

A cross-sectional model of eating disorders in Argentinean overweight and obese children

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Abstract Despite the fact that past research identified childhood obesity as an antecedent of eating disorders, not all obese children further develop this pathology. With this regard, our first purpose was to isolate which characteristics differentiate overweight children who have an eating disorder from those who have not. Second, considering that there is little evidence collected in Latin American countries, we provided overweight children data from an Argentinean sample. Specifically, we investigated if weight-teasing, perfectionism, disturbed eating attitudes and behaviors, and body image dissatisfaction are related to the occurrence of an eating disorder in 100 school-aged overweight/obese children (37 girls and 63 boys; mean age 10.85, SD 0.88). Participants completed self-report instruments and were interviewed between 1 and 2 months later to confirm the presence of eating disorders. Seventeen percent participants confirmed to have an eating disorder. Further, the multivariate logistic analysis revealed that perfectionism (Exp $\beta = 1.19$) and disturbed eating attitudes and behaviors (Exp $\beta = 4.78$) were jointly associated with the presence of an eating disorder. These results were

maintained even when the overall model was adjusted for covariates such as age, gender, body mass index, and school type. Weight-teasing and body image dissatisfaction did not contribute to the multivariate model. Prevalence rates of ED and model findings were discussed.

Keywords Eating disorders · Overweight · Children

Introduction

Children with eating disorders (ED) have come to be regarded as a subgroup of interest due to the importance of early detection in these disorders [1]. However, the identification of ED may be problematic in children and younger adolescents. While the core psychopathology of these disorders is similar across the lifespan, clinical presentation may vary according to age and gender [2]. Children under the age of 13 appear with atypical presentations [3], for instance, a lower frequency of binge eating and compensatory behaviors [4] and a more equitable gender distribution [5]. In fact, the hallmark of these disorders in children and adolescents is a subthreshold presentation [6]. Besides that, the majority of children who do not meet full criteria for ED diagnosis still may be at risk of developing it [7].

In recent years, prospective studies have identified childhood obesity as an antecedent of ED in adults [8] and adolescents [9]. Considering the worldwide growth of childhood obesity [10], overweight and obese youth are, in consequence, a special risk group for the development of ED. Nevertheless, despite the fact that obesity and ED overlap each time more frequently [11], overweight children do not necessarily develop an eating disorder [12]. In a meta-analysis, Stice [13] concluded that only a small

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proportion of children and adolescent who has a high body mass index (BMI) develop an eating disorder. Thus, it would be interesting to identify those unique characteristics that predict ED in overweight and obese youth. The distinction between these two groups of children could lead to specific psychological strategies to help them. Especially, bearing in mind that preventive interventions evidence better results when it focus on groups of greater vulnerability [14].

To identify possible factors, past research has shown that overweight children are more likely to be victims of teasing and bullying compared to their average-weight peers [15]. Madowitz et al. [16] have found that overweight children who suffer from teasing increase five times the risk of adopting extreme weight control behaviors. Also, several studies found that overweight children develop an excessive concern about weight and shape [17] and are markedly dissatisfied with their body image [18]. So far, it is not surprising that these children tend to adopt more frequently disturbed eating attitudes and behaviors [19, 20] and, therefore, appeal to restrictive diets [21] as a mean to adjust their body image to a cultural ideal of thinness as well as to reduce teasing from peers. As disturbed eating attitudes and behaviors may be related to the development of an eating disorder in adolescents [22], additional research focused on the factors associated with these disorders in overweight children is needed.

While some aforementioned factors have been extensively studied in overweight and obese youth (e.g., body image dissatisfaction, teasing) (see review in Ref. [23]), other well-established variables in the field of ED received less attention in child research. Perfectionism, the tendency to strive for excellence, is recognized as a key variable in the development of ED in adults [24], probably because it leads to the pursuit of an excessively high standard of the body weight and shape [25]. The authors of the transdiagnostic model of ED posit that perfectionism can function as an external mechanism to the eating disorder psychopathology that maintain this psychopathology and obstruct change [26]. However, except for a few studies [27, 28], there is no work to our knowledge who link perfectionism with ED in children, nor they in overweight children.

Hence, the aim of this study is to identify which characteristics differentiate overweight children who have an eating disorder from those who have not. Despite there is a growing interest in this field, most of the work relied on assessing specific variables and did not provide an integrative model of several identified factors from past research. With this regard, we can mention Eddy and colleagues' study [29] as an exception. These authors developed a risk model with several factors in a clinical sample

of overweight children and adolescents. Following this line, to assess a model that jointly contributes to the occurrence of ED with traditional and new proposed factors (teasing, body image dissatisfaction, and perfectionism) in overweight and obese children could help in the identification of these particular cases. Regarding that many pediatrician and parents tend to attribute ED to other disorders in child diagnosis [30, 31], and even more if they present overweight [3], this study sought to fill the gap in knowledge in this field.

At last, although we did not propose any cross-cultural hypothesis, we present data from a Latin American sample of overweight and obese children, which can serve as a starting point for future between-cultures comparisons, especially, considering that both obesity [32, 33] and eating disorders [34] are penetrating into developing countries and increasingly affecting younger age groups, since the past decade. Accordingly, a secondary aim of this study is to describe the prevalence of ED in overweight/obese Latin American youth.

Methods

Participants

A sample of school-aged participants was investigated. Selection involved children of both genders of two public and two private primary schools in the Autonomous City of Buenos Aires (CABA). Inclusion criteria were as follows: Being between 9 and 13 years old and being overweight or obese—established by the World Health Organization (WHO) standards [35] (see “[Instruments and measures](#)”). Recruitment and assent/consent procedures are also described below. Exclusion criteria were: not presenting informed consent, inability to read or write, lack of reliable information in the questionnaires (e.g., incongruent or contradictory answers), and inability to obtain the child's weight and height.

From an initial screening of 337 children, almost a third ($N = 100$) met the inclusion criteria (37 girls and 63 boys; mean age 10.85, SD 0.88), thus conforming the final sample. There were no significant gender differences regarding age. Participants attended the fifth (43 %), sixth (33 %) and seven (24 %) of four schools in the CABA (50 % public, 50 % private).

Procedure

All study procedures were approved by the Research Ethics Board of a national public university of Buenos Aires, Argentina. According to ethical principles, we provided full information about the purpose of the study

to the school authorities and the participants' parents. The parents also signed an informed consent as a precondition for their child's eligibility. Additionally, we assured the children the voluntary nature of their participation as well as the confidentiality of the data collected.

Participants completed the self-administered instruments at school during class time. The evaluation process took approximately 45 min, and trained psychologists were present to supervise completion and answer any request. Upon completion of questionnaires, the anthropometric assessment was performed individually in a private room of the school to ensure confidentiality. Subsequently, between 1 and 2 months after the initial evaluation, each participant was interviewed to confirm (or not) the presence of ED—Ph.D. level psychologists conducted these interviews. Considering that the traditional eating disorder categories derived from the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) [36] are not sensitive to the diagnoses of eating disorders in children [37], to confirm ED we followed the recommendation proposed by the Workgroup for Classification of Eating Disorders in Children and Adolescent [38]. We considered the presence of ED if the child exhibits, at least, one of the following criteria: (1) an extreme body shape/weight preoccupation and self-evaluation unduly influenced by body shape and weight, (2) binge eating episodes, and (3) extreme food restriction in order to lose weight or counteract the effects of a binge (skipping meals, fasting).

Finally, individual interviews were conducted with the children's parents who confirmed ED, to refer them to a specialized treatment.

Instruments and measures

Socio-demographic questionnaire

A self-report of demographics including age, gender, educational level, and school type (public or private) was obtained.

Height and weight

These measurements were taken by trained physicians according to the anthropometric regulations of the Sociedad Argentina de Pediatría [Argentine Society of Pediatrics] [39]. BMI was calculated, and the participants were classified into overweight (BMI = 85th–94th percentiles) or obese (BMI = above the 95th percentile) children, considering cutoff points for gender and age-specific recommended by the WHO for children and adolescents [35].

Teasing

Weight-related teasing was assessed via two single items: (1) Have you ever been teased about your weight or body shape? (yes/no), (2) What did they tell you? (open response). A child was considered teased when he or she answers positively to the first question and when we verified that the teasing reason was undoubtedly by overweight.

Disturbed eating attitudes and behaviors

The Children's Eating Attitudes Test (ChEAT) [40] adapted for Argentina [41] was used to assess maladaptive eating attitudes and behaviors among children aged 8 to 13. Argentine adaptation of this instrument retains 23 of the original 26 items, grouped into three subscales: Diet and body preoccupation, Social pressure to eat and Preoccupation with food. Participants use a 6-point response format (always, very often, often, sometimes, rarely, never) and for each question the most symptomatic response is recorded to a score of 3, 2, and 1, respectively. The remaining choices receive a score of 0. A score of 20 has often been used as a cutoff to identify disturbed versus normal eaters [42]. However, the Argentine adaptation established a more sensitive cutoff of 11 [41]. We employed in the present study the total score instead of the subscales scores. The ChEAT total score presented good internal reliability in the original ($\alpha = 0.76$), the adaptation ($\alpha = 0.81$) and the current study ($\alpha = 0.83$).

Body image dissatisfaction

This construct was assessed with the Child/Adolescent Version of the Silhouette Rating Scale (Ch/ASRS) [43]. This instrument is a self-administered visual scale including seven girls and seven boys' figures that range from very thin to obese. Each participant is asked to select the figure that represents his or her current appearance (current figure) and the figure that reflects the appearance he or she would most like to look like (ideal figure). The discrepancy between the selected current and ideal drawings is a measure of body dissatisfaction, with a greater discrepancy indicating greater body dissatisfaction. Test–retest reliability coefficients for figure selections were 0.71 for current figure and 0.59 for ideal figure [43].

Perfectionism

This personality construct was assessed using the Cuestionario de Perfeccionismo Infantil (CPI) [44] [The Child Perfectionism Questionnaire], a self-administered instrument designed for children aged 8–13. The CPI has two

subscales (Self-demands and Reactions to failure) and comprises 16 items, each with three choices: (yes/I think that = 2; sometimes/I think that sometimes = 1; and no/I don't think that = 0). This questionnaire has demonstrated adequate reliability rates (total score's $\alpha = 0.83$; self-demands = 0.82, and reactions to failure = 0.70) [44]. For the current study, we used the total score ($\alpha = 0.79$) instead of the subscales scores.

Eating disorder symptomatology

The Eating Disorder Examination Interview version 12.0 (EDE) [45], adapted for Argentina [46], was used to confirm ED. The EDE is an individual interview that comprises open and closed questions measuring the severity of the core psychopathology of eating disorders and generating eating disorder diagnoses, as stated in the DSM-IV [36]. For the purposes of this research, the EDE was modified following recommendations made by experts in the field of eating disorders in children [47]. These modifications include the use of concrete examples and metaphors to assess abstract concepts (e.g., loss of eating control is similar to 'a ball rolling down a hill') and some questions were added to assess intent in addition to actual behavior. Different questions of the EDE allowed to confirm the criteria considered in this study for the diagnosis of eating disorder. As previously mentioned (see "Procedure"), we considered the presence of ED if the child exhibits at least one of the following criteria: (1) an extreme body shape/weight preoccupation and self-evaluation unduly influenced by body shape and weight (e.g., "Has thinking about your shape or weight interfered with your ability to concentrate on things that you are actively engaged in", "Has your weight or shape been important in influencing how you feel about yourself as a person"), (2) binge eating episodes (e.g., "Could you describe any times when you have felt that you have eaten too much at one time?", "Did you feel you have lost control over eating?"), and (3) extreme food restriction in order to lose weight or counteract the effects of a binge (skipping meals, fasting) (e.g., "Have you been skipping meals to lose weight?").

Statistical analyses

Statistical analyses were conducted using SPSS software (version 19.0, IBM Corporation). Descriptive analyses of all variables were performed. Also, an univariate logistic regression analysis was conducted to examine if the presence of ED was associated with perfectionism, weight-teasing, body image dissatisfaction and disturbed eating attitudes and behaviors (each variable separately). Variables that were found to be significantly associated with ED were included in a multivariate logistic regression

model. Analyses were performed using the enter method and multicollinearity between independent variables was also explored. To determine if demographic characteristics (age, gender, BMI, and school type) would change the association between the independent variables and the outcome variable, we compared two models: "Unadjusted" with only the independent variables and "adjusted" with demographic variables as covariates.

Results

Descriptive analyses

The mean BMI was 23.28 kg/m² (SD 4.08) for the 100 participants. Sixty-one percent of the children was classified as overweight while 39 % was classified as obese. Forty-one percent of participants reported weight-teasing and 80 % showed some level of body image dissatisfaction—desiring, at least, one figure thinner than their current figure. Conversely, 19 % of children were satisfied with their current figure and only 1 % (one child) mentioned the desire for a bigger figure.

The average discrepancy between the ideal and current figures was 1.07 (SD 0.81). There were no gender differences in BMI, weight-teasing and body image dissatisfaction. Nevertheless, significant differences were observed in perfectionism [$t(98) = -2.00, p = 0.048; 95\% \text{ CI } -4.46, -0.02; d = 0.40$], with boys attaining the highest scores (29.46, SD 5.04; girls = 27.21, SD 5.98).

The average ChEAT score was 10.06 (SD 9.45). Forty percent ($n = 40$) of children showed disturbed eating attitudes and behaviors, with scores of ChEAT above 11 (14 girls and 26 boys, without significant gender differences).

According to the clinical interview, 17 % ($n = 17$) of children presented ED (eight girls and nine boys), also with no gender differences in this variable. According to the three criteria used for ED diagnosis, 16 % of the total sample showed an extreme body shape/weight preoccupation and self-evaluation unduly influenced by body shape and weight (criteria 1), 9 % reported binge eating episodes (criteria 2), and 15 % exhibited an extreme food restriction to lose weight or counteract the effects of a binge, like skipping meals (criteria 3). All children with an ED diagnosis presented at least two of these three criteria. Demographics and clinical characteristics for children with and without ED diagnosis are presented in Table 1.

Univariate analyses

Single univariate analyses revealed that perfectionism [Exp (β) = 1.23; 95 % CI 1.09, 1.39], body image

Table 1 Demographics and clinical characteristics in children with and without eating disorders

| | ED <i>n</i> = 17 | | Without ED <i>n</i> = 83 | | Univariate test | |
|----------------------------|----------------------|----------------------|--------------------------|-----------|-----------------|--|
| | <i>M</i> ± <i>SD</i> | <i>M</i> ± <i>SD</i> | <i>t</i> | <i>df</i> | <i>p</i> | |
| Body mass index | 25.23 ± 6.29 | 22.88 ± 3.38 | -1.50 | 17.934 | 0.152 | |
| Age | 10.76 ± 1.03 | 10.87 ± 0.85 | 0.44 | 98 | 0.663 | |
| Body image dissatisfaction | 1.18 ± 1.00 | 0.96 ± 0.73 | -2.44 | 19.627 | 0.025 | |
| ChEAT | 19.82 ± 11.48 | 8.06 ± 7.63 | -4.04 | 19.000 | <0.001 | |
| Perfectionism | 33 ± 5.11 | 27.73 ± 5.15 | -3.84 | 98 | <0.001 | |
| | % (<i>n</i>) | % (<i>n</i>) | χ^2 | <i>df</i> | <i>p</i> | |
| Gender | | | 0.89 | 1 | 0.346 | |
| Female | 47.1 (8) | 34.9 (29) | | | | |
| Male | 52.9 (9) | 65.1 (54) | | | | |
| School type | | | 3.47 | 1 | 0.062 | |
| Public | 70.6 (12) | 45.8 (38) | | | | |
| Private | 29.4 (5) | 54.2 (45) | | | | |
| Weight-teasing | 58.8 (10) | 37.3 (31) | 2.69 | 1 | 0.101 | |
| DEAB (ChEAT ≥ 11) | 76.5 (13) | 32.5 (27) | 11.35 | 1 | <0.001 | |

ED, children with eating disorder diagnosis; Without ED, children without eating disorder diagnosis; ChEAT, Children's Eating Attitudes Test; DEAB, disturbed eating attitudes and behaviors

Table 2 Multivariate logistic regression model predicting eating disorders

| Predictors | Unadjusted | | Adjusted ^a | |
|--|---------------|---------------------------|-----------------------|---------------------------|
| | β (SE) | Exp (β) (95 % CI) | β (SE) | Exp (β) (95 % CI) |
| Disturbed eating attitudes and behaviors | 1.40 (0.66)* | 4.06 (1.11–14.83) | 1.56 (0.72)* | 4.78 (1.17–19.56) |
| Perfectionism | 0.17 (0.07)** | 1.18 (1.02–1.35) | 0.18 (0.07)** | 1.19 (1.04–1.37) |
| Body image dissatisfaction | 0.53 (0.35) | 1.71 (0.86–3.40) | 0.24 (0.40) | 1.27 (0.8–2.80) |

Referent group is children without eating disorders

B beta, *SE* standard error, *Exp (B)* exponential beta, *CI* confidence interval

* *p* < 0.05; ** *p* < 0.01

^a Adjusted for age, gender, BMI status and type of school. McFadden *R*² = 0.30, for the adjusted model. Model χ^2 (8) = 10.97

dissatisfaction [Exp (β) = 2.50; 95 % CI 1.28, 4.86], and disturbed eating attitudes and behaviors [Exp (β) = 6.74; 95 % CI 2.01, 22.63] were significantly associated with the presence of ED (all *p*'s < 0.01). Weight-teasing was not associated with ED.

Multivariate analysis

Multivariate logistic analysis revealed that perfectionism and disturbed eating attitudes and behaviors remained significant (see Table 2), jointly contributing to ED (30 % variance explained). Each one-unit increase in perfectionism predicted 1.2 % greater odds of ED. Furthermore, children who exhibited disturbed eating attitudes and behaviors as measured by scores above the ChEAT's cutoff

were 4.78 times more likely to confirm ED after the clinical interview. Unstandardized (β) coefficients, odds ratios (Exp β), significance levels and confidence intervals for each variable retained for both models (adjusted and unadjusted) are presented in Table 2. The model correctly classified 86 % of cases.

Finally, a linear regression analysis to explore the existence of multicollinearity between independent variables was performed. It was found that all independent variables obtained variance inflation factors (VIF) close to 1 and, therefore, below the limit of 5 established to identify multicollinearity problems [48]. Additionally, the tolerance values were higher than 0.10 and eigenvalues were similar among the variables, showing that there are no linear relationships among predictors in the model.

Discussion

Eating disorders in obese youth were associated with negative outcomes such as greater comorbidity with other mental illness [49], lower quality of life [50], increased weight gain [51] and poorer treatment responses [52]. However, eating disorders and obesity are far from being considered as synonymous and research is needed to distinguish them. With this regard, our purpose was to identify which characteristics differentiate overweight children who have eating disorders from those who have not. Moreover, although the relationship between obesity and eating disorders is less investigated in children compared with adults, there is even lesser evidence collected in Latin American countries [23]. To our knowledge, this is the first attempt to examine this issue in Argentina as well as in Latin American overweight children.

In this study, firstly, 17 % overweight/obese children confirmed to have eating disorders following a clinical interview undertaken by trained psychologists. Besides different ways of establishing children diagnoses, this rate is impressive compared with previously school-based studies including normal-weight and overweight/obese youth (e.g., 3.44–3.81 % in Sancho et al. [53]). Indeed, this rate is also considerable concerning clinical samples (e.g., children who sought inpatient treatment for their obesity). For instance, 13 % of subclinical forms of binge eating disorder and 36.5 % of binge eating episodes were reported by Cebolla et al. [54] and by Decaluwé et al. [55], respectively. Although differences in design (self-report vs. clinical interview, clinical populations vs. general populations) may limit the extent of comparisons, our findings were in the line of research who alert obese children as a high-risk population to develop an eating disorder [12, 23]. Additionally, and in convergence with previous evidence in overweight youth [19, 20], age and gender were not associated with eating disorders, suggesting that these disorders affect both boys and girls as young as 9 years old.

Secondly, to isolate which characteristics can discriminate overweight children with eating disorders, our study showed that perfectionism, body image dissatisfaction and disturbed eating attitudes and behaviors were related to these pathologies. Nevertheless, only perfectionism and disturbed eating attitudes and behaviors were retained in the multivariate analysis, jointly contributing to the occurrence of an eating disorder. Overweight/obese children who exhibited disturbed eating attitudes and behaviors, as measured by scores above the ChEAT's cutoff, were almost five times more likely to confirm eating disorders after the clinical interview. Although the change in eating habits could be normal and even healthy for overweight

children, strict and maladaptive dieting (i.e., the “diet” that measures the ChEAT) could lead to binge eating and promote body weight increases [22, 51], a paradoxical effect of long-term diets [56].

Perfectionism, on the other hand, was also found to increase the risk for eating disorders in overweight children. Besides few research has explored the role of perfectionism in the development of eating disorders in children [27, 28], our results are consistent with those as well as several research in non-obese adolescents and adults [13, 24]. Children who have this personality trait are more vulnerable to develop unrealistic standards concerning the silhouette and body weight. Thus, perfectionist children might ascribe more strongly to the ideal of thinness promoted by culture and engage in extreme weight control behaviors to achieve this ideal, increasing the risk for eating disorders. To our knowledge, only one published study has tested the role of perfectionism in overweight youth. In this previous work, Eddy and colleagues [29] found that children with increased perfectionism were less likely to endorse eating disorder pathology. Although our finding contradicts Eddy's work, this may be due to methodological differences. In fact, Eddy and colleagues' suggest that the measure of perfectionism employed in their research (a brief 6-item subscale of the Eating Disorder Inventory) could not adequately assess the construct of interest. Additionally, no previous studies have examined this relationship in a non-clinical sample of overweight youth.

Regarding perceived body image, 80 % of participants showed some level of dissatisfaction. Although our univariate analysis finding was in line with previous research [57], the multivariate analysis showed that this variable was not associated with ED unlike other more relevant variables to the model. One possible explanation for this result could be related to the large proportion of children showing body image dissatisfaction. Theoretically, a high degree of body image dissatisfaction was expected in overweight children [23], given that they are immersed in a cultural context that emphasizes thinness and stigmatizes obesity. This high degree of dissatisfaction may preclude to distinguish eating disorders (or risk for) in this population. In this line, other constructs related to body image such as overvaluation of shape and weight could have a greater predictive potential since it constitutes the “core psychopathology” of eating disorders [58]. Interestingly, weight-teasing also kept insignificant in our final model, despite research that encountered strong associations in obese children [16, 29]. In this case, this could be occurring due to artifacts related to our way of operationalizing this construct (only two single questions and we did not assess the frequency and degree of distress caused by weight-teasing).

As in all studies, there are some limitations that need to be addressed. The sample size obtained as well as the intentional sampling is not representative of overweight and obese child at large, which places a potential limit on the generalizability of our findings. Further limitations include the dichotomic evaluation of weight-teasing. The cross-sectional design, also, does not allow us to draw conclusions about the temporality of the model. Future longitudinal studies are needed to identify which variables could occur before the onset of an ED.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments.

Informed consent Informed consent was obtained from all individual participants included in the study.

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