



# Psychological well-being and weight-related teasing in childhood obesity: a case–control study

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## Abstract

**Purpose** The prevalence of childhood obesity continues to increase worldwide. The aims of this study were to (1) assess the psychological well-being and rates of teasing of Spanish children with obesity (OG) and compare them with their non-overweight peers (NG), and (2) analyze the mediating role of weight-related teasing on the relation between children's BMI  $z$  score and psychological well-being.

**Methods** The cross-sectional study included 50 preadolescents with obesity, matched with non-overweight children according to age, sex, and socioeconomic status, who were assessed via self-report instruments measuring anxiety, depression, self-esteem, and teasing.

**Results** The OG reported higher anxiety, depression, and teasing, and lower self-esteem. SEM revealed that children who scored worse on instruments assessing psychological well-being had higher BMI  $z$  scores. Weight-related teasing predicted poor psychological well-being scores and weight-related teasing mediated the relation between BMI and psychological well-being.

**Conclusions** The high rates of anxiety, depression, and weight-related teasing, as well as the low self-esteem, which was observed amongst the children with obesity, raise concerns about the quality of life of this population. Furthermore, the finding that weight-related teasing mediated the relationship between BMI and psychological well-being adds to a growing body of research, highlighting the harmful effects of weight-related stigma. Overall, these results highlight the importance of early intervention to assess for, and address, the presence of weight-related teasing and psychological well-being difficulties in preadolescents with obesity.

**Level of evidence** Level III, case-control study.

**Keywords** Anxiety · Children · Obesity · Self-esteem · Weight-related teasing

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## Introduction

In recent years, there has been a notable increase in the prevalence rate of obesity with a substantial increase in developed countries [1]. In particular, child and adolescent obesity deserves attention given that the prevalence of overweight and obesity in this population in Spain is close to 40% [2]. Obesity has a multifactorial etiology that includes biological–genetic, social, and psychological variables [3]. The previous studies suggest that these children and adolescents may experience consequences to both their mental and physical health [4, 5].

In the last decade, several systematic reviews have highlighted the finding that children with overweight or obesity present high levels of psychiatric comorbidity [4, 6–8]. However, when results have been examined according to

sex, contradicting findings emerge. For example, findings of a longitudinal study by Sanderson et al. [9] found that childhood obesity in females, but not males, was associated with higher prevalence of mood and anxiety disorders in adulthood. Likewise, Puder and Munsch [8] found that higher body mass index (BMI) was associated with anxiety in children when the sample was considered as a whole, but only with depression when girls were considered separately. Despite the fact that both boys and girls with overweight and obesity have lower self-esteem than normal-weight peers, it seems that girls tend to score lower on measures of self-esteem, body image, and general well-being than their male peers [10–14]. Together, these studies suggest that sex must be considered when exploring psychopathology in children with obesity.

In addition, obesity is a stigmatizing condition, and youth with obesity may be victims of discriminatory attitudes and prejudices in multiple domains, primarily interpersonal relationships (e.g., peers; family), education, health, and sexual identity [15–17]. Peers are the most frequent source of negative attitudes and higher rates of peer teasing have been found in children and adolescents with obesity compared to their non-overweight peers [18, 19]. Children with overweight or obesity who have been victims of teasing and bullying at school present a higher risk for psychiatric comorbidity, lower self-esteem, higher levels of anxiety and depression, and future eating disorders [20–25]. In this direction, a recent study has found 17% overweight or obese children from 100 children between 9 and 13 years confirmed to have an eating disorder by a child clinical interview, in which perfectionism was the clear factor that increased the risk for eating disorders [26]. Another review study shows robust evidence of loss-of-control (LOC) eating on pediatric samples with obesity as opposed to binge eating episodes in adult samples. Perhaps, this behavior is less studied by clinicians; however, given its high comorbidity with excess weight gain in youth, it may impact the development of eating disorder symptoms [27]. Confirming this fact, our team has recently studied LOC episodes among 170 children with overweight/obese, and found that 33.5% of the sample presented this behavior, which was associated with more pathologic eating attitudes versus children who did not [28].

The relation between teasing and body weight has been hypothesized to be bidirectional, with increased BMI provoking teasing, and teasing leading children to engage in coping behaviors (e.g., increased food consumption, inactivity) that may contribute to weight gain [29]. The importance of investigating this factor among this population is underscored by suggestions that the health and psychosocial consequences suffered by children with obesity may partly be a result of the discrimination they face [20]. Experiencing weight-based teasing is associated with both physical and psychological health consequences [16], including a 60%

increased risk of mortality in adults [30]. Furthermore, a recent longitudinal study found that, when children were overweight, they had an increased risk for internalizing symptoms in early adolescence, a relation that was mediated by peer victimization and a desire to be thinner [31]. Furthermore, this relation may be maintained into adolescence and adulthood as low self-esteem in adulthood is associated with having been a victim of bullying, and these self-esteem difficulties increased the risk of presenting depression and anxiety [32].

Despite the fact that research on psychological well-being and teasing among children with obesity has increased in recent years, many of these studies present shortcomings, such as inattention to the potentially important role of sex, lack of a control group, and/or the absence of strict criteria to define obesity [32]. Furthermore, there is a shortage of studies examining the relation between these variables that employ causal modeling or path analyses [33]. Finally, researchers have pointed to the need for studies that can explore the relation between weight-related teasing and psychological well-being [16, 34] because of the promise it holds for improving interventions with individuals with overweight and obesity [35, 36].

The aims of the current study include (1) to assess psychological well-being (self-esteem, anxiety, and depression) and rates of teasing in a sample of children with obesity and compare them with their non-overweight peers, while taking sex into consideration, (2) to examine the role of weight-related teasing as potential mediator of the relation between BMI *z* score and psychological well-being in these two groups.

## Method

### Participants and procedure

This case–control study assessed a number of psychosocial factors using self-report questionnaires in a representative sample ( $n = 100$ ) of children aged 8–12 years from the region of Madrid, Spain. The group of children with obesity (OG) included 50 Caucasian children with a BMI > 97th percentile according to the age- and sex-specific cut-off points proposed by Cole et al. [37]. The non-overweight group included 50 Caucasian children (NG;  $n = 50$ ) whose BMI category did not classify them as underweight, overweight, or obese (i.e., BMI 15th to < 85th percentile for their age and sex). Each case of NG was matched for age, sex, and family socioeconomic status with a case of OG (1:1). Family socioeconomic status (SES) was based on the parent's educational level and employment status according to Hollingshead's index [38].

The study received ethical approval by the Niño Jesus Children's Hospital, Ethics Committee (Ref. 0009/10), Central Committee of Research, Primary Care Commission (Ref. 11/12), and the corresponding University Autonomous of Madrid, Research Ethics Committee (UAM, CEI 27–673). Participation was voluntary and informed assent and consent was obtained from all the parents participating in the study.

Nurses carried out anthropometric measurements of the children in both groups. Mothers' and fathers' height and weight were collected by trained interviewers using a Seca digital (Type 799 and 769) weighing scale (kg) rounded to one decimal place and calibrated to the digital scale at the public outpatient clinic.

Groups did not differ on the matching variables ( $p > 0.05$ , see Table 1). A flowchart of the study with details regarding the recruitment and sample selection procedure is shown in Fig. 1.

Table 1 shows clinical and sociodemographic characteristics and differences by group.

## Measures

The State-Trait Anxiety Inventory for Children (STAIC) [39, 40] is composed of two separate anxiety scales, made up of 20 items each, with four response options (0–3). The state anxiety (SA) scale measures transient levels of anxiety whereas the trait-anxiety (TA) scale measures dispositional, or more stable, levels of anxiety. The total score of each scale ranges from 0 to 60. Cronbach's alpha was 0.89 for state anxiety and 0.85 for trait anxiety in the Spanish version. In the current study, reliability was similar to that reported in the Spanish validation study (SA,  $\alpha = 0.82$ ; TA,  $\alpha = 0.85$ ).

The Child Depression Inventory (CDI) [41, 42] consists of 27 items with three response options (0–2), and aims to measure the cognitive, affective, and behavioral signs of depression. The total score of the scale ranges from 0 to 54. The internal reliability of the Spanish version was 0.69. In

the current study, reliability indices were higher than those reported in the Spanish validation study ( $\alpha = 0.83$ ).

The Lawrence's Self-Esteem Questionnaire (LAWSEQ) [43, 44] is composed of 16 items with a three-point response scale (no, yes, and don't know) and assesses a child's self-esteem, excluding the assessment of body image and body satisfaction. The internal reliability of the original version was 0.76 and the Spanish version was 0.67. In the current study, reliability was similar to that reported in the Spanish validation study ( $\alpha = 0.64$ ).

The Perception of Teasing Scale (POTS-S) [45, 46] assesses teasing in children and young adults. While the original scale consists of 11 items, the Spanish version includes only 9 of these items [45]. However, it is comprised of the same two subscales Weight-Related Teasing (WRT) and Competency Teasing (CT), and shows good psychometric properties. For the Spanish version, the WRT scale (4 items) had a Cronbach's alpha of 0.86 and the CT scale (5 items) had an alpha of 0.76. The Cronbach's alphas for the current study were slightly higher than those reported in the Spanish validation study (WRT,  $\alpha = 0.89$  and CT,  $\alpha = 0.81$ ). Participants respond to each item on a Likert scale ranging from 1 to 5.

## Data analysis

Data were analyzed using SPSS 21.0 for Windows and Mplus software. As each NG, subject was matched to a specific OG case and the data had a non-parametric distribution, the comparison between the two groups was analyzed using the Wilcoxon signed-rank tests for continuous variables and Chi-square tests for categorical variables. Effect sizes were calculated using Cohen's  $d$  to indicate the magnitude of the differences between groups. The guidelines for interpreting this value ( $d$ ) are:  $< 0.4 =$  small effect,  $> 0.4 =$  moderate effect, and  $> 0.75 =$  large effect [47].

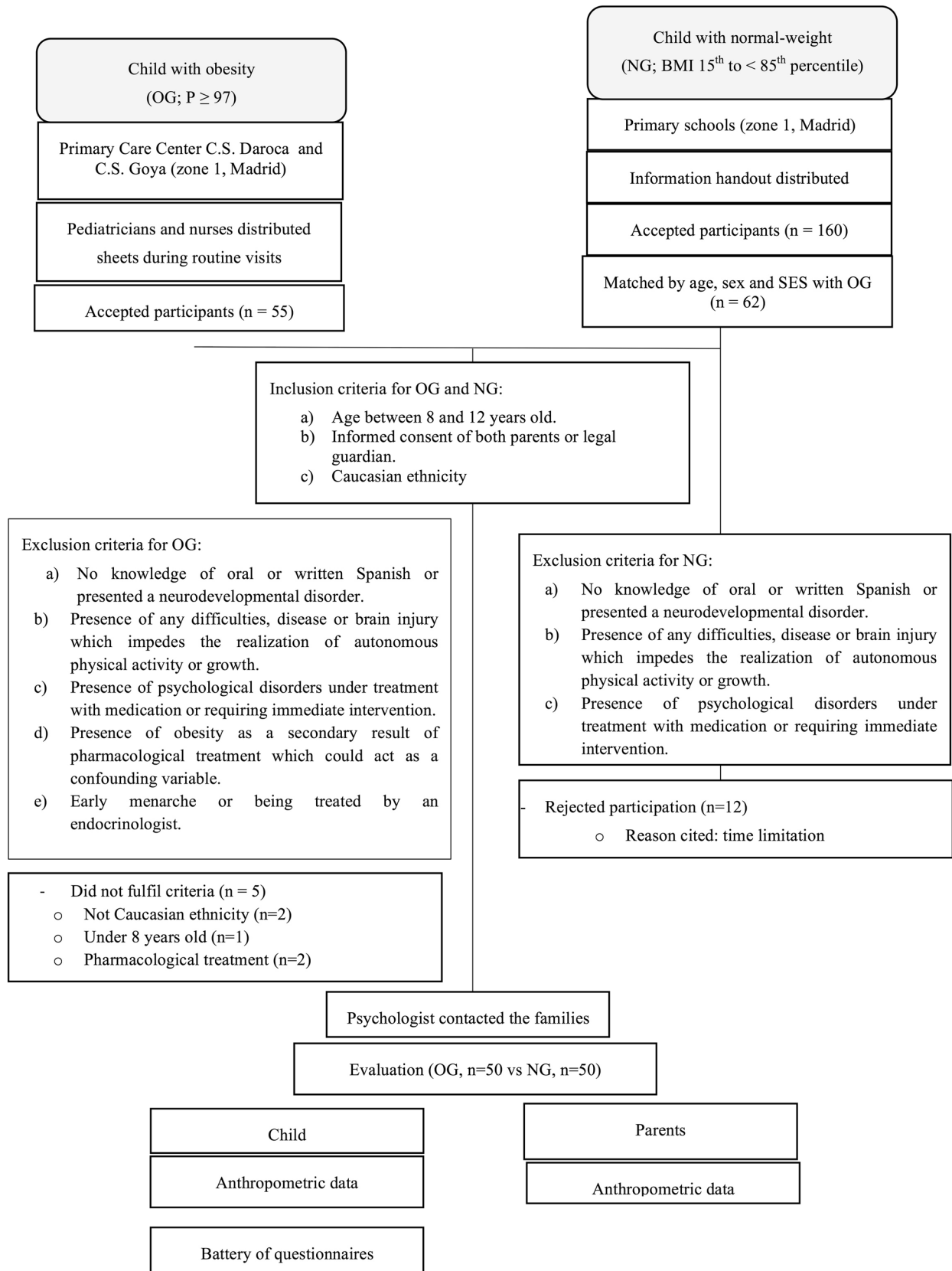
BMI standard deviation scores (BMI  $z$  scores) were computed by comparing the subject's body mass index with the

**Table 1** Clinical characteristics of children and parents

	OG ( $N = 50$ )	NG ( $N = 50$ )	Wilcoxon test
Age [ $M$ (SD)]	10.04 (1.29)	10.24 (1.41)	1.18 n.s.
Male [ $N$ (%)]	20 (40)	20 (40)	0.01 n.s.
Waist circumference [ $M$ (SD)]	84.52 (8.24)	61.92 (6.90)	5.50***
Arm circumference [ $M$ (SD)]	27.94 (2.53)	21.22 (3.63)	5.33***
Children BMI [ $M$ (SD)]	26.03 (2.46)	17.3 (2.94)	–6.15***
Children BMI $z$ scores <sup>a</sup> [ $M$ (SD)]	2.92 (0.97)	0.22 (0.83)	–6.15***
Mother's BMI [ $M$ (SD)]	26.76 (5.85)	24.46 (3.41)	–2.07*
Father's BMI [ $M$ (SD)]	30.15 (3.80)	28.17 (4.64)	–2.42***

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , n.s. not significant

<sup>a</sup>BMI  $z$  scores indicate BMI accounting for differences among growing children based on their age and sex



**Fig. 1** Recruitment Flowchart

average BMI for their age and sex in the general population [48]. A univariate logistic regression analysis was performed to assess the likelihood of children being classified as either obese or non-overweight according to their anxiety, depression, self-esteem, and teasing scores. Finally, a path analysis model was computed using the entire sample ( $N = 100$ ) to test the relation between psychological well-being measures (LAWSEQ, STAIC-T and CDI), BMI  $z$  scores, weight-related teasing (WRT), and demographic measures (sex and age). Using the Mplus software [49], multilevel modeling was carried out as an estimation method, since multivariate normality was not assumed. Model fit was assessed using the  $\chi^2_{SB}$  statistical test [50], the root-mean-square error of approximation (RMSEA; [51]), and the comparative fit index (CFI; [52]). Values close to 0.95 for CFI and below 0.06 for RMSEA indicate a good fit [52, 53]. Statistical significance was defined as  $p = 0.05$ .

## Results

### Clinical characteristics of children and their parents

Table 1 shows the clinical characteristics of the 100 children, ranging in age from 8 to 12 years ( $M = 10.14$ ;  $SD = 1.35$ ) and their parents. The OG and NG groups were each composed of 50 children, 30 girls and 20 boys. We did not find significant differences between the two groups in regards to the age of the children or the SES of the families. However, there were significant differences between the children's waist and arm circumference, children's BMI, and mothers'

and fathers' BMI, in that the children with obesity, and their parents, had higher scores on these variables (Table 1).

### Differences in psychological variables between obesity and non-overweight groups

No significant differences were found in terms of anxiety, depression, self-esteem, and teasing between male and female children for either group ( $p > 0.05$ ). However, when comparing the OG and NG groups, significant differences were found on nearly all variables related to psychological well-being. The OG children reported greater state and trait anxiety, higher levels of depression, lower levels of self-esteem, and greater frequency of both types of teasing. Effect sizes ( $d$ ) ranged from 0.47 to 1.13 indicating medium-to-large, significant differences between these two groups. The logistic regression revealed that the presence of these variables increased the likelihood of presenting childhood obesity (by 0.74–4.08 times, depending on the particular variable; see Table 2). We did not calculate the models according to sex given that significant differences on the psychological variables were not found between males and females ( $p > 0.05$ ).

### Path analysis model

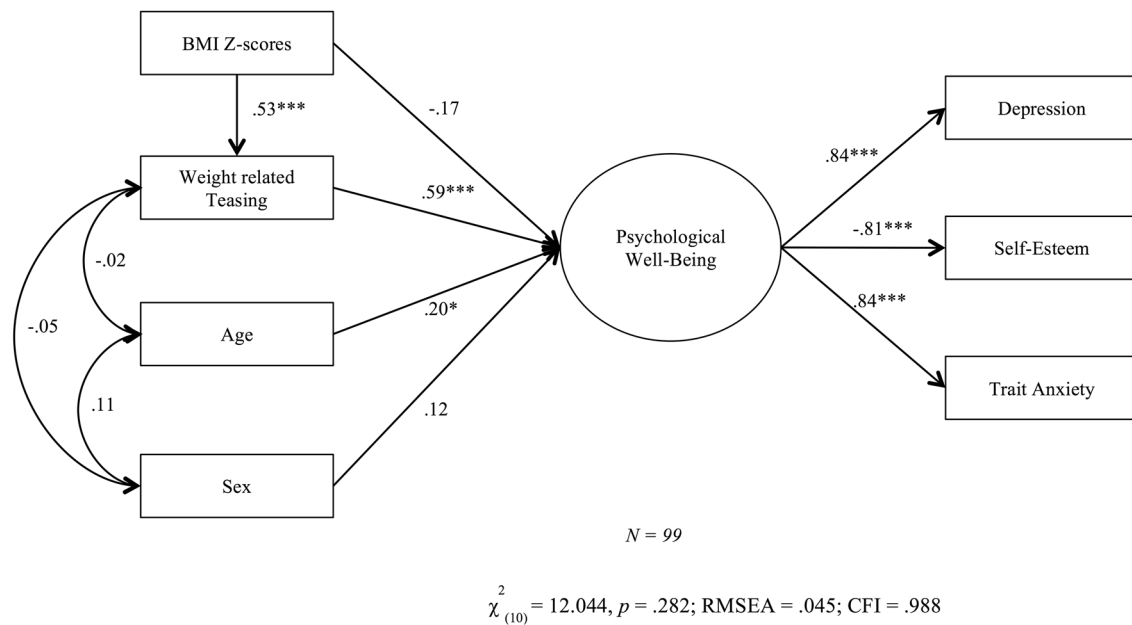
Figure 2 shows the outcomes for the model. The fit indices of the model were all satisfactory:  $\chi^2_{SB} (10) = 12.044$ ,  $p = 0.282$ ;  $RMSEA = 0.045$ , 90% CI [0.00–0.123];  $CFI = 0.988$ . The psychological well-being factor comprised of trait-anxiety (TA), depression (CDI), and self-esteem (LAWSEQ) was well defined with factor loadings

**Table 2** Means, standard deviations, and between-group differences of variables related to psychological well-being and teasing for the OG and NG children

Variables	OG ( $p > 97$ ) Mean(SD) $N = 50$	NG ( $25 \leq p \leq 84$ ) Mean (SD) $N = 50$	Wilcoxon test	$d$ -Cohen	OR	CI
Children's psychological well-being						
State-Trait-Anxiety Inventory (STAIC)						
STAIC-state	27.29 (6.27)	24.60 (3.53)	–2.35**	0.53	1.12**	1.02–1.22
STAIC-trait	33.36 (7.06)	30.16 (5.87)	–2.59**	0.49	1.08**	1.01–1.15
Depression Inventory (CDI)						
CDI	9.56 (6.57)	6.98 (4.03)	–1.87*	0.47	1.10*	1.01–1.20
Self-Esteem Questionnaire (LAWSEQ)						
LAWSEQ	16.40 (5.21)	19.01 (2.80)	2.88**	0.62	0.85**	0.76–0.95
Teasing (POTS-S)						
POTS-WRT	7.34 (4.06)	4.08 (0.39)	–4.78***	1.13	4.08***	1.80–9.21
POTS-CT	8.59 (4.38)	5.98 (1.78)	–3.68***	0.78	1.33***	1.12–1.57

OG obesity group, NG non-overweight group, STAIC The State-Trait-Anxiety Inventory for Children, CDI The Child Depression Inventory, LAWSEQ The Lawrence's Self-Esteem Questionnaire, POTS-S The Perception of Teasing Scale, CI confident interval for odds ratio (OR), SD standard deviation

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ;  $d$ -Cohen effect size was calculated based on the subscales' means and standard deviation



**Fig. 2** Mediation model with standardized estimates; \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . The correlations between BMI  $z$  scores and sex and age were not estimated given that age and sex were both forced to be 0

higher than 0.80. Specifically, the factor loadings of depression and trait anxiety were both positive with a value of 0.84, while the value for self-esteem was negative with a magnitude of 0.81. Other variables (age, sex, BMI  $z$  scores, and weight-related teasing) were entered to predict the psychological well-being factor and these variables explained 43.05% of the variance of the psychological well-being factor. Weight-related teasing (WRT) was the variable with the highest regression weight (0.59,  $p < 0.001$ ), followed by age (0.20,  $p = 0.044$ ). The direct regression weights from sex and BMI  $z$  scores on the psychological factor were not significant ( $-0.17, p = 0.163$  and  $0.12, p = 0.277$ , respectively). However, an indirect effect was found ( $0.31, p < 0.001$ ) with BMI  $z$  scores predicting the psychological well-being factor through its direct effect on WRT ( $0.53, p < 0.001$ ).

## Discussion

The main objective of the present study was to assess the psychological well-being and presence of teasing in a non-clinical sample of children with obesity and compare them with a non-overweight control group. To the best of our knowledge, it is the first case–control study to explore the psychological well-being and incidence of teasing in children with obesity that has matched each participant with a non-overweight peer according to their sex, age, and the socioeconomic status of their parents.

The first aim of the present study was to examine several variables related to psychological well-being in children

with obesity. We found that the OG had higher scores in anxiety, depression, and teasing, and lower scores in self-esteem, than the NG. The observed differences between the groups on rates of depression and anxiety mirror prior studies that found that greater rates of anxiety and mood disorders were associated with obesity in childhood and adolescence [3, 8, 11, 31, 54]. Similarly, studies of children and adolescents with obesity have shown that their weight status greatly impacts their global self-perception [12, 13]. More specifically, Franklin et al. (2006) showed the children with obesity at age 11 presented between 2 and 4 times lower levels of competence and global self-worth than normal-weight peers [10]. However, findings are mixed as other studies have not found a relation between weight and psychological well-being [35, 55]. It is possible that there are variables which have not been controlled for which may mediate this relation. For instance, the previous studies have pointed the need to explore the role of weight-related teasing and concern about weight and shape [56, 57].

In regards to teasing, the OG group presented greater frequency of teasing than the NG group, and those children that were victims of weight-related teasing had a notably increased risk of pertaining to the OG group. Studies comparing adolescents with overweight and obesity with their non-overweight peers have shown similar results. Youth that have been victims of teasing are more likely to be overweight, and it is associated with poorer psychological well-being [16, 19, 21–24, 35]. A large percentage of pre-adolescents with obesity have experienced peer teasing and those that had been victims of teasing showed significantly

higher levels of depression and were more likely to engage in unhealthy weight control behaviors [23].

The second objective of this study was to evaluate the mediating role of WRT in explaining the relation between BMI and psychological well-being. The results show that age and WRT were associated with the psychological well-being factor, with WRT showing the highest association with this factor ( $r=0.59$ ,  $p<0.001$ ). In addition, we found a strong association between BMI  $z$  scores and WRT ( $r=0.53$ ,  $p<0.001$ ) and children's BMI  $z$  scores were indirectly related to psychological well-being (more trait-anxiety and depression, and lower self-esteem) through the variable of weight-related teasing. These results suggest that being a victim of WRT and presenting poor psychological well-being during childhood are associated with child's weight and that weight-related teasing plays an important mediating role in the relation between weight and children's psychological health, which had previously been hypothesized by Russell-Mayhew et al. [56]. These results are consistent with the previous research that suggested that teasing was associated with psychological well-being [20, 31] and could be a maintenance factor for being an adult with obesity [58]. In fact, a study with 20,286 adults with obesity from the U.S. and U.K. showed that the link between obesity and depressive symptoms was explained by weight discrimination [59].

Several studies have focused on the influence of sex on the presence of psychiatric disorders in children with obesity [11, 19, 25]. However, we did not find sex differences on any of the variables assessed and our data showed no sex differences in the path analysis model. A possible explanation for this result may be that the present sample was composed of children and these differences may be more marked in adolescence or in cases of chronic obesity [32, 51]. One unexpected finding was that age significantly contributed to the model, which suggests that older children reported greater psychological well-being. Future studies would benefit from exploring whether the psychological health of younger children with overweight and obesity is more affected by WRT than that of their older preadolescent peers.

The present study is not without its limitations. First, the variables evaluated via self-report questionnaires may be affected by socially desirable responding. Furthermore, the internal reliability of LAWSEQ in the current sample is slightly lower than the acceptable level. However, it was the only scale validated into Spanish language for preadolescent. Self-esteem was an essential characteristic to measure in this sample of children, it is unclear whether a decrease in self-esteem is related to enhanced weight increase, and data relating to this variable should be interpreted with caution. In addition, the cross-sectional nature of the study prevents us from drawing any conclusions concerning causality between the psychosocial variables and children's weight status. It is important for future longitudinal studies to be

carried out to clarify temporal and causal relations with the psychosocial variables. Future studies could benefit from recruiting a larger sample size, as the sample size was a limitation in the current study. It is necessary that future research tests whether the relationships between the variables in that path model are significant with a more acceptable sample. In addition, participants of both groups were matched for the sociodemographic variables reducing the influence of differences in demographics in the outcomes. In addition, future research could explore other significant mediators such as unhealthy eating behaviors and attitudes, and concern about weight and shape [51, 56], body dissatisfaction [56, 60, 61], perfectionism extreme [26], and LOC eating episodes [27, 28], given that the previous studies have identified these variables as risk factors for the development of weight-related problems [62]. Finally, the fact that the sample was comprised of entirely Caucasian children limits the generalizability of the results to other populations.

The findings from the present study have several implications for intervention programs in different settings. For instance, this information could be used in the development of school-based training programs aimed at increasing awareness among staff on the complexity of obesity, including its relation with teasing and impaired psychological well-being. This would assist educators in adjusting school-wide policies and could improve early detection of weight-related teasing or difficulties in psychological well-being among these children with the aim of reducing the child's exposure to teasing and promoting greater psychological health. Furthermore, these results may also be of use for medical practitioners working with children who present with overweight or obesity as they highlight the importance of assessing for both the presence of mental health difficulties as well as the occurrence of weight-related teasing. Finally, these findings add to the growing body of research pointing to the harmful effects of weight-related stigma, even at an early age, and may be of use for changing public policy regarding weight discrimination.

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## Compliance with ethical standards

**Conflict of interest** The authors have no conflict of interests to declare and they have agreed to authorship in the indicated order.

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

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

## References

- World Health Organization (2000) Obesity: preventing and managing the global epidemic. WHO Technical Report Series 894, pp 16–30
- Sánchez-Cruz JJ, Jiménez-Moleón JJ, Fernández-Quesada F, Sánchez MJ (2013) Prevalence of child and youth obesity in Spain in 2012. *Revista Española Cardiología* 66:371–376. <https://doi.org/10.1016/j.rec.2012.10.012>
- Harrison K, Bost KK, McBride BA, Donovan SM, Grigsby-Toussaint DS, Kim J, Liechty JM, Wiley A, Teran-Garcia M, Jacobsohn GC (2011) Toward a developmental conceptualization of contributors to overweight and obesity in childhood: the Six-Cs model. *Child Dev* 82:50–58. <https://doi.org/10.1111/j.1750-8606.2010.00150.x>
- Rankin J, Matthews L, Cobley S, Han A, Sanders R, Wiltshire HD, Baker JS (2016) Psychological consequences of childhood obesity: psychiatric comorbidity and prevention. *Adolesc Health Med Ther* 7:125–146. <https://doi.org/10.2147/AHMT.S101631>
- Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS (2015) Childhood obesity: causes and consequences. *J Fam Med Prim Care* 4:187–192. <https://doi.org/10.4103/2249-4863.154628>
- Kalarchian MA, Marcus MD (2012) Psychiatric comorbidity of childhood obesity. *Int Rev Psychiatry* 24:241–246. <https://doi.org/10.3109/09540261.2012.678818>
- Latzer Y, y Stein D (2013) A review of the psychological and familial perspectives of childhood obesity. *J Eat Disord* 1:7–20. <https://doi.org/10.1186/2050-2974-1-7>
- Puder JJ, Munsch S (2010) Psychological correlates of childhood obesity. *Int J Obes* 34:37–43. <https://doi.org/10.1038/ijo.2010.238>
- Sanderson K, Patton GC, McKercher C, Dwyer T, Venn AJ (2011) Overweight and obesity in childhood and risk of mental disorder: a 20-year cohort study. *Aust N Z J Psychiatry* 45:384–392. <https://doi.org/10.3109/00048674.2011.570309>
- Franklin J, Denyer G, Steinbeck KS, Caterson ID, Hill AJ (2006) Obesity and risk of low self-esteem: a statewide survey of Australian children. *Pediatrics* 118:2481–2487. <https://doi.org/10.1542/peds.2006-0511>
- Rofey DL, Kolko RP, Iosif AM, Silk JS, Bost JE, Feng W et al (2009) A longitudinal study of childhood depression and anxiety in relation to weight gain. *Child Psychiatry Hum Dev* 40:517–526. <https://doi.org/10.1007/s10578-009-0141-1>
- Strauss RS (2000) Childhood obesity and self-esteem. *Pediatrics* 105:1–5. <http://www.pediatrics.org/cgi/content/full/105/1/e15>
- Taylor A, Wilson C, Slater A, Mohr P (2012) Self-esteem and body dissatisfaction in young children and associations with weight and parenting style. *Clin Psychol* 16:25–35. <https://doi.org/10.1111/j.1742-9552.2011.00038.x>
- Young-Hyman D, Tanofsky-Kraff M, Yanovski SZ, Keil M, Cohen ML, Peyrot M et al (2006) Psychological status and weight-related distress in overweight or at-risk-for-overweight children. *Obesity* 14:2249–2258. <https://doi.org/10.1038/oby.2006.264>
- Alberga AS, Pickering B, Hayden A, Ball G, Edwards A, Jelinski S, MacKean G, Nutter S, Oddie S, Sharma AM, Russell-Mayhew S (2016) Weight bias reduction in health professionals: a systematic review. *Clin Obes* 6:175–188. <https://doi.org/10.1111/cob.12147>
- Puhl RM, Heuer CA (2009) The stigma of obesity: a review and update. *Obesity* 17:941–964. <https://doi.org/10.1038/oby.2008.636>
- Puhl RM, Himmelstein MS, Watson RJ (2019) Weight-based victimization among sexual and gender minority adolescents: findings from a diverse national sample. *Pediatr Obes*. <https://doi.org/10.1111/ijpo.12514>
- McCormack LA, Laska MN, Gray C, Veblen-Mortenson S, Barr-Anderson D, Story M (2011) Weight-related teasing in a racially diverse sample of sixth-grade children. *J Am Diet Assoc* 111:431–436. <https://doi.org/10.1016/j.jada.2010.11.021>
- Goldfield G, Moore C, Henderson K, Buchholz A, Obeid N, Flament M (2010) The relation between weight-based teasing and psychological adjustment in adolescents. *Paediatr Child Health* 15:283–288. <https://doi.org/10.1093/pch/15.5.283>
- Eisenberg ME, Neumark-Sztainer D, Story M (2003) Associations of weight-based teasing and emotional well-being among adolescents. *Arch Pediatr Adolesc Med* 157:733–738. <https://doi.org/10.1001/archpedi.157.8.733>
- Hayden-Wade HA, Stein RI, Ghaderi A, Saelens BE, Zabinski MF, Wilfley DE (2005) Prevalence, characteristics, and correlates of teasing experiences among overweight children vs. non-overweight peers. *Obes Res* 13:1381–1392. <https://doi.org/10.1038/oby.2005.167>
- Libbey HP, Story MT, Neumark-Sztainer DR, Boutelle KN (2008) Teasing, disordered eating behaviors, and psychological morbidities among overweight adolescents. *Obesity* 16:24–29. <https://doi.org/10.1038/oby.2008.455>
- Madowitz J, Knatz S, Maginot T, Crow SJ, Boutelle K, N (2012) Teasing, depression and unhealthy weight control behavior in obese children. *Pediatr Obesity* 7:446–452. <https://doi.org/10.1111/j.2047-6310.2012.00078.x>
- Neumark-Sztainer D, Falkner N, Story M, Perry C, Hannan PJ (2002) Weight-teasing among adolescents: correlations with weight status and disordered eating behaviors. *Int J Obes Relat Metab Disord* 26:123–131. <https://doi.org/10.1038/sj.ijo.0801853>
- Van Geel M, Vedder P, Tanilon J (2014) Relationship between peer victimization, cyberbullying, and suicide in children and adolescents: a meta-analysis. *Pediatrics* 168:435–442. <https://doi.org/10.1001/jamapediatrics.2013.4143>
- Elizathe LS, Arana FG, Rutzstein G (2018) A cross-sectional model of eating disorders in Argentinean overweight and obese children. *Eat Weight Disord* 23:125–132. <https://doi.org/10.1007/s40519-016-0321-5>
- Byrne ME, LeMay-Russell S, Tanofsky-Kraff M (2019) Loss-of-control eating and obesity among children and adolescents. *Curr Obes Rep*. <https://doi.org/10.1007/s13679-019-0327-1>
- Sepulveda AR, Solano S, Blanco M, Lacruz T, Graell M (2018) Prevalence of childhood mental disorders among children with overweight/ obesity: identifying loss of control eating. *Psychiatry Res* 267:175–181. <https://doi.org/10.1016/j.psychres.2018.06.019>
- Feeg VD, Candelaria LM, Krenitsky-Korn S, Vessey JA (2014) The relationship of obesity and weight gain to childhood



- teasing. *J Pediatr Nurs* 29:511–520. <https://doi.org/10.1016/j.pedn.2014.08.011>
30. Sutin AR, Stephan Y, Terracciano A (2015) Weight discrimination and risk of mortality. *Psychol Sci* 26:1803–1811. <https://doi.org/10.1177/0956797615601103>
  31. Pryor L, Brendgen M, Boivin M, Dubois L, Japel C, Falissard B, Tremblay RE, Côté SM (2016) Overweight during childhood and internalizing symptoms in early adolescence: the mediating role of peer victimization and the desire to be thinner. *J Affect Disord* 202:203–209. <https://doi.org/10.1016/j.jad.2016.05.022>
  32. Adams RE, Bukowski WM (2008) Peer victimization as a predictor of depression and body mass index in obese and non-obese adolescents. *J Child Psychol Psychiatry* 49:858–866. <https://doi.org/10.1111/j.1469-7610.2008.01886>
  33. Pulgarón ER (2013) Childhood obesity: a review of increased risk for physical and psychological comorbidities. *Clin Ther* 35:18–32. <https://doi.org/10.1016/j.clinthera.2012.12.014>
  34. Puhl RM, Latner JD (2007) Stigma, obesity, and the health of the nation's children. *Psychol Bull* 133:557–580. <https://doi.org/10.1037/0033-2909.133.4.557>
  35. Puhl R, Suh Y (2015) Stigma and eating and weight disorders. *Curr Psychiatry Rep* 17:1–10. <https://doi.org/10.1007/s11920-015-0552-6>
  36. Neumark-Sztainer D (2009) Preventing obesity and eating disorders in adolescents: what can health care providers do? *J Adolesc Health* 44:206–213. <https://doi.org/10.1016/j.jadohealth.2008.11.005>
  37. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH (2000) Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 320:1240. <https://doi.org/10.1136/bmj.320.7244.1240>
  38. Hollingshead A (1975) Four factor index of social status. Yale University Department of Psychology, New Haven
  39. Seisdedos N (1990) Adaptación española del cuestionario: state-trait Anxiety Inventory for Children (STAIC). TEA, Madrid
  40. Spielberger CD, Gorsuch RL, Lushene RE (1973) Manual for the state-trait anxiety inventory for children. Consulting Psychologist Press, Palo Alto
  41. Davanzo P, Kerwin L, Nikore V, Esparza C, Forness S, Murelle L (2004) Spanish translation and reliability testing of the child depression inventory. *Child Psychiatry Hum Dev* 35:75–92. <https://doi.org/10.1023/B:CHUD.0000039321.56041.cd>
  42. Kovacs M (1992) Children depression inventory CDI (manual). Multihealth systems, Toronto
  43. De Gracia M, Marco M, Trujano P (2007) Factores asociados a la conducta alimentaria en preadolescentes [Factors associated with eating behaviors in preadolescents]. *Psicothema* 19:646–653
  44. Lawrence D (1981) The development of a self-esteem questionnaire. *Br J Educ Psychol* 51:245–251. <https://doi.org/10.1111/j.2044-8279.1981.tb02481>
  45. López-Guimerá G, Fauquet J, Sánchez-Carracedo D, Barrada JR, Saldaña C, Masnou-Roig A (2012) Psychometric properties of the perception of teasing scale in a Spanish adolescent sample: POTS-S. *Eat Weight Disord Stud Anorex Bulim Obes* 17:210–218. <https://doi.org/10.3275/8245>
  46. Thompson JK, Cattarin J, Fowler B et al (1995) The Perception of Teasing Scale (POTS). Revision and extension of the physical appearance related Teasing Scale. *J Pers Assess* 65:146–157. [https://doi.org/10.1207/s15327752jpa6501\\_11](https://doi.org/10.1207/s15327752jpa6501_11)
  47. Cohen J (1988) Statistical power analysis for the behavioral science. Hillsdale Elrbaum, New Jersey
  48. Sobradillo B, Aguirre A, Aresti U, Bilbao A, Fernández-Ramos C, Lizárraga A et al (2004) Curvas y Tablas de Crecimiento. Estudios longitudinal y transversal [Growth curves and tables. Longitudinal and cross-sectional studies]. Fundación Faustino Orbeagoiz Eizaguirre, Bilbao
  49. Muthén LK, Muthén BO (2008) Mplus user's guide, 5th ed. Muthén & Muthén, Los Angeles
  50. Satorra A, Bentler PM (1994) Corrections to test statistics and standard errors in covariance structure analysis. In: von Eye A, Clogg CC (eds) *Latent variables analysis: Applications for developmental research*. Sage, Thousand Oaks, pp 399–419
  51. Steiger JH, Lind JC (1980) Statistically-based tests for the number of common factors. Handout for a presentation delivered at the meeting of the Psychometric Society, Iowa City
  52. Bentler PM (1990) Comparative fit indexes in structural models. *Psychol Bull* 10:238–246. <https://doi.org/10.1037/0033-2909.107.2.238>
  53. Hu L, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Model* 6:1–55. <https://doi.org/10.1080/10705519909540118>
  54. Mustillo S, Worthman C, Erkanli A, Keeler G, Angold A, Costello EJ (2003) Obesity and psychiatric disorder: developmental trajectories. *Pediatrics* 111:851–859. <https://doi.org/10.1542/peds.111.4.851>
  55. Jansen W, Van de Looij-Jansen PM, De Wilde EJ, Brug J (2008) Feeling fat rather than being fat may be associated with psychological well-being in young Dutch adolescents. *J Adolesc Health* 42:128–136. <https://doi.org/10.1016/j.jadohealth.2007.07.015>
  56. Russell-Mayhew S, McVey G, Bardick A, Ireland A (2012) Mental health, wellness, and childhood overweight/obesity. *J Obes* 2012:1–9. <https://doi.org/10.1155/2012/281801>
  57. Bromfield PV (2009) Childhood obesity: psychosocial outcomes and the role of weight bias and stigma. *Educ Psychol Pract* 25:193–209. <https://doi.org/10.1080/02667360903151759>
  58. Hübner C, Baldofski S, Crosby RD, Müller A, De Zwaan M, Hilbert A (2016) Weight-related teasing and non-normative eating behaviors as predictors of weight loss maintenance. A longitudinal mediation analysis. *Appetite* 102:25–31. <https://doi.org/10.1016/j.appet.2016.02.017>
  59. Robinson E, Sutin A, Daly M (2017) Perceived weight discrimination mediates the prospective relation between obesity and depressive symptoms in U.S. and U.K. adults. *Health Psychol* 36:112–121. <https://doi.org/10.1037/hea0000426>
  60. Allen KL, Byrne SM, Blair EM, Davis EA (2006) Why do some overweight children experience psychological problems? The role of weight and shape concern. *Int J Pediatr Obes* 1:239–247. <https://doi.org/10.1080/17477160600913552>
  61. Van den Berg P, Neumark-Sztainer D (2007) Fat n' happy 5 years later: is it bad for overweight girls to like their bodies? *J Adolesc Health* 41:415–417. <https://doi.org/10.1016/j.jadohealth.2007.06.001>
  62. Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA (2007) Shared risk and protective factors for overweight and disordered eating in adolescents. *Am J Prev Med* 33:359–369. <https://doi.org/10.1016/j.amepre.2007.07.031>

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