51; 0.39)	03	.799	.00		
QÜIC-head/chest	Step 1 QÜIC-satisfaction head/chest	0.46 (0.25; 0.67)	.44	<.001	.20	18.52	.19
	Step 2 QÜIC-satisfaction head/chest	0.37 (0.13; 0.60)	.35	.003	.10	3.88	.21
	ВМІ	-0.03 (-0.10; 0.05)	09	.463	.01		
	Extreme weight control behaviors	0.37 (-1.00; 1.74)	.06	.592	.00		
	CIMEC F2: Influence of advertising	-0.11 (-0.21; -0.01)	31	.025	.05		
	CIMEC F4: Influence of social models	0.03 (-0.15; 0.21)	.04	.749	.00		
	CIMEC F5: Influence of social situatio	ns 0.03 (-0.22; 0.27)	.03	.810	.00		
	Dieting during the last month	0.18 (-0.02; 0.38)	.22	.071	.03		
QÜIC-trunk/extremities	Step 1 QÜIC-satisfaction trunk/extremities	0.47 (0.32; 0.63)	.57	<.001	.33	37.01	.32
	Step 2 QÜIC-satisfaction trunk/extremities	0.22 (0.02; 0.41)	.26	.028	.04	8.83	.42
	ВМІ	-0.13 (-0.23; -0.03)	30	.009	.05		
	Extreme weight control behaviors	-0.18 (-1.79; 1.42)	02	.821	.00		
	CIMEC F2: Influence of advertising	-0.15 (-0.26; -0.03)	30	.011	.05		
	CIMEC F4: Influence of social models	0.05 (-0.16; 0.27)	.05	.635	.00		
	CIMEC F5: Influence of social situatio	ns -0.08 (-0.37; 0.21)	06	.588	.00		
	Dieting during the last month	0.12 (-0.11; 0.35)	.11	.306	.01		

[†] semi-partial *r*-square; ‡ *F* test of multiple regression analysis; § corrected *R*-square; In bold: p<0.05 for final model (Step 2)