



## ORIGINAL ARTICLE

# Teasing as a risk factor for abnormal eating behaviours: A prospective study in an adolescent population<sup>☆</sup>



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### KEYWORDS

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### Abstract

**Introduction:** There are discrepancies in the literature about the role of teasing in the onset of eating pathology. This article aims to establish the influence of teasing in abnormal eating behaviours and attitudes in the adolescent population.

**Material and methods:** This is a two-year prospective study conducted in 7167 adolescents between 13 and 15 years of age. In a first assessment, teasing about weight and teasing about abilities were measured by means of the POTS questionnaire. Its association with eating psychopathology after two years was analysed controlling nutritional status (BMI), body dissatisfaction, drive to thinness, perfectionism (EDI), emotional symptoms and hyperactivity (SDQ) which had also been measured in the first assessment. The analysis was carried out independently for both genders.

**Results:** The multivariate analysis found no significant or independent effect of teasing about weight or teasing about abilities in the onset of later eating psychopathology. The obtained models were similar for both genders although in girls, but not in boys, controlling BMI was enough to make any effect of teasing disappear.

**Conclusions:** Teasing about weight or abilities has no direct effect, neither in boys nor in girls of 13–15 years old, in the development of eating psychopathology.

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**PALABRAS CLAVE**

Diseño prospectivo;  
Burlas;  
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Trastornos  
alimentarios

## Burlas como factor de riesgo para conductas alimentarias anómalas: estudio prospectivo en una población adolescente

**Resumen**

**Introducción:** Existen discrepancias en la literatura sobre el papel de las burlas en la aparición de clínica alimentaria. El objetivo de este artículo es establecer la influencia de las burlas sobre la aparición de conductas alimentarias anómalas en una población adolescente.

**Material y métodos:** Se trata de un estudio prospectivo a 2 años en el que participaron 7.167 adolescentes de entre 13 y 15 años. En una evaluación basal se estudió su exposición a burlas sobre el peso y sobre las capacidades, mediante el cuestionario POTS. Posteriormente, se analizó su asociación con psicopatología alimentaria (EAT) ulterior controlando el efecto del estado nutricional (IMC), la insatisfacción corporal, el impulso a la delgadez, el perfeccionismo (EDI), los síntomas emocionales y la hiperactividad (SDQ), también evaluados en la línea base. El análisis se hizo de manera independiente para ambos géneros.

**Resultados:** El análisis multivariante descartó la existencia de un efecto significativo e independiente de las burlas sobre el peso y de las burlas sobre las capacidades sobre la aparición de psicopatología alimentaria posterior. Los modelos obtenidos fueron similares en ambos sexos, aunque en las chicas, a diferencia de los chicos, el control del IMC bastó para anular cualquier repercusión de las burlas.

**Conclusiones:** Las burlas sobre el peso o sobre las capacidades carecen de efecto directo, en chicos y chicas de 13 a 15 años, sobre el desarrollo de psicopatología alimentaria posterior.

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**Introduction**

Eating disorders are a serious health problem among teenagers but studying them is still a difficult task. Firstly, their aetiology is not well known and is determined by many, non circumscribed factors. Also, their relatively low incidence prevents longitudinal studies being conducted with sufficient samples for analysis of these factors and to verify the effect of possible preventative measures.<sup>1</sup> Since the creation of prevention programmes demands accurate knowledge of risk factors, their study has recently taken on great importance.<sup>2,3</sup>

Teasing is a common phenomenon during childhood and adolescence.<sup>4-6</sup> Its effect has been linked to its frequency and individual sensitivity. In the literature most studies focus on the frequency of the teasing,<sup>7</sup> but the *Perception of Teasing Scale* (POTS)<sup>8</sup> determines both dimensions simultaneously. It has not yet been definitively defined in which period of life the effect of teasing about weight is most intensely related to the appearance of eating disorders, but the literature suggests that early adolescence would be the time of greatest vulnerability<sup>9</sup> and that its influence on the appearance of eating disorders would be confined to a brief period.<sup>10</sup>

Several cross-sectional studies have associated teasing with body dissatisfaction<sup>11</sup> and with abnormal eating behaviours.<sup>12</sup> Studies in different cultural contexts have also been made.<sup>13-16</sup> In a meta-analysis which analysed the influence of teasing on weight and body dissatisfaction, from publications from 1991 to 2009, a high correlation was established between both factors in cross-sectional studies. With regard to longitudinal studies, of higher validity,<sup>17</sup> a lower, but also positive correlation was made.<sup>7</sup>

Several authors have found a positive association between teasing about weight and eating disorders. In a follow-up study lasting 3 years, Thompson et al.<sup>18</sup> detected an association between teasing about weight, body dissatisfaction and eating behaviour disorders. However, the effect of teasing was indirect and was measured by the second variable. Presnell et al.<sup>19</sup> and later Stice and Whitenton<sup>20</sup> also described a significant association between teasing about weight and body dissatisfaction, which would disappear in multivariate analysis, and this would suggest that teasing about weight could be correlated with other risk factors. In a 5-year prospective study with two cohorts of young people at the beginning and mid adolescence Paxton et al.<sup>21</sup> concluded that teasing about weight predicted body dissatisfaction in males although its effect was associated with the factor "depression". On focusing analysis on mid adolescence, an intense correlation was made between teasing about weight and body dissatisfaction in both sexes, although measured by the body mass index (BMI). Wojtowicz and von Ronson,<sup>22</sup> however, in a prospective one-year study with mid-teens were not able to detect any correlation between teasing about weight and body dissatisfaction. However, *The Growing Up Today Study*, with a sample aged between 9 and 11 years, reported a combination of social factors (level of internalising about the thinness ideal, social pressure, teasing about weight and diet) which predicted the appearance of purgative behaviour after one year of follow-up and of bulimic behaviour after 2 years. In contrast neither Cattarin and Thompson<sup>23</sup> nor Field et al.<sup>24</sup> detected a positive association between teasing and the subsequent appearance of eating behaviour disorders.

A rarely studied variable is the differential influence which teasing could have, depending on gender. Haines

et al.<sup>25</sup> conducted a 5-year prospective study on a teenage sample of 1386 females and 1130 males. Whilst for the males teasing about weight was a significant risk factor for both bulimic behaviours and excessive weight control (use of laxatives or diuretics, consumption of tobacco to lose weight, eating diet foods), for the women it was predictive of restrictive behaviours.

In sum, only a limited number of studies have assessed the association between teasing about weight, body dissatisfaction and abnormal eating behaviours and their results have been mixed. Some of them found a positive correlation between teasing as a risk factor of eating disorders, whilst others found that the associations could be spurious or measured by other variables, underlining the need to conduct further multivariate analysis. To this end, the aim of this study is to analyse whether prior exposure to teasing about weight or abilities, in a representative sample of Spanish teenagers, could be correlated with the appearance of eating psychopathology. We also intend to analyse whether teasing may be separated from other factors studied, such as nutritional status, body dissatisfaction, the drive for thinness and emotional symptoms.

## Material and methods

A sample of 7167 teenagers of both sexes were prospectively assessed (3751 girls and 3416 boys) in a 2-year interval. Data were extracted from an institutional programme for the Detection and Prevention of Eating Behaviour Disorders of the Community of Valencia (DITCA). This sample had

been previously analysed for a cross-sectional study made to evaluate the influence of the above described factors.<sup>26</sup> Informed passive consent was given at the schools by parents or tutors for the school age teenagers participating in the study. Those who did not present with eating psychopathologies were selected on the baseline evaluation. (ChEAT  $\leq$  20).

Nutritional status (BMI) was determined, a measurement of abnormal eating behaviours and attitudes through the Children Eating Attitudes Test (ChEAT), along with measurements of the drive for thinness (DT), Body dissatisfaction, inefficiency and perfectionism through the subscales corresponding to the only scales of the Eating Disorders Inventory [EDI] included in the DITCA programme). The Perception of Teasing scales (POTS) was used to measure exposure to teasing about weight and abilities and the presence of emotional symptoms was made using the subscale of the Strengths and Difficulties Questionnaire [SDQ]). The students' weight and height were measured at the schools, using valid tools provided to this end. The sample was mainly Caucasian (over 95%) (Table 1).

We have no information on the causes leading to the losses in relation to the initial cohort. Some left their secondary schools for unknown reasons and others refused to respond to the questionnaires. Data were analysed independently of gender.

## Tools and variables

The variables and tools used were as follows.

**Nutritional status.** Low weight was defined as a BMI under the percentile 10 for their age, whilst overweight was

**Table 1** Characteristics of the subjects studied.

	All (n = 7167) Mean $\pm$ SD	Girls (n = 3751) Mean $\pm$ SD	Boys (n = 3416) Mean $\pm$ SD	p
<b>Nationality (% , 95% CI)</b>				
Spanish	95.48 (94.98–95.94)	95.33 (94.62–95.97)	95.64 (94.91–96.28)	n.s.
Hispanic	1.59 (1.32–1.90)	1.63 (1.26–2.07)	1.55 (1.18–2.01)	n.s.
Eastern European	.71 (.54–.93)	.72 (.48–1.03)	.70 (.46–1.03)	n.s.
Arabic	.21 (.12–.34)	.27 (.15–.47)	.15 (.05–.32)	n.s.
Asiatic	.11 (.05–.21)	.11 (.03–.26)	.12 (.04–.28)	n.s.
Others	1.90 (1.60–2.23)	1.95 (1.54–2.43)	1.84 (1.43–2.34)	n.s.
Age (years)	13.66 $\pm$ .64	13.63 $\pm$ .62	13.70 $\pm$ .66	<.001
Baseline ChEAT score	8.21 $\pm$ 6.79	9.29 $\pm$ 7.61	7.03 $\pm$ 5.52	<.001
Final ChEAT score	8.16 $\pm$ 7.19	9.99 $\pm$ 8.17	6.16 $\pm$ 5.24	<.001
BMI (kg/m <sup>2</sup> )	2.92 $\pm$ 3.93	2.84 $\pm$ 3.89	21.00 $\pm$ 3.95	n.s.
EDI-BD	6.46 $\pm$ 5.17	7.42 $\pm$ 5.83	5.41 $\pm$ 4.06	<.001
DT	3.69 $\pm$ 4.65	4.63 $\pm$ 5.26	2.65 $\pm$ 3.60	<.001
Inefficiency	4.47 $\pm$ 3.33	4.73 $\pm$ 3.60	4.19 $\pm$ 2.98	<.001
Perfectionism	5.42 $\pm$ 3.57	5.00 $\pm$ 3.50	5.89 $\pm$ 3.60	<.001
Emotional symptoms	3.01 $\pm$ 2.15	3.47 $\pm$ 2.21	2.52 $\pm$ 1.97	<.001
Hyperactivity	4.39 $\pm$ 2.20	4.33 $\pm$ 2.16	4.46 $\pm$ 2.25	.013
Prosocial	7.82 $\pm$ 1.63	8.17 $\pm$ 1.49	7.46 $\pm$ 1.68	<.001
Teasing about weight score	14.92 $\pm$ 7.45	15.05 $\pm$ 7.55	14.77 $\pm$ 7.30	.134
Teasing about abilities score	13.55 $\pm$ 5.71	13.66 $\pm$ 5.80	13.42 $\pm$ 5.72	.083

ChEAT: Children Eating Attitudes Test; SD: standard deviation; EDI-BD: body dissatisfaction; 95% CI: confidence interval of 95%; DT: drive to thinness; BMI: body mass index; n.s.: not significant.

established as a percentile between 90 and 97. Obesity was defined as a BMI above the percentile 97.<sup>27</sup>

**Perception of Teasing Scale (POTS).** POTS<sup>8</sup> is a questionnaire which studies the perception of teasing suffered by other people in relation to their physical appearance, being overweight or their level of competence. It contains 11 sections, assessed on a scale of 5 points which range from 1 (never) to 5 (frequently). It rates the person's experience of having suffered teasing about weight and their capabilities or skills. The total score is obtained by summing up the total of responses which range from between 22 and 110 points. A factorial analysis showed two factors: "perception of teasing on appearance (teasing about weight)" and "perception of teasing by competence or skills". In both it is possible to differentiate a frequency and an impact score.

A Spanish version of the POTS was used.<sup>28</sup> No cut off point was used, resulting in higher scores indicating higher levels of exposure and sensitivity to teasing. The Cronbach alpha values were .95 for the whole scale, .95 for the subscale of teasing about weight and .895 for the subscale which assesses teasing by competence.

**Children's Eating Attitude Test (ChEAT).** The *Eating Attitude Test* (EAT)<sup>29,30</sup> is a self-administered questionnaire which assesses cognitions, emotions and behaviours associated with eating behaviour disorders. Its child versions is ChEAT, which has been validated for Spain.<sup>31</sup> Scores lower than or of 20 are considered normal, whilst higher scores indicate a possible eating disorder. The Cronbach alpha was .78. Three subscales were obtained: diet, restriction and purges, and oral control.

**Drive to thinness (DT).** The DT subscales of the EDI<sup>32</sup> measures attitudes and behaviours which are characteristic of eating behaviour disorders. The items of this subscale refer to concerns about weight, diet and fear of weight gain. Participants indicate, on a scale of 6 Likert type points how frequently they suffer from the 7 statements which indicate concern about weight. Their internal consistency was .81.

**Body dissatisfaction (body dissatisfaction [EDI-BD]).** Body dissatisfaction (EDI-BD) is another subscale of the EDI<sup>32</sup> which is used to measure the dissatisfaction a person feels about their body, or with those parts of the body that are of greater concern to people who suffer from eating behaviour disorders. The Cronbach alpha was .7.

**Inefficiency.** The subscale of inefficiency and low self esteem of the EDI<sup>32</sup> reflects feelings of general inadequacy or low self-esteem. The Cronbach alpha was .59.

**Perfectionism.** The subscale of perfectionism of the EDI<sup>32</sup> measures the degree to which a person thinks their personal outcomes should be better, using 6 questions. Its Cronbach alpha was .6.

**Strengths and Difficulties Questionnaire (SDQ): Emotional Symptoms Scale.** The SDQ, of which a validated Spanish version exists,<sup>33</sup> consists of 25 questions divided into 5 subscales of 5 items each. The subscales are: Hyperactivity (Cronbach  $\alpha = .63$ ), emotional symptoms ( $\alpha = .62$ ), behaviour disorder ( $\alpha = .17$ ), problems with peers ( $\alpha = .23$ ) and prosocial behaviour ( $\alpha = .53$ ). They score from 0 to 2, and scores therefore vary from 0 to 10. Due to the low internal consistency of the scales behaviour disorder and problems with peers were not used in the study.<sup>34</sup>

## Data analysis

Collected data were analysed with the statistical software SPSS 22.0 for Windows.<sup>35</sup>

The quantitative variable data were obtained as mean  $\pm$  standard deviation (SD), and the qualitative data as percentages (%) and 95% confidence intervals (95% CI). Comparison of parameters between both sexes were made by applying a *t*-test for non paired data in quantitative variables and the chi-squared test in the categorical variables.

The Pearson correlation coefficients were calculated to determine associations between quantitative variables pairs. A simple correlation analysis was made to determine the significance of lineal relationships between baseline ChEAT scores and those obtained 2 years later. Total variance ( $R^2$ ) of the ChEAT was made in the prospective assessment, explained by the score in the teasing scale measured at the beginning.

To examine the possible mediating role of the other variables in the relationship between exposure to teasing and the appearance of abnormal eating behaviour, we conducted a multiple lineal regression analysis (method using forward steps), with the dependent variable being the ChEAT score after 2 years and the independent variables being the scores in the baseline measurements of the ChEAT, BMI, DT, EDI-BD, Inefficiency, Perfectionism, Emotional symptoms, Hyperactivity and Teasing about weight and abilities. For regression, the covariate in equation was firstly introduced, and secondly the potential predictors (procedure by steps), and lastly the main effect.

Inclusion and exclusion criteria were established as  $p < .05$  and  $p > .10$ , respectively. The procedure was completed when none of the new variables satisfied the inclusion criteria. We chose the forward step method to avoid co-linearity, since the independent variables could be highly correlated. In each one of the models total variance of the ChEAT was determined in the final assessment explained by the independent variables.

Data were separately analysed according to gender. A bilateral *p* value below .05 was chosen as statistical significance.

## Results

### Preliminary analysis

The characteristics of the study participants are contained in [Table 1](#). The girls were somewhat younger than the boys and no differences were found regarding nationality. Both the initial and final ChEAT scores were considerably higher in the girls. The POTS scores were somewhat lower, but not significantly, in the boys, both in the teasing about weight subscale and in the teasing on abilities. Significant differences were found between the girls and boys in all potentially predictive variables of abnormal eating behaviours (EDI-BD, DT, Inefficiency, Perfectionism, Emotional symptoms, Hyperactivity and Prosocial behaviour), except in the BMI. Separate multivariate analysis was therefore made (multiple hierarchy regression) in girls and boys.

[Table 2](#) shows the results of correction analysis. We detected a significant correlation between the score in

**Table 2** Correlation coefficients between the ChEAT score obtained after 2 years (ChEAT 2), the initial chEAT score (ChEAT 1) and predictive variables (BMI, EDI-BD, DT, Inefficiency, Perfectionism ID, Emotional symptoms, Hyperactivity, Prosocial attitude, and initial scores of the POTS weight and POTS abilities).

	ChEAT 2	ChEAT 1	BMI	EDI-BD	DT	Inefficiency	Perfectionism	Emotional symptoms	Hyperactivity	Prosocial	POTS weight	POTS abilities
<i>Girls</i>												
ChEAT 2	1.000	.451**	.173**	.352**	.441**	.247**	.177**	.238**	.127**	.014	.184**	.09**
ChEAT 1		1.000	.172**	.574**	.723**	.450**	.280**	.364**	.194**	.012	.315**	.181**
BMI			1.000	.403**	.366**	.131**	.003	.072**	-.058**	-.018	.420**	.060**
EDI-BD				1.000	.715**	.479**	.124**	.319**	.155**	-.56**	.438**	.195**
DT					1.000	.454**	.233**	.317**	.129**	-.45**	.413**	.182**
Inefficiency						1.000	.259**	.425**	.199**	-.62**	.338**	.291**
Perfectionism							1.000	.174**	.000	.115**	.107**	.148**
Emotional symptoms								1.000	.264**	.002	.226**	.324**
Hyperactivity									1.000	-.141**	.045**	.135**
Prosocial										1.000	-.004	-.065**
POTS weight											1.000	.389**
POTS abilities												1.000
<i>Boys</i>												
ChEAT 2	1.000	.429**	.138**	.292**	.368**	.180**	.183**	.214**	.082**	.004	.214**	.142**
ChEAT 1		1.000	.167**	.434**	.608**	.323**	.295**	.301**	.133**	.030	.314**	.214**
BMI			1.000	.363**	.362**	.113**	-.001	.056**	-.048**	.006	.421**	.092**
EDI-BD				1.000	.560**	.407**	.117**	.284**	.108**	-.038*	.477**	.236**
DT					1.000	.358**	.211**	.269**	.091**	.004	.427**	.208**
Inefficacy						1.000	.203**	.361**	.144**	-.074**	.296**	.317**
Perfectionisms							1.000	.190**	.036*	.114**	.078**	.099**
Emotional symptoms								1.000	.230**	.008	.250**	.348**
Hyperactivity									1.000	-.123**	.062**	.109**
Prosocial										1.000	-.022	-.051**
POTS weight											1.000	.437**
POTS abilities												1.000

ChEAT: Children Eating Attitudes Test; EDI-BD: body dissatisfaction; DT: drive to thinness; BMI: body mass index; n.s.: not significant; POTS: Perception of Teasing Scale; POTS abilities: teasing about abilities or skills; POTS Weight: teasing about weight.

\*  $p < .05$  (bilateral).

\*\*  $p < .001$  (bilateral).

teasing about weight in the baseline evaluation and the score in ChEAT 2 years later (girls:  $r = .18$ ,  $p < .001$ ; boys:  $r = .21$ ,  $p < .001$ ). In the case of teasing due to abilities, this correlation was far lower (girls:  $r = .09$ ,  $p < .001$ ; boys:  $r = .14$ ;  $p < .001$ ). Sample size appears to have had a determining value in this significance.

In the girls, teasing about weight was also significantly correlated with baseline scores of BMI, EDI-BD, DT, Inefficiency, Perfectionism, Emotional symptoms and Hyperactivity. The correlation was low and negative with prosocial behaviours. For teasing on abilities these correlations were also significant. The correlations between BMI, EDI-BD, DT, Inefficiency and teasing about weight were clearly higher than teasing about abilities. In contrast Perfectionism, Emotional symptoms and Hyperactivity were higher correlations with teasing about abilities. In boys, the pattern of correlations was similar, except for the baseline scores on Inefficiency showed a somewhat higher correlation with teasing on abilities than about weight, and the insignificant nature of correlations of perfectionism (.078 with teasing about weight and .09 with teasing on abilities), Hyperactivity (.06 and .1) and prosocial behaviour (−.02 and −.05) (Table 2). Only the prosocial behaviour variable of the initial assessment did not significantly correlate in any sex with the ChEAT score obtained 2 years later. For this reason this variable was not included in the multiple regression analysis.

### Multiple hierarchy regression analysis (Tables 3 and 4)

Table 3 contains the result in the group of girls. The adjustment model is good, explaining at the end of it almost 80% of the variance. In step 1 correlation of scores of both types of teasing with the dependent variable is significant, but this significance is lost when the first predictive variable, the BMI comes in. The other variables are successively introduced (BD, Perfectionism, Emotional symptoms and Hyperactivity). Body dissatisfaction and Inefficiency remain outside the model, as also occurs with the two POTS variables.

In boys (Table 4) the multiple regression model shows differences, although at the end the result is again that none of the POTS scales independently predict eating psychopathology 2 years later. The model also explains almost 70% of the variance. The POTS-teasing effect about weight drops, but does not lose its significance in the model on introducing the BMI, but it does when the BD variable is introduced into the model. The POTS-teasing about abilities variable however, does not disappear from the model until the emotional symptoms variable appears.

## Discussion

In this study we have tried to replicate the longitudinal relationship between teasing and pathological eating behaviours.<sup>7</sup> Its main strengths are its prospective nature, the population size upon which follow-up is made and the period of 2 years between the two evaluations. This is one of the prospective studies on risk factors concerning abnormal eating behaviours and attitudes with a broader sample. The Haines et al.<sup>25</sup> study included 4746 teenagers whilst other published studies present much smaller samples.

Furthermore, it includes different variables considered as possible mediators between teasing and eating behaviour disorders. The sample was selected from several secondary schools in the autonomous community of Valencia. Due to its breadth we consider that it was representative of the school age population for this age range. Our sample was originally formed by students in early teens, a period which is particularly sensitive to the effects of teasing.<sup>21</sup> Moreover, the possible differential effect of teasing was independently studied in both girls and boys, controlling the effects of the variables included in the model.

Measurement of exposure to teasing was made using the POTS tool which assessed teasing about weight and teasing about abilities. Whilst the associations with the former have been previously studied, study of the latter is novel.

### Teasing and abnormal eating behaviours

It has not been possible to establish an association between teasing about weight and the successive expression of abnormal eating behaviours or attitudes, which contradicts the literature. In a previous cross-sectional study on this same sample, a positive association was found between teasing about weight and body dissatisfaction, and so too between teasing about weight and abnormal eating behaviours, although the latter association was measured by the BD variable.<sup>26</sup> In this prospective study, neither teasing about weight nor teasing about abilities had a separate predictor effect on the ChEAT score 2 years later. Although the correlations between the scales of teasing and the successive score of ChEAT were significant, multivariate analysis where the influence of BMI, BD, Body dissatisfaction efficiency, Perfectionism, Emotional symptoms and Hyperactivity were controlled, cancelled out the existence of that association. Our results coincide with the trend shown in other studies of detecting a lower effect of teasing on eating alterations in longitudinal studies than in cross-sectional ones. For example, in study carried out by Loth et al.,<sup>36</sup> study with 1902 participants, after 10 years there was no significant association between teasing about weight in the base line figures and the appearance of excessive dieting and eating disorders.

To the extent that the ChEAT includes items which measure eating restrictions and purgative behaviours<sup>37</sup> our study coincides with authors such as Field et al.<sup>34</sup> and Cattarin and Thompson<sup>23</sup> who were not able to demonstrate any association between teasing and specific anorexic or bulimic behaviours. Furthermore, data analysis by Wertheim et al.,<sup>9</sup> who defended that they detected a linear association between teasing about weight and bulimic behaviours, show that this association is singularly cross-sectional, only calculated among the variables in baseline measurement.

In a multivariate model, prospective 3-year study Thompson et al.<sup>18</sup> found an indirect association between teasing and abnormal eating behaviours measured by body dissatisfaction. This result has been repeated by cross-sectional studies.<sup>4,16</sup> In our study, both in the initial assessment and the longitudinal one, correlations between teasing about weight and body dissatisfaction appear to support this data, but the results of multiple hierarchical regression do not

**Table 3** Hierarchical multiple regression in girls.

Summary of the model					
Model	Variables	$\beta$	$R^2$ model	$\Delta R^2$	$p$
1	Initial ChEAT score	.465	.662		
	POTS teasing about weight	.203			
	POTS teasing about abilities	.203			
2	Initial ChEAT score	.423	.683	.021	
	BMI	.423			
	POTS teasing about weight	-.009			
3	POTS teasing about abilities	.023	.690	.007	
	Initial ChEAT score	.300			
	BMI	.428			
4	DT	.162	.693	.003	
	POTS teasing about weight	-.041			
	POTS teasing about abilities	.048			
5	Initial ChEAT score	.272	.694	.001	
	BMI	.400			
	DT	.160			
6	Emotional symptoms	.112	.695	.001	
	POTS teasing about weight	-.041			
	POTS teasing about abilities	.003			
7	Initial ChEAT score	.256	.694	.001	
	BMI	.372			
	DT	.161			
8	Emotional symptoms	.106	.694	.001	
	Perfectionism	.069			
	POTS teasing about weight	-.038			
9	POTS teasing about abilities	-.013	.695	.001	
	Initial ChEAT score	.440			
	BMI	.332			
10	DT	.167	.695	.001	
	Emotional symptoms	.091			
	Perfectionism	.071			
11	Hyperactivity	.073	.695	.001	
	POTS teasing about weight	-.032			
	POTS teasing about abilities	-.027			

ChEAT: Children Eating Attitudes Test; DT: drive to thinness; BMI: body mass index; POTS: Perception of Teasing Scale.

support a mediating effect of body dissatisfaction. On the contrary, they suggest the existence of a complex association between exposure to teasing about weight and eating attitudes and behaviours in which body dissatisfaction only has a minor predictive independent effect of eating psychopathology in males. Our data, like that of Muris and Littel<sup>38</sup> and Eisenberg et al.<sup>4</sup> also show a significant association between teasing about weight and other variables, such as BMI, DT, Emotional symptoms, Inefficiency and Perfectionism. A mediating effect could also be attributed to them and it cannot be excluded that teenagers with greater BMI (more exposed to teasings<sup>26</sup>), DT and ID and greater emotional distress are more likely to be teased or more critically and negatively perceive the comments about their weight. Carlson-Jones<sup>39</sup> offered an alternative explanation according to which other mediating variables are involved in the relationship between teasing and abnormal eating behaviours, such as self-image.

All of the above leads us to reflect on the complexity of the relationships between the variables studied in the development of eating psychopathology, making it difficult to determine what comes before or after. Our best precursor of eating psychopathology is its presence 2 years previously (the baseline scores of the ChEAT being the most solid predictor). Its entry in the regression equation did not cancel out the significant effect teasing has on successive eating psychopathology, as occurred with BMI. We know that emotional psychiatric morbidity is also an important risk factor of eating psychopathology,<sup>40</sup> and for the same reason it could be present prior to our first evaluation and could determine greater sensitivity to teasing. We wish to suggest the possibility that exposure to teasing could either be a secondary phenomenon to other psychopathological or relational phenomena prior to those they both depended on or it could be an intermediate phenomenon which would enhance the risk of eating changes. Other possible determining factors could

**Table 4** Hierarchical multiple regression in boys.

Summary of the model					
Model	Variables	$\beta$	$R^2$ model	$\Delta R^2$	$p$
1	Initial ChEAT score	.444	.646		
	POTS teasing about weight	.203			
	POTS teasing about abilities	.209			
2	Initial ChEAT score	.410	.657	.011	
	BMI	.303			
	POTS teasing about weight	.072			
3	POTS teasing about abilities	.078	.660	.03	
	Initial ChEAT score	.349			
	BMI	.313			
4	DT	.093	.662	.002	
	POTS teasing about weight	.030			
	POTS teasing about abilities	.097			
	Initial ChEAT score	.331			
	BMI	.306			
5	DT	.088	.664	.002	
	Emotional symptoms	.090			
	POTS teasing about weight	.024			
	POTS teasing about abilities	.053			
	Initial ChEAT score	.311			
	BMI	.264			
6	DT	.089	.664	.001	
	Emotional symptoms	.081			
	Perfectionism	.081			
	POTS teasing about weight	.031			
	POTS teasing about abilities	.041			
	Initial ChEAT score	.440			
	BMI	.332			
7	DT	.167	.695	.001	
	Emotional symptoms	.091			
	Perfectionism	.071			
	Hyperactivity	.073			
	POTS teasing about weight	-.032			
	POTS teasing about abilities	-.027			
	Initial ChEAT score	.304			
7	BMI	.249	.695	.001	
	DT	.075			
	Emotional symptoms	.075			
	Perfectionism	.084			
	Hyperactivity	.068			
	Body dissatisfaction	.105			
	POTS teasing about weight	.013			
POTS teasing about abilities	.043				

ChEAT: Children Eating Attitudes Test; DT: drive to thinness; BMI: body mass index; POTS: Perception of Teasing Scale.

include a previous high BMI which is associated with eating psychopathology and exposure to teasing, relationship difficulties, low self-esteem, being made to feel small by the family or alexithymia.

Regarding teasing about abilities we should mention that its correlations with eating variables (ChEAT, EDI-BD, DT, BMI) were very much lower than those observed with teasing about weight. Their higher correlations were with emotional symptoms, in line with the data of our prior cross-sectional

study<sup>26</sup> and with other previous ones where an association was detected with fears of negative evaluations by the others or those with emotional disorders.<sup>41,42</sup>

Another factor which we should not ignore is that the effect of teasing about weight could impact subsequent eating behaviours. Although the previous literature suggests that teasing about weight is clearly more influential in early teens it would be reasonable to assume that it may affect people later than the 2-year period of study. To this end, a



recent cross-sectional study observed that the women who had been teased during their childhood presented with more eating disorders than those who had not.<sup>6</sup> The ideal of thinness, defined by social norms, could be internalised through teasing about weight, and affect both body image and other more complex psychological factors such as self-esteem, which would involve a predisposing role for the adoption of pathological body dissatisfaction eating habits.<sup>43</sup>

### Teasing as a predictive factor of eating disorders in girls and boys

The existence of higher scores in girls has already been mentioned, in the scales most associated with eating psychopathology and in the emotional symptoms. Boys scored more on the hyperactivity and perfectionism scale. There were no differences in BMI.

In both sexes hierarchical regression explained a similar proportion of the variance.

Regression models are similar with regards to the inclusion of predictive variables. The exception was the EDI-BD variable, which only attained presence, with a reduced beta, in boys. In both cases the variable Inefficiency was not present in the model.

We found no prospective studies with both sexes with which to compare our results. We find it interesting to point out that in the case of the girls teasing loses its significance in the regression model when the BMI variable is introduced, underlining the raised importance among the girls and its role in sensitivity or exposure to teasing.

Data is somewhat different among the boys. The BMI did not cancel out the significance in the association of teasing with eating psychopathology. It would appear that a DT is necessary for teasing about weight to bear any significance. In the case of teasing about abilities it is also necessary for emotional symptoms to be involved.

These results suggest, in the case of girls, that a more specific pattern to experience or develop sensitivity to teasing is very highly linked to BMI. In boys the pattern is somewhat more complex. Perhaps these results may suggest different models of preventative intervention regarding eating psychopathology as regards gender. Personal and social/family education interventions would be appropriate for both boys and girls to expand a more flexible body aesthetics model. In both cases early recognition and the addressing of eating psychopathology would also help as this is the most significant predictive variable of their maintenance or deterioration.

### Limitations

The limitations of this study are that the conclusions may only be established for the age interval studied. As specified, several authors suggest that teasing about weight is linked to eating disorders in a relatively short time and that the effects cannot be long-lasting.<sup>10</sup> Furthermore, teasing about weight seems to be more intense in early adolescence and for this reason our sample seems to be appropriate to demonstrate the studied effect.

We should highlight that the psychometric variables used (ChEAT and EDI) allowed us to determine the existence of behaviours or symptoms associated with eating behaviour disorders, but did not allow us to discern whether the subjects with high values in them present an eating behaviour disorder or not, which affects the extrapolation of results to these clinical entities.

No other variables were assessed which could discriminate different vulnerabilities in exposure to teasing, such as race, culture or socioeconomic status. However, practically the whole sample comprised white, Caucasians and we therefore consider that a bias due to race or culture could be considered insignificant.

Although most of the initial sample remained throughout the study, we cannot rule out the existence of bias due to losses. For example, students who stopped going to secondary school could have developed eating disorders which impeded their participation in re-evaluation. It should also be taken into account that the sample was not random, although we may assume that a great part of the population obtained from secondary schools which was representative of the socioeconomic situation of the Community of Valencia, would minimise a selection bias.

### Declaration of transparency

The first author states that this manuscript is an honest, precise and transparent account of the study it presents, that no major aspect of the study has been omitted and that the differences between this study and that initially planned have been explained (and recorded when relevant).

### Ethical disclosures

**Protection of people and animals.** The authors declare that no experiments on humans or animals were carried out for this research.

**Data confidentiality.** The authors declare that they have adhered to the protocols of their centre of work regarding patient data publication.

**Right to privacy and informed consent.** The authors obtained the informed consent from the patients and/or people referred to in this article. This document is held by the corresponding author.

### Conflict of interests

The authors of this article have no conflict of interests to declare in relation to the information contained in it.

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