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**PREVALENCE OF CHILDHOOD MENTAL DISORDERS IN OVERWEIGHT
AND OBESE SPANISH CHILDREN: IDENTIFYNG LOSS OF CONTROL
EATING**

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ABSTRACT

The aim was to examine the prevalence of childhood mental disorders in overweight/obese pediatric sample and also to explore the relationship between these pathologies and loss of eating control (LOC). Another aim was to assess the association between psychopathology and severity of obesity. A total of 170 children from different Health Centers were evaluated (84 girls and 86 boys; aged 8 to 12 years). Childhood psychological problems were assessed through a standardized diagnostic interview schedule (K-SADS-R) and by questionnaires (STAIC for anxiety, CDI for depression and ChEAT for disordered eating). Loss of control eating episodes were evaluated through the diagnostic interview. Of the sample, 57.06% of overweight/obese children met a DSM-5 diagnosis, typically an anxiety disorder; and 33.53% of the overweight/obese children presented loss of eating control episodes. We found more pathologic eating attitudes (ChEAT) in children who presented LOC versus children who did not. Finally, the scores obtained in the STAIC correlated positively with z-BMI and a positive association was found between z-BMI and the presence of episodes of LOC. These results highlight the importance of including psychological component in the initial assessment and contribute to the understanding of LOC episodes, which are still underestimated in childhood obesity.

KEY WORDS

Loss of eating control; obesity, eating attitudes; childhood psychopathology.

Highlights

- We found a high prevalence of childhood psychological problems according to DSM-5 diagnosis in overweight / obese Spanish pediatric sample.
- The results show the relevance of carrying out a standardized childhood-adolescence interview with the objective of making a reliable clinical diagnosis among a population with overweight/obesity.
- Similarly to adults with obesity showing a high prevalence of binge episodes, in the case of children, LOC episodes are prevalent.
- We observed a clear association between the occurrence of LOC episodes and negative emotions such as anxiety.

1. Introduction

The prevalence of childhood overweight and obesity continues to rise in most countries, associated with short-term medical, psychological and social consequences that worsen in the long term (Speiser et al., 2005; WHO, 2012). The mechanisms responsible for the etiology of overweight and obesity are complex. In addition, the dynamic process in which behaviors, cognitions and emotional regulation interact with each other, together with biological parameters (i.e. genetic predisposition, energy and/or metabolic expenditure), environmental factors (i.e. eating habits, sedentary lifestyle) (Stice et al., 1999; Speiser et al., 2005), and psychological factors influence the development and maintenance of these problems. A further important psychological correlate of childhood obesity might be found in familial stress. Familial stress such as mental disorders or somatic illnesses of parents, or stress associated with low socio-economic status. In longitudinal studies, this familiar context has been suggested to be associated with poor parent–infant interactions during feeding and with children’s emotional and behavioral problems during infancy (Cimino et al., 2016; Hansel et al., 2005). In this sense, this might contribute to the manifestation and maintenance of childhood overweight, partly by fostering excessive energy intake (Blissett and Haycraft, 2011). Early detection of these psychopathological factors could aid tertiary prevention (Goodman and Whitaker, 2002; Puder and Munsch 2010; Pulgarón, 2013). The aim of this study was to examine the prevalence of childhood mental disorders in overweight/obese Spanish pediatric sample and also to explore the relationship between this pathology and loss of control eating (LOC).

1.1. Association with psychological problems during childhood

Pioneering studies had already noted a higher prevalence of psychological problems during childhood among children with obesity, when compared to children with normal weight (Brunch and Toutaine, 1940). Recently, systematic reviews of the related scientific evidence show that the main psychological correlates associated with childhood overweight and obesity are the psychological problems of depression, anxiety, disruptive behavior problems and pathological eating disorders (Puder and Munsch, 2010; Pulgarón, 2013).

Focusing on prevalence studies, Vila et al.'s (2004) study carried out in France on a sample of 155 children with obesity, using the K-SADS-R clinical diagnostic interview can be highlighted. The results of this study showed that more than 50% of children had a DSM-IV diagnosis, and that 32% of children aged between 5 and 17 years suffered from an anxiety disorder and 12% presented a mood disorder. Similar results were found among a Mexican population with childhood obesity (125 children), where 27.5% of them suffered from an affective disorder and 20% presented an anxious disorder according to the CBCL ranges (Portillo-Reyes et al., 2016). Esposito (2014) carried out a case-control study to evaluate the relationship between psychological problems and obesity among a sample of 148 children and adolescents (8 to 12 years of age). The results of this study showed a significantly higher level of depressive and anxious symptomatology among the group with obesity in comparison to the control group.

More specifically, regarding the relationship between childhood obesity and depression, it has been shown that suffering from a depressive disorder during childhood independently predicts excess weight during the adult stage and doubles the risk of suffering from some degree of overweight (Goldstein, Wolk, and Weissman, 2001; Hammerton, Thapar and Thapar, 2014). Among the adolescent population, it has been observed that having depressive symptoms predicts an increase in weight one year

later, regardless of the baseline weight, especially in women (Hasler et al., 2005). It seems that women are more likely to present lower scores in self-esteem, body satisfaction and general well-being (Boutelle et al., 2010; Rofey et al., 2009). Similarly, Hammerton et al. (2014) found that, although depression was a good predictor of weight gain, the BMI did not significantly predict the development of depressive symptoms, suggesting an unidirectional relationship (depressive symptomatology predicts weight gain). However, another recent systematic review of longitudinal and cross-sectional studies among infant-adolescent population concluded that although the association between obesity and depression is clear, it seems to be bidirectional. This review also confirmed the presence of a greater association between these variables among adolescent women (Mühlig et al., 2016).

The study of the relationship between weight status and variables related to anxious symptomatology among children and adolescents has been broader. Roberts and Duong (2016) examined, through a prospective study of 3,134 adolescents, the reciprocal effects between weight and anxiety diagnoses according to DSM-IV. Their results showed that the weight status did not increase the risk of suffering subsequent anxious symptomatology. However, presenting anxiety initially increased the subsequent risk of obesity. When they analyzed the results differentiating by sex, they found a higher risk of obesity in men with anxious symptomatology.

Different studies have shown the relationship between behavioral problems and attention deficit hyperactivity disorders (ADHD), and childhood overweight/obesity (Vila et al., 2004; Puder and Munsch, 2010; Pulgarón, 2013). Agranat-Meged et al. (2005) determined that the prevalence of ADHD among a North American population of children hospitalized with obesity was 58%. This prevalence decreased to 10% when children presented the disorder and obesity without requiring hospitalization. This

relationship has been widely studied on a sample of 62,887 children, aged between 5 and 17 years, through the National Survey of Children Health (USA), which determined that children with a clinical diagnosis of ADHD (non-medicated) presented an odds ratio of 1.5 of suffering from some degree of overweight (Waring and Lapene, 2008). Continuing along this line, attention must be placed on the role of impulsivity, as it has been observed that children who presented some degree of overweight scored to a greater extent on variables of aggressiveness and disruptive behavior, in comparison to children with normal weight (Zeller, Reiter-Purtill and Ramey, 2008).

1.2. Associations with emotional eating in childhood and adolescence

Currently, there is a high prevalence of pathological eating patterns among overweight children and adolescents (Tanofsky-Kraff et al., 2008). Among the adult population, the relationship between the presence of binge eating disorder and overweight/obesity has been widely studied. However, it must be born in mind that, in rare cases, children are also diagnosed with binge eating disorder. Some differences between adult binge eating and childhood binge eating include the fact that childhood binges generally entail a lower energy intake and usually occur at regular meals, special occasions or when some type of snack is offered. Tanosky-Kraff et al. (2008) adapted the original criteria of the binge episode and suggested the concept of "Loss of control eating (LOC)". This concept was defined as the experience of absence of control regardless of the amount of intake. In a study carried out with 162 overweight children, without any type of treatment, an interview revealed that 9% of these children experienced "LOC" episodes (Tanofsky-Kraff et al., 2004). The prevalence of these episodes estimated for an obese child population that is receiving specialized treatment is between 15 and 36% (Levine et al., 2006).

As can be observed, there is evidence for the relationship between pathological eating patterns and childhood overweight/obesity. Moreover, it should be noted that there are also models that relate variables such as anxiety and depression and the appearance of phenomena such as LOC and emotional eating. In a study carried out with 115 children aged between 8 and 18 years suffering from some degree of overweight, a diagnostic interview revealed that high anxiety was related to the presence of emotional eating and LOC episodes, with emotional eating mediating between anxiety and LOC. This did not happen in the case of depression, as it was only associated to emotional eating (Goossens et al., 2009).

Taking into account the limitations of previous studies related to studying the presence or lack of psychological problems only through questionnaires or the use of hospitalized populations or age ranges that are too wide, rendering the sample unrepresentative, and the need to continue exploring this field, the need for the present study is warranted, with the aim of achieving the following main objectives: a) to study the type and frequency of psychological problems during childhood according to the DSM-5 criteria, using a standardized clinical interview, b) to evaluate the degree of agreement between diagnoses obtained through clinical interview and the cut-off points obtained by questionnaire, c) to explore the relationship between these psychological problems and the presence of episodes of loss of control eating (LOC), and with sociodemographic variables, and finally, d) to determine the relationship between psychological problems and the degree of excess weight.

2. Method

2.1. Subject Samples and Design

It is a cross-sectional study which includes a clinical interview and battery of questionnaires. A total of 170 children and adolescents (86 boys and 84 girls), aged between 8 and 12 years ($M=10.03$, $SD=1.55$) were evaluated. Families from two Primary Care Centers belonging to the Health Care System of the Community of Madrid and different Primary Education Centers (all in geographical proximity) were invited to participate in the study. All the participants had a body mass index (BMI) higher than the 85th percentile. Those participants who presented secondary obesity (e.g. due to Cushing Syndrome), those who did not have an adequate oral or written command of Spanish, those who suffered from a developmental disorder and those children whose parents could not take part were excluded from the study. The children's weight was calculated using Z-scores, the Body Mass Index (BMI) compared to the average BMI of the population according to age and sex (Sánchez-Cruz et al., 2013). The range of Z-scores was between +0.25 and +5.15 ($mean=2.04$, $SD = 0.75$). Of the entire sample, 11.4% of the participants came from families with a socioeconomic status of I, a 17.1% had level II status, 39.3% had a level III status, 17.9% had a level IV status and lastly 14.3% belonged to a level V status, according to Hollingshead criteria (2011).

2.2. Instruments

The Schedule for Affective Disorders and Schizophrenia for School-Age Children- Present and Lifetime version (K-SADS-PL) (Kaufman et al., 1997) is a semi-structured interview which generates 32 DSM-IV Axis I child psychiatric diagnoses. It includes both a screening interview and supplementary questions that are administered to ascertain a diagnosis if deemed relevant. Scores include 1 (absence of diagnosis), 2 (probable diagnosis) and 3 (definitive clinical diagnosis). Questions were directed at the children and responses confirmed with the parents. The Spanish version of the interview (de la Peña et al., 2002) was used and the diagnoses were subsequently adapted to the DSM-5 criteria by the researchers.

The State-Trait Anxiety Inventory for Children (STAIC) (Spielberger, Gorsuch and Lushene, 1970) is composed of two separate anxiety scales, which consist of 20 items

each, with four alternatives (0 to 3). Item example: “I worry about things that may happen” or “I have strange sensations in my stomach”. The state-anxiety scale measures transient levels of anxiety whereas the trait-anxiety scale measures dispositional, or more stable, levels of anxiety. The total score of each scale ranges from 0 to 60. In the current sample, the cut-off score of 36 was used to identify a risk of state-anxiety and 43 to identify a risk of trait-anxiety. Cronbach’s alpha was 0.89 for state-anxiety and 0.85 for trait-anxiety in the Spanish version (Seisdedos, 1990). In the current sample, the internal reliability was 0.78 for state-anxiety and 0.88 for trait-anxiety

The *Child Depression Inventory (CDI)* (Kovacs, 2004) consists of 27 items with three response options (0 to 2). Item example: “I am always sad” or “I do not like how I am”. The total score of the scale ranges from 0 to 54. In this sample, the cut-off of 19 was used to identify a risk of depression. The internal reliability of the Spanish version was 0.69 (Davanzo, 2004). In the current sample, Cronbach’s alpha was 0.68.

The Children’s Eating Attitudes (ChEAT) (Maloney, McGuire and Daniels, 1988) is composed of 26 items with 6 response options that assess eating attitudes, behaviors, diet and preoccupation with food in children. Item example: “I’m too afraid to weigh too much” or “I think of food continuously”. A total score above 20 points indicates the possible presence of an eating pathology. The Spanish validation obtained an internal reliability coefficient of 0.76 (Rojo-Moreno, 2011). In the current sample, Cronbach’s alpha was 0.80.

2.3. Procedure

All participants were evaluated over a period of 4 years (between 2012 and 2016). A 45% of the participants were invited through the pediatricians of the different Primary Care Centers during their routine visits to the center. On the other hand, 55% were

invited to participate through the tutors of the different collaborating schools. All participants were informed of the objectives and methods of the study through an informed consent approved by the Ethics Committee of the Niño Jesús University Hospital and the Primary Health Care Research Commission. All participants (N=170) and their relatives were interviewed through the *K-SADS-R*. Subsequently, the children completed the battery of questionnaires (*STAIC*, *ChEAT* and *CDI*). After the assessment, all families took part in a session in which the results obtained were explained, they received an evaluation report and they were derived, if necessary, to the corresponding public health care service.

2.4. Statistical Analyses

The analysis of the data was carried out using the SPSS 21.0 program for Windows. The results are expressed in terms of frequencies, means and standard deviations. The (2-tailed) correlations were calculated using Pearson's coefficient and Spearman's *rho* coefficient for the semi-quantitative variables. Nonparametric tests were used in cases in which the number of subjects was not large enough, that is, Mann-Whitney tests for quantitative variables and Fisher's exact test for qualitative variables. The mean comparison was carried out through Student's *t*-tests and one-factor ANOVAs, whenever necessary. The point of statistical significance was assigned at $p=0.05$.

3. Results

3.1. Prevalence of childhood psychological problems according to DSM-5

The results show that 57.06% (50 girls and 47 boys) of overweight/obese children had at least one definitive DSM-5 diagnosis (see Table 1). The most prevalent problems were anxiety disorders, with 54 participants (31.7%, 30 girls and 24 boys) presenting at least one type according to DSM-5 criteria (19.50% generalized AD, 4.05% separation

AD, 4.05% other specified AD, 2.50% social AD, .80% panic disorder and .80% Specific phobia). Secondly, 17 participants (10%, 7 girls and 10 boys) were diagnosed with some affective disorder (5% Major depression, 5% Dysthymic disorder). In addition, 11 participants (6.47%, 5 girls and 6 boys) presented a diagnosis of attention deficit disorder (3.53% ADHD and 2.94% ADD). Furthermore, 5 participants (2.94%, 1 girl and 4 boys) presented a diagnosis of disruptive, impulse control and conduct disorders (2.35% Intermittent explosive disorder and 0.6% Oppositional defiant disorder). Finally, 10 participants (5.88%, 7 girls and 3 boys) presented Eating disorders (2.35% Binge eating disorder, 1.76% Bulimia nervosa and 1.76% Anorexia nervosa). It should be mentioned that 9 cases exhibited comorbid anxiety and affective disorders in the form of a mixed disorder (5.3%, 4 girls and 5 boys).

3.2. Psychological problems screening through severity cut-off points of questionnaires (STAIC, CDI and ChEAT)

According to the results obtained through the questionnaires' scores, 30 overweight/obese children (17.6%, 19 girls and 11 boys) exceeded the severity cut-off point (36) in the STAIC state-anxiety scale. In terms of severe depressive symptomatology, 16 children (8.7%, 9 girls and 7 boys) had scores higher than 19 in the CDI. Regarding the eating symptomatology, 24 children exceeded the risk of pathological eating cut-off point (20) in the ChEAT (15.2%, 10 girls and 14 boys).

3.3. Degree of agreement in diagnosis between the clinical interview and the questionnaires

Table 1 shows the number of cases that have been diagnosed through the clinical interview (K-SADS-R), of some of the aforementioned disorders, and the number of cases that have exceeded the cut-off point in each of the questionnaires (STAIC, CDI

and ChEAT). Of the 97 children diagnosed with some disorder through a clinical interview, 72.16% (70) exceeded the cut-off point in at least one questionnaire.

The STAIC-State scale does not show significantly different scores between children suffering from some type of anxiety disorder (27.2 ± 6.53) and those who did not (26.43 ± 5.61 ; $t = -0.71$; $p = 0.47$). The children (17) who suffered from depression according to DSM-5 criteria presented an average score in the CDI of (11.60 ± 6.02), which was not significantly different from that obtained by the rest of children with overweight/obesity (9.17 ± 6.20 ; $t = -1.40$; $p = 0.16$). The ChEAT scale shows significantly different scores between children who were at risk of pathological eating (19.44 ± 14.21) and those who were not (10.39 ± 8.52 ; $t = -2.96$; $p = 0.04$).

PLEASE INSERT TABLE 1 ABOUT HERE

3.4. Association between loss of control eating and psychological variables

A 33.53% (57) of children and adolescents presented, according to criteria proposed by Tanofsky-Kraff et al. (2008), episodes of LOC eating. Of this percentage, 25.8% (7 girls and 9 boys) did not present any DSM-5 diagnosis, 48.8% (19 girls and 11 boys) had an anxiety diagnosis, 11.3% (4 girls and 3 boys) presented an affective disorder diagnosis, 3.2% presented an attention deficit disorder (2 girls) or a disruptive behavior disorder (1 girl and 1 boy). At the time of diagnosing the presence of LOC, the binge eating disorder was not taken into account. When comparing the scores obtained in the different questionnaires, a significant difference was found in the ChEAT (9.50 ± 8.27 vs. 13.35 ± 10.03 ; $t = -2.60$, $p = 0.01$) questionnaire, which was higher in the group with LOC. No significant differences were found regarding the scores in the STAIC and CDI questionnaires. Table 2 shows the differences in the scores obtained in the

questionnaires according to the presence or absence of DSM-5 diagnosis and the presence or absence of LOC episodes.

PLEASE INSERT TABLE 2 ABOUT HERE

3.5. Relationship between psychological variables and sociodemographical factors

There were no significant differences between boys and girls (female and male children and adolescents) in relation to the total prevalence of childhood psychological problems according to DSM-5 (Fisher's exact test = 0.515) or the presence of LOC (Fisher's exact test = 0.524). Table 3 shows the differences in the prevalence of disorders according to DSM-5 criteria according to sex. Regarding the questionnaire scores, no significant differences were observed according to sex for the CDI questionnaires, where girls obtained an average of 9.89 ± 6.24 compared to boys, with 8.87 ± 6.10 ; nor for the ChEAT questionnaire, where girls presented an average of 11.15 ± 8.43 and boys an average of 10.67 ± 9.82 . However, significant differences were found for the scores of the anxiety scale (STAIC) questionnaire, where the girls' mean was 27.89 ± 6.90 compared to that of the boys of 25.40 ± 4.32 ($t = 2.71$; $p = 0.008$).

PLEASE INSERT TABLE 3 ABOUT HERE

There was no significant correlation between the age of children with overweight/obesity and the scores in any of the questionnaires (STAIC, CDI or ChEAT). There were no significant associations between socioeconomic status and the score of any of the questionnaires (tested by ANOVA) of anxiety (STAIC), depression (CDI) or pathological eating (ChEAT). A significant association was found between the total prevalence of mental disorders (Chi-squared test = 8.127, $p = 0.017$) and socioeconomic status. More diagnoses were obtained in children with lower socioeconomic levels.

3.6. Association between psychological problems and degree of excess weight and BMI

If the total presence of psychopathology was taken into account, a significant association between the presence of a DSM-5 diagnosis and BMI ($+1.81 \pm 0.74$ vs. $+2.16 \pm 0.90$; $t = 2.29$, $p = 0.02$) was found. The scores obtained in the STAIC significantly correlated positively with the BMI of the children ($r = .308$; $p = 0.001$). However, this positive relationship did not appear between the DSM-5 diagnoses of anxiety and BMI ($+2.00 \pm 0.84$ vs. $+2.13 \pm 0.93$; $t = -0.87$, $p = 0.38$). In relation to the other diagnoses (affective disorders, ADHD, behavior disorders and eating disorders), no significant association was found with the children's BMI. Likewise, no significant correlations appeared between the CDI and ChEAT scores and the BMI. Finally, a positive association was found between the children's BMI and the presence of LOC eating episodes ($+1.84 \pm 0.80$ vs. $+2.35 \pm 0.87$; $t = 3.57$, $p = 0.001$).

4. Discussion

The first aim of the present work was to study the type and prevalence of childhood psychological problems among children and adolescent Spanish pediatric sample with overweight and obesity problems, according to DSM-5 criteria, using standardized diagnostic tools. The results show a high presence of psychological problems (57.06% according to the K-SADS-R, and between 8.70% and 17.60% based on the screening by questionnaires). According to the World Health Organization (WHO, 2012), the prevalence of psychological disorders during childhood ranges between 10% and 20%. In general, in the Spanish child population, psychological disorders range around 8.5% (Valero and Ruiz, 2003). The data of the present study are similar to Vila et al.'s (2004) results, who, using a diagnostic interview, found that 58% of 155 French children and

adolescents with childhood obesity also had a childhood mental disorder and also found that this occurred to 50% of children when based on standardized questionnaires (STAIC and CDI).

Analyzing in greater depth, anxiety disorders according to DSM-5 criteria were the most frequent (31.7%), followed by affective disorders (10%), which are similar to the results found in different studies (Vila et al., 2004; Drukker et al., 2009; Pitrou et al., 2010; Esposito et al., 2014).

Furthermore, ADHD/ADD (6.47%) also appeared as prevalent, and, to a lesser extent, disruptive, impulse-control and conduct disorders (2.35%). These results, in addition to being consistent with the literature (Waring and Lapene, 2008), show the role of impulsivity in childhood overweight/obesity. In this sense, it is known that children who present some degree of overweight score higher on variables of aggressiveness and disruptive behavior, in comparison to children with normal weight (Zeller et al., 2008).

In the present sample, the Eating disorders also appeared as prevalent (5.88%), which is especially important when the fact that childhood obesity is a risk factor for developing a subsequent eating disorder (López-Guimerà et al., 2013) is taken into consideration. In spite of this, studies with children focus on studying the presence or lack of binge eating episodes with the consequent assessment difficulty, which will be later explained. In summary, these findings are in accordance with systematic reviews on both Spanish (Pulgarón, 2013), and international (Puder and Munsch, 2010) obese children.

The second objective of the present study was to evaluate the degree of agreement between diagnoses obtained through clinical interviews and questionnaires. In this regard, there was no adequate agreement between the data obtained through the standardized diagnostic interview and the severity cut-off points of the questionnaires

(STAIC and CDI). However, the ChEAT questionnaire (pathological eating) seemed to be more sensitive. One hypothesis that could explain this result is that the interviewing psychologists may have overestimated the number of clinical diagnoses. Despite being a possible limitation of the study, it should be mentioned that the prevalences found are very similar and consistent with those found in other studies (Vila et al., 2004) that use a clinical interview (K-SADS-R) with children. This leads to another possible hypothesis, where the results may not match due to a bias of the child when answering the questionnaires or even due to the poor identification of emotions in this sample (Wheeler, Greiner and Boulton, 2005). In Vila et al.'s (2004) study, the authors found an adequate concordance between questionnaires (STAIC and CDI), but it is noteworthy that, in such study, the sample with obesity was undergoing hospital treatment while in the present study, the sample was obtained from health care centers or schools. This fact could explain the possible familiarization with the psychological evaluation instruments or the terms used in the questionnaires. In one way or another, the results show the relevance of carrying out a standardized childhood-adolescence interview with the objective of making a reliable clinical diagnosis among a population with obesity.

Other possible limitations of the present study relate to the generalization of these results to the entire population of children with overweight and obesity. An over-representation of childhood psychological problems is to be expected, as the families who took part in the present study were voluntary and were aware of the assessment through a diagnostic interview. Despite this, Vila et al.'s (2004) study, which is very similar to the present study, suggested reproducing their study on a population of children who were not hospitalized or under an endocrine treatment for obesity.

Therefore, the selection of the present study's sample can be considered as an approximation to the generalization of results in this type of population.

Exploring the relationship between the prevalence of psychological problems (anxiety, depression and risk of pathological eating) and the presence of episodes of loss of control eating (LOC) was another of the present study's objectives. There is a recent increase in the evidence that, similarly to adults with obesity showing a high prevalence of binge episodes, in the case of children, LOC episodes are prevalent (Tanofsky-Kraff et al., 2008). Studies focused on examining the presence of LOC in non-clinical children samples, using different assessment methods, conclude there is a prevalence ranging between 2% and 10% (Tanofsky-Kraff et al., 2008). In the present study, the prevalence of this type of behaviors, evaluated through a clinical interview, is around 33.53% of overweight/obese children and adolescents. These data are in agreement with those found in the scientific literature, where the prevalence ranges between 9% among untreated overweight children (Tanofsky-Kraff et al., 2004) and 36% in groups with treated obesity (Levine et al., 2006). It must be born in mind that this type of episodes in children has been associated with increases in altered eating behaviors (Hilbert and Munsch, 2005; Tanofsky-Kraff et al., 2008). Once again, in the present study, there is a correspondence between the presence of LOC episodes and a greater risk of pathological eating, measured through the ChEAT questionnaire. Regarding the relationship between depressive symptomatology and/or anxiety and presence of LOC, it was observed that 48.8% of children diagnosed with an anxiety disorder according to DSM-5 criteria suffered from LOC episodes. This relationship is congruent with results found by other research groups. For example, Goossens, Braet, Van Vlierghe and Mels (2009) observed a clear association between the occurrence of LOC episodes and negative emotions such as anxiety. They predicted, using a model, that the increase in

anxiety levels was related to the occurrence of LOC eating episodes. Similarly, they observed that this relationship was not found for depressive symptomatology, which was more related to emotional eating. In this sense, in the present sample, only 11.30% of those presenting LOC had been diagnosed with an affective disorder according to DSM-5 criteria. Some authors propose that the appearance of LOC may be due to inadequate learning of negative emotion management strategies such as anxiety (Gossens et al., 2009).

Another of the initial aims of the present study was to investigate the association between psychological variables and sociodemographic factors. In this regard, no significant correlation was found between the age or sex of children and adolescents with overweight/obesity and the scores on the questionnaires. There were also no significant differences according to sex in the total prevalence of childhood psychological problems or the presence of LOC. These results are not in line with those found in other studies that suggest that there is a relationship between excess weight in women and levels of depressive symptomatology (Hasler et al., 2005; Hammerton et al., 2014). In this sense, it is believed that the fact that these types of studies are carried out on adolescent population and the present study is carried out on a children and adolescent population can contribute to this discrepancy. Regarding socioeconomic status, no significant associations were found with the score of the questionnaires. However, a significant association was found between the overall prevalence of psychological problems and a lower socioeconomic status, similar to other studies (Goodman and Whitaker, 2002; Hasler et al., 2005; Pitrou et al., 2010).

Finally, determining the relationship between psychological problems and the degree of excess weight was the last of the present study's goals. In relation to this, a significant association between the presence of a DSM-5 diagnosis and the BMI of the children

was found, as found in Vila et al.'s (2004) study. However, none of the disorders alone correlated significantly with the severity of excess weight. Regarding the questionnaires, only a positive correlation was found between the degree of excess weight and the scores obtained in the anxiety scale (STAIC), thus, determining a possible association between this type of symptomatology and excess weight (Vila et al., 2004; Drukker et al., 2009; Pitrou et al., 2010). Finally, it is worth mentioning the positive association found between the children's BMI and the presence of LOC eating episodes, similarly to results found in other studies (d'Autume, 2012; Kalarchian and Marcus, 2012).

In relation to the limits and strengths of the study, it is worth mentioning the age range of the sample. The WHO states that adolescence spans from 10 to 19 years. In this manner our sample comprises children and adolescents. In these terms, we have had two different, although related, developmental stages. Therefore, we must take into account neuro-psychological differences and psychological mechanisms. Regarding the added value of paper, we found a high prevalence of psychiatric disorders according to DSM-5 diagnosis in an overweight/obese Spanish pediatric sample. The results show the relevance of carrying out a standardized childhood-adolescence interview with the aim of making a reliable clinical diagnosis among a population with overweight/obesity. Finally, the study is a pioneer in the study of LOC in a Spanish pediatric population. Similar to adults with obesity who show a high prevalence of episodes of binge eating, in the case of children, episodes of LOC are frequent. We observed a clear association between the occurrence of LOC episodes and negative emotions such as anxiety.

Considering all of the aforementioned, it is important to take into account psychological (cognitive-affective and behavioral) variables in the assessment protocols for overweight/obesity in children. Future longitudinal studies could clarify whether it is an

etiologically from the beginning (given the results found in children) or a factor that supports the problem of excess weight, or both. However, including a psychological/psychiatric approach in the treatment of obesity may aid an improvement of interventions with this type of population and their families.

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	Diagnoses K- SADS-R	STAIC \geq 36	CDI \geq 19	ChEAT \geq 20
<i>N</i>	97	30	16	24
Anxiety disorder	54	21/54 (.39) ^d	3/54 (.05)	8/54 (.15)
Affective disorder	17	2/17 (.12)	8/17 (.47)	2/17 (.12)
ADD/ADHD ^a	11	2/11 (.18)	2/11 (.18)	2/11 (.18)
DBD ^b	5	1/5 (.20)	1/5 (.20)	4/5 (.80)
ED ^c	10	4/10 (.40)	2/10 (.20)	8/10 (.80)

Table 1. Agreement between Kiddie-SADS-R diagnoses and cut-off score by questionnaire for overweight and obese pediatric children.

^a ADD/ADHD: Attention Deficit Disorder/Attention Deficit with Hyperactivity Disorder. ^bDBD, Disruptive Behavior Disorders. ^c ED, Eating Disorders. ^d Rate of agreement between DSM-5 diagnosis and questionnaires; for example, 39% of K-SADS-R anxiety disorders were positive to the screening by STAIC with a score above the cut-off point.

Table 2. Differences in the questionnaire scores according to the prevalence of childhood psychological problems (DSM-5) and LOC episodes.

	No diagnosis or LOC <i>N</i> = 60 <i>M</i> (<i>SD</i>)	Diagnosis but no LOC <i>N</i> = 53 <i>M</i> (<i>SD</i>)	Presence of LOC <i>N</i> = 57 <i>M</i> (<i>SD</i>)	Bonferroni Post-Hoc
STAIC	24.52 (4.40)	28.19 (6.60)	27.23 (6.21)	1<2,3*
CDI	6.36 (4.13)	11.14 (6.79)	10.36 (6.33)	1<2,3*
ChEAT	7.65 (6.54)	10.44 (9.72)	12.35 (1.03)	1,2<3*

*The difference in means (ANOVA) is significant $p < 0.05$.

Table 3. Differences in the prevalence of childhood psychological problems (DSM-5) in a sample with overweight/obesity according to sex.

	Females	Males	Fisher's exact test
Anxiety disorder	30/84	24/86	.237
Affective disorder	7/84	10/86	.590
ADD/ADHD ^a	5/84	6/86	1.00
DBD ^b	1/84	4/86	1.00
ED ^c	7/84	3/86	.326

^a ADD/ADHD: Attention Deficit Disorder/Attention Deficit with Hyperactivity Disorder. ^bDBD, Disruptive Behavior Disorders. ^c ED, Eating Disorders.