

## **Frequency and correlates of picky eating and overeating in school-aged children: A Portuguese population-based study**

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### **Running head**

Prevalence and correlates of picky eating and overeating in school-aged children

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**Ethical Approval:** All procedures complied with legal requirements by establishing protocols with the different entities involved (Ministry of Education and the Data Protection Authority in Portugal). Schools were contacted, and authorization was provided by the directorial/pedagogical boards of the schools. All parents received a letter explaining the study, main goals and procedures.

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

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## Abstract

Using the Achenbach System of Empirically Based Assessment (ASEBA) battery in a non-clinical Portuguese population-based study, we aimed to examine a broad spectrum of emotional and behavioral problems and competencies, including picky eating and overeating behaviors in children and youth. Overall, 2687 children from 6 to 18 years old were evaluated by their parents, teachers and, in the case of children older than 11 years old, by themselves. Picky eating and overeating were assessed using the Child Behavior Checklist (CBCL) and Youth Self Report (YSR). The frequency of picky eating and overeating was 23.1% and 24%, respectively. Picky eaters, compared with over eaters and non-picky/non-over eaters, tended to belong to the younger group of participants, and in turn, over eaters tended to belong to the older group. Overeating was significantly associated with overweight, which also emerged as a predictor of belonging to the overeating group. Both picky eaters and over eaters scored significantly higher on all emotional and behavioral problems and DSM-5-oriented subscales. The results of two independent binary logistic regression analyses indicated that internalizing and externalizing problems, together with the total problems score emerged as a predictor for both groups, including picky eater and overeater school-aged children. In accordance with previous studies, our results also supported the possibility that a broader pattern of potentially non-adaptive emotional and behavioral problems could also be associated with both pickiness and excessive eating.

**Keywords:** Picky eating, Overeating, School-aged children, Emotional and behavioral problems, Correlates.

## Highlights

- We found a picky eating and overeating frequency of 23.1% and 24% respectively.
- Picky eating was more common in younger children and overeating in older children.
- Overeating was significantly associated with lower socioeconomic status and overweight.
- Picky eating and overeating were associated to emotional and behavioral problems and DSM-5-oriented subscales.
- Internalizing and externalizing problems, together with total problems score, predicted picky eating and overeating.

## Introduction

Children's feeding and eating behaviors may be a source of parental concern from infancy through adolescence. Research suggests that children in many families are described to experience some type of feeding problems (e.g., Herle et al., 2020; Taylor et al., 2019; Van Tine et al., 2017); moreover, a common finding of community surveys indicates that parents tend to be concerned about their child's eating pattern (cf. McDermott et al., 2008). Furthermore, eating behavior in children is modified by the following: a) exposure and accessibility of foods; b) modeling behavior of peers, siblings, and parents; c) the physiologic consequences of ingestion; and d) child-feeding practices (Birch & Fisher, 1995; Ventura & Birch, 2008). When parents encourage or restrict children's consumption of certain types of foods, it may have adverse consequences for the development of children's food preferences and the regulation of energy intake (Birch & Fisher, 1995). More recently, Demir and Bektas (2017) found that children's eating behaviors explain 18% of the occurrence of obesity and parental feeding styles explain 2% of the occurrence of being obese.

Picky eating is characterized by children who reject certain types of food or groups of food that parents consider appropriate or necessary for the child's development (Jacobi et al., 2008). Parents can also describe their children as not eating well, requiring longer feeding times or lengths of meals, lower nutritional variety and a more limited total number of foods consumed, strong preferences concerning food presentation and preparation, and other specific features related to food and eating (e.g., low enjoyment of food, slowness in eating, and higher satiety responsiveness; Hoek, 2015). This often leads parents to provide their child different meals from the rest of the family (Mascola et al., 2010), which impacts family meals (Trofholz et al., 2017) and results in a diet characterized by a low variety of foods and few vegetables and fruits (Dovey, et al., 2008; Galloway et al., 2005; Galloway et al., 2003; van der Horst, 2012). Picky eating is a relatively common problem in early childhood, with a prevalence that ranges from 14% to 50% (cf., Cano et al., 2015a; Machado, et al., 2016), as well as in later childhood, with a prevalence that ranges from 8% to 50% in different samples (e.g., Mascola et al., 2010; van der Horst, 2012). According to McDermott and colleagues (2008), approximately 40% of irregular eaters at age 5 will continue to be labeled by their parents and caregivers as irregular eaters at age 14. In most cases, picky eating in early childhood can be considered as part of normal development, having a higher prevalence in preschool children, and decreasing thereafter; yet, in some individuals, may persist through to adulthood (Hoek, 2015). Most recently, Taylor and colleagues (2019), concluded that the differences in food and food group intakes at age 3 tend to persist into adolescence, particularly for vegetable, fruit and meat intakes. Moreover, studies have supported the relationship between picky eating and various behavioral

problems, including both internalizing and externalizing behaviors (e.g., Jacobi, et al., 2008; Machado et al., 2016; Micali et al., 2011). In a recent study conducted with a preadolescent sample, picky eating was also associated with a higher risk for being underweight (cf., Viljakainen et al., 2019a). In another study, Viljakainen and colleagues (2009b) found that avoiding fruits and vegetables and following irregular breakfast and dinner patterns were associated with underweight and excess weight in adolescents. Inconsistent associations exist between picky eating and children's and adolescent's weight status. As Brown and colleagues (2016) summarize, picky eaters who do not consume sufficient calories may become underweight; nevertheless, parents may also compensate for children's pickiness by pressuring their child to eat or by offering foods their children may find more acceptable, which may inadvertently increase the risk for obesity. Systematizing, associations between picky eating and weight status are particularly inconsistent, with some studies finding no association, some finding a greater risk of overweight, and some finding a greater risk of underweight (cf., Brown et al., 2018). Moreover, picky eating can be associated with weight and health concerns. However, picky eating is a different condition from DSM-5 avoidant/restrictive food intake disorder (APA, 2013), which is suitable for diagnosing clinically significant restrictive eating problems that result in a persistent failure to meet an individual's nutritional and/or energy needs (cf. Norris et al., 2016).

With respect to overeating, it is characterized by consuming an objectively large amount of food; although, overeating is different from binge eating, which is characterized by overeating accompanied by a sense of loss of control while eating (Goldschmidt et al., 2015; Goldschmidt, 2017). Both behaviors contribute to excess energy intake and weight gain (Goldschmidt, 2017) and are distinct from loss of control eating (LOC), which is defined by the subjective experience of feeling out of control while eating, with or without the consumption of an objectively large amount of food (Sinclair-McBride & Cole, 2017). Overeating is associated to weight development and predicts excess weight gain among children at increased risk for obesity and adolescents (Mustelin et al., 2018). On the other hand, adolescence is identified as a period of high nutritional risk in which eating habits develop and are strongly influenced by the environment (Rodrigues et al., 2017), tending to persist throughout the life span. The authors concluded that regular meal habits may contribute to healthy eating among adolescents. Although, overeating typically begins during adolescence, a period in which weight concerns may also arise (Ackard et al., 2003); it has been reported that 14.2% of girls and 6.9% of boys reported objective overeating during adolescence. If we consider all three eating behaviors described, the prevalence rates range from 7.8% to 26.0% (Sinclair-McBride & Cole, 2017), with all behaviors likely associated with depressive symptoms (e.g., Sinclair-McBride & Cole, 2017; Skinner et al., 2012). Overeating

has been associated with higher body mass index (BMI) values and obesity status, more frequent dieting, greater stress on the importance of weight and shape, compromised psychological health associated with body dissatisfaction, a more severe depressive mood, lower self-esteem and reported suicidal thoughts and attempts (Ackard et al., 2003). Moreover, in a recent literature review, Goldschmidt (2017) concluded that objective overeating in youth was associated with psychosocial impairment and distress compared to youth without eating pathology. More recently, Herle and colleagues (2019) found that childhood overeating was associated with increased risk of adolescent binge eating and binge eating disorder.

Furthermore, adolescence is considered a key period for the onset of eating disorders, as well as a critical period for weight gain (Mustelin et al., 2018). Haycraft, Goodwin and Meyer (2014) conducted a study that aimed to examine the relationship between adolescents' eating-related attitudes and their reports of their parents' practices around food and mealtimes. The authors identified higher levels of eating pathology with adolescent boys who reported feeling more parental restriction of food and with adolescent girls who reported greater parental pressure to eat.

Feeding problems may be described through parental perception of poor appetite, fussiness or picky eating, and the exhibition of problematic food refusal behaviors (Machado, Dias, Lima, Campos, & Gonçalves, 2016). Moreover, studies have described fluctuations between inhibited eating and secretive eating and overeating (Stice et al., 1999). Furthermore, overeating among adolescents has been identified as common, regardless of individual loss of control, episode frequency, or distress (e.g., Ackard et al., 2003).

The occurrence of problematic feeding and eating behaviors, which may include picky and/or overeating behaviors, appears to emerge from childhood to adolescence in many families. Accordingly, understanding children's and youth's attitudes toward food and eating appears to be relevant for parents, clinicians, health professionals and teachers. Thus, the present study aims to build on a previous picky eating study (cf. Machado et al., 2016) by extending the investigation from preschool-aged children to school-aged children (6-18 years) and also assessing overeating during this developmental period. Machado and colleagues (2016) conducted a study with a population-based sample of 959 children from 1.5 to 6 years old and found a picky eating prevalence of 25.1%. The comparison of the picky eating group and the non-picky eating group indicated that picky eating was more common in older children and in children from lower-income families with younger parents. Emotional and behavioral problems were also found to differentiate picky eaters from non-picky eaters; specifically, children with somatic complaints and attention problems were more likely to be picky eaters. Considering these results, we believe that understanding the mechanisms that coexist between eating

behaviors and global psychological functioning in nonclinical populations of children, pre-adolescents and adolescents may be a critical area of developmental psychopathology research. Considering the scarce research that combines the assessment of picky and overeating in non-clinical populations during the school age period, particularly in relation to the eventual co-occurrence of emotional and behavioral problems, the present study was conducted with a Portuguese population-based school-aged sample that aimed to (1) examine the frequency rates of picky eating and overeating, (2) investigate the presence of related sociodemographic correlates among picky eaters and over eaters vs. non-picky/non-over eaters, (3) evaluate the presence of emotional and behavioral problems among picky and over eaters vs. non-picky/non-over eaters and (4) evaluate the role of picky eating and overeating correlates, such as sociodemographic characteristics, overweight, and the children's/youth's competencies, adaptive functioning and emotional and behavioral problems according to the perspectives of parents, teachers and the youth themselves. Using the Achenbach System of Empirically Based Assessment (ASEBA) battery, we are able to assess the same problems, thus obtaining a better characterization of behavioral and emotional difficulties in different environments.

We hypothesized that the frequency rates of picky eating and overeating in school-aged children would be similar to the rates identified in other studies, with picky eating more prevalent in younger children and overeating more prevalent in older children. We also hypothesized that picky and over eaters would differ from non-picky/non-over eaters in relation to the presence of emotional and behavioral problems and from over eaters with respect to the presence of overweight. Moreover, we hypothesized that over eaters would present higher results related to emotional and behavioral problems compared to picky eaters, particularly with respect to the presence of depressive problems. We expect this study to facilitate the understanding of feeding and eating problems by considering the perceptions of different significant informants, including parents and teachers, without neglecting the perspective of the youth. We also believe that teachers' perspective may be useful to understand the adaptative functioning of school-aged children and youth, along with their eating behaviors, providing an environmental extra-family viewpoint.

## **Methods**

### **Participants**

Data used in the present study were extracted from a larger study, the Assessment of Psychopathology in Children and Adolescents: Validation of the ASEBA Battery (Achenbach et al., 2014). The normative sample was based on the number of students who were enrolled in public and private schools in Portugal in 2009. The

Portuguese Office of Statistics and School Planning was the source of the information. Every year, this office releases the number of students that are enrolled with the schools. To define the final sample, a random sampling stratified by geographic area, private vs. public schools, gender and age was used. The final sample included 2687 children and adolescents; however, participants with more than eight missing items on one of the questionnaires were excluded. Therefore, the final sample included 2647 (1333 female) children assessed by their parents, teachers, and themselves. The stratified sampling process was based on the public records of enrolled students in seven administrative regions of the Ministry of Education in Portugal (including the autonomous regions of Azores and Madeira), on the public vs. private nature of the schools and on students' age and gender distribution in those regions and type of schools (all schools were co-ed, attended by both boys and girls). Data were collected in 61 schools (48 public schools and 13 private schools). Response rate by administrative region ranged from 57% (Lisbon region) and 96% (Alentejo region) ( $M = 85.29\%$ ;  $SD = 14.05\%$ ).

Table 1 presents the demographic information. The children were aged between 6 and 18 years old ( $M = 11.62$  years;  $SD = 3.68$ ). Most of the children were firstborns, and most of the children lived with their parents and siblings. Three hundred ninety children had already been referred to health services (e.g., for mental health, speaking difficulties, and transactional difficulties). Most children (721) were reported to be Caucasian, and the remaining children did not answer or indicated other ethnicities.

Regarding the parents, mothers were aged between 21 and 73 ( $M = 40.57$ ;  $SD = 6.00$ ) years old, and fathers were aged between 23 and 75 ( $M = 43.05$ ;  $SD = 6.61$ ) years old. Most mothers completed the 4<sup>th</sup>, 6<sup>th</sup>, 9<sup>th</sup> grade or secondary education and 13 did not completed any academic level. Regarding the fathers, most completed the same academic level as the mothers, and 21 did not completed any academic level. Most mothers and fathers were married and employed. Regarding the parents' SES, low, medium-low and medium were the most prevalent.

*Insert table 1 around here*

## **Procedure**

We operationalized picky eating and over eating based only on the CBCL 6-18 items (parents' report). Parents were asked to indicate whether their child "doesn't eat well" or "overeats" on a 3-point Likert scale of (0) not at all applicable, (1) sometimes, and 2) often applicable. In relation to the picky eating assessment and

based on previous studies (Cano, et al., 2015a; Machado, et al., 2016), children with a score of sometimes and/or often (score  $\geq 1$ ) were classified as “picky eaters”. The same procedure was adopted for the overeating assessment, in which children with a score of sometimes and/or often (score  $\geq 1$ ) were classified as “over eaters”.

The data collection procedure complied with legal requirements by establishing protocols with the different entities involved. First, authorizations from the Ministry of Education and the Data Protection Authority in Portugal were obtained. Schools were subsequently contacted, and authorization was provided by the directorial/pedagogical boards of the schools. All parents received a letter explaining the study, including its main goals and procedures, and written informed consent was obtained. Questionnaires, in paper, were sent to participants’ homes, and the completed forms (CBCL 6-18 and YSR) were returned. Only after the parents agreed to participate in the study, completed the CBCL 6-18 (mother, father or other legal guardian) and provided their written consent, where the children and teachers also asked to complete their forms. Teachers completed a TRF for all children who participated. If parents did not agree to participate in the study, the YSR and TRF were not collected. Data used in the present study were extracted from a larger study that comprised a stratified random sample of individuals from 1 ½ to 18 years of age, which was based on the number of children that were registered in schools (data were provided by the Office of the Ministry of Education). The sample stratification was made according to geographic region, public vs private schools, gender, and age.

## **Measures**

### **Sociodemographic questionnaire**

The sociodemographic questionnaire assessed demographic information regarding the children (gender, age, firstborn vs other, household, and ethnicity), fathers and mothers (gender, age, education, marital status and SES). To assess SES, an adaptation of the Graffar Schedule (1956) was used; scores range from 5 to 25, with higher scores indicating lower socioeconomic level. This schedule takes into account the years of formal education and profession of the parents, sources of income, and type of housing and neighborhood to assign the family to one of the five socioeconomic status categories. Based on profession and education, an SES level was computed (Amaro, 1990).

### **Child Behavior Checklist 6-18**

The Child Behavior Checklist 6-18 (CBCL 6-18; Achenbach & Rescorla, 2000; Portuguese version Achenbach et al., 2014) consists of 112 items that describe behavioral and emotional problems of children aged



between 6 and 18 years. Parents were asked to rate the child's functioning in the previous 6 months using a Likert scale, in which problems are rated 0 when not true, 1 when somewhat or sometimes true and 2 when very true or often true. Moreover, parents were requested to provide information regarding child competencies, relationships with others, academic performance, diseases and other difficulties.

### **Teacher Report Form**

The Teacher Report Form (TRF; Achenbach & Rescorla, 2000; Portuguese version Achenbach et al., 2014) consists of 112 items that describe behavioral and emotional problems of children aged between 6 and 18 years. Teachers were asked to rate the child's functioning in the previous 2 months using a Likert scale, in which problems are rated 0 when not true, 1 when somewhat or sometimes true and 2 when very true or often true. Moreover, teachers were requested to provide information regarding the child's academic trajectory, academic performance, competencies, diseases and other difficulties.

### **Youth Self Report**

The Youth Self Report (YSR; Achenbach & Rescorla, 2000; Portuguese version Achenbach et al., 2014) consists of 112 items that describe behavioral and emotional problems of children aged between 11 and 18 years. Youths were asked to rate their functioning in the previous 6 months using a Likert scale, in which problems are rated 0 when not true, 1 when somewhat or sometimes true and 2 when very true or often true. Youths were similarly requested to provide information regarding their competencies, relationships with others, academic performance, diseases and other difficulties.

The CBCL 6-18, TRF and YSR share a substantial number of items that assess the same problems, thus enabling a better characterization of behavioral and emotional difficulties in different contexts.

In the CBCL 6-18 and YSR, the problem items may be summed to yield eight narrow-band syndrome scales: anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems (e.g., mind off, harm self, hear things, twitch, picks skin, repeats acts, see things, stores up, strange behavior, strange ideas), attention problems, rule-breaking behavior, and aggressive behavior. In the case of the TRF, problem items may also be computed to yield nine narrow-band syndrome scales: anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, inattention problems, hyperactivity-impulsivity problems, rule-breaking behavior, and aggressive behavior. Each syndrome scales summarizes the kinds of problems that form the syndrome comprising the problem items that tend to co-occur together. High scores indicate clinically important deviance, once they reflect numerous problems (Achenbach et al., 2014). Furthermore, for the CBCL 6-18, TRF and YSR, six DSM-oriented scales may be scored:

depressive problems, anxiety problems, somatic problems, attention deficit and hyperactivity problems, oppositional and defiant problems, and conduct problems. Two broad-band syndrome scales, internalizing problems and externalizing problems, and a total problems scale may also be computed for the three questionnaires. Internalizing consists of the three syndromes, anxious/depressed, withdrawn/depressed, and somatic complaints. According to the authors internalizing includes problems that are mainly within the self. Externalizing consists of the two syndromes, rule breaking behavior and aggressive behavior, and it includes problems that mainly involve conflicts with other people and with their expectations for the child.

In addition to the problems scales, both the CBCL 6-18 and YSR include competency scales. Specifically, in the CBCL 6-18, there are four scales: activities, social, school, and a total competency score; in the YSR, three scales are computed: activities, social, and a total competency score. The activities scale includes scores for the number of sports, other recreational activities, and jobs and chores, plus ratings of the amount and quality of the child's participation in various activities (cf., Achenbach et al., 2014).

The psychometric properties of the CBCL 6-18, TRF and YSR were examined according to methods used in previous studies in the USA (Achenbach & Rescorla, 2000): construct validity analysis using confirmatory factor analysis and group difference analyses (clinical vs. normative sample); reliability analyses using Cronbach's Alpha; and cross-informant agreement assessed by Pearson correlation. All analyses indicated good psychometric properties of all instruments (Achenbach et al., 2014).

## **Data analysis**

To evaluate the associations of gender, SES and overweight with picky eaters, overeaters, and non-picky/non-overeaters, chi-square tests were conducted. In accordance with Achenbach, McConaughy and Howell (1987), we performed Pearson correlation tests to analyze the association between parents' perceptions and children's perceptions concerning picky eating and overeating. To evaluate the differences between picky eaters, overeaters and non-picky/non-overeaters regarding age, parents' age, the CBCL, YSR, TRF, competency scale total scores, and DSM-5-oriented subscale scores, unifactorial one-way analyses of variance  $F$  (ANOVAs) were conducted. To evaluate between-group differences in terms of the CBCL, YSR, TRF, and competence subscale scores, we applied multivariate analysis of variance (Wilks' lambda). Then we performed two different post hoc tests appropriated to compare all different combinations of the treatment groups (cf. Field, 2013): Games-Howel and Gabriel. According to Field (2013), the Games-Howel post hoc test is more suitable when

there is any doubt that the group variances are equal. The Gabriel post-hoc test is more advisable when the sample sizes are slightly different.

To predict picky eating and overeating, we applied two logistic regression analyses independently despite using the same rational and almost the same variables (exceptions only for block 1, in which we use participants' and mothers' ages for picky eating and participants' ages and overweight for overeating). In both regression models, we used socio-demographic variables in the first block, variables related to the parents' reports (CBCL internalizing, externalizing and total problems score) in the second block, variables related to youth reports (YSR internalizing, externalizing, total problems score and competence scales) in the third block, and variables related to the teachers' reports (TRF internalizing, externalizing and total problems score) in the fourth block.

Statistical significance for the analysis of the results was set at the 5% level ( $p < .05$ ).

## Results

### Frequency and correlates of picky eating and overeating

According to the parents' reports, five hundred ninety-six (23.1%) participants were considered picky eaters, 619 (24%) participants were considered over eaters, and 1363 (52.9%) participants were considered non-picky/non-over eaters. According to the YSR, 24.4% ( $n = 353$ ) of the children evaluated themselves as "I don't eat as well", and 39.3% ( $n = 570$ ) indicated "I eat too much" (vs. 36.3%,  $n = 526$  non-picky/non-over eaters according to children's own report). There was a significant association between the parents' perceptions and children's own perceptions concerning picky eating ( $r = .35, p < .001$ ) and overeating ( $r = .47, p < .001$ ). We also found a significant association between overeating and overweight,  $\chi^2(1) = 621.86, p < .001$ .

Table 2 presents data regarding sex, age, and family SES in these three groups. Age differences between the groups were identified,  $F = 21.328, p < .001$ . The over eaters were older than the non-picky/non-over eaters ( $p = .01$ ) and picky eaters ( $p < .001$ ) and the picky eaters were younger than the non-picky/non-over eaters,  $p < .001$ . No sex differences were identified. Regarding parental age, no significant differences were identified for the father's age; however, the mothers of picky eaters were significantly younger than the mothers of non-picky/non-over eaters ( $F = 5.948, p < .01; p < .001$ ). No differences between parents' age and over eaters vs. non-picky/non-over eaters were identified. There was a significant association between SES and these three groups; the majority of the non-picky/non-over eaters and picky eaters were from the medium/high SES group, while the majority of the over eaters were from the low SES group ( $\chi^2(2) = 57.599, p < .001$ ).

*Insert table 2 around here*

### **Parent report**

Table 3 presents the results of the CBCL in the three groups regarding the CBCL 6-18 syndrome scales, internalizing, externalizing and total problems. The multivariate analysis showed significant differences between groups (Wilks lambda = .66,  $F(5134, 18) = 66.77, p < .001$ ). Univariate tests showed significant differences between groups in all subscales of the CBCL ( $p < .001$ ).

*Insert table 3 around here*

Games-Howel post hoc tests showed that the picky and over eaters scored significantly higher on all subscales of the CBCL than the non-picky/non-over eaters ( $p < .001$ ). No differences were identified between the picky and over eaters, with the exception of somatic complaints ( $p = .002$ ), with the overeaters scoring significantly higher on this measure. For the total score of the CBCL, significant differences were identified between the groups ( $F(890) = 112.67, p < .001$ ). Games-Howel post hoc test showed that the picky eaters had higher CBCL total scores than the non-picky/non-over eaters ( $p < .001$ ). The overeaters also had higher CBCL total scores than the non-picky/non-over eaters ( $p < .001$ ) and the picky eaters ( $p < .01$ ).

Regarding the DSM-5 related scales, using parents' reports, significant differences were identified between the groups for all scales ( $p < .001$ ). Gabriel post hoc tests showed that the picky eaters scored higher on depressive problems than the over eaters ( $M = 3.47$  vs  $M = 2.79, p < .001$ ) and non-picky/non-over eaters ( $M = 3.47$  vs  $M = 1.08, p < .001$ ). The overeaters also scored significantly higher on depressive problems than the non-picky/non-over eaters ( $p < .001$ ). Regarding anxiety problems, the picky eaters scored higher than the non-picky/non-over eaters ( $M = 3.15$  vs  $2.04, p < .001$ ), and the over eaters scored higher than the non-picky/non-over eaters ( $M = 3.19$  vs  $2.04, p < .001$ ). For somatic problems, the over eaters scored significantly higher than the picky eaters ( $M = 1.75$  vs  $M = 1.49, p = .010$ ) and non-picky/non-over eaters ( $M = 1.75$  vs  $M = .97, p < .001$ ), and the picky eaters scored significantly higher than the non-picky/non-over eaters ( $M = 1.49$  vs  $.97, p < .001$ ). Regarding attention deficit/hyperactivity problems, the picky eaters scored higher than the non-picky/non-over eaters ( $M = 2.91$  vs  $2.34, p < .001$ ), and the overeaters scored higher than the non-picky/non-over eaters ( $M = 2.92$  vs  $M = 2.91, p < .001$ ). For oppositional defiant problems, the picky eaters scored higher than the non-

picky/non-over eaters ( $M = 2.41$  vs  $M = 1.29$ ,  $p < .001$ ), and the over eaters scored higher than the non-picky/non-over eaters ( $M = 2.36$  vs  $M = 1.29$ ,  $p < .001$ ). Regarding conduct problems, the picky eaters scored higher than the non-picky/non-over eaters ( $M = 1.86$  vs  $M = .83$ ,  $p < .001$ ), and the over eaters scored higher than the non-picky/non-over eaters ( $M = 2.11$  vs  $M = .83$ ,  $p < .001$ ).

### **Youth report**

Table 4 presents the results of the YSR in the three groups with respect to the YSR syndrome scales, internalizing, externalizing and total problems. The multivariate analysis showed significant differences between the groups (Wilks lambda = .14,  $F(2840,18) = 11.73$ ,  $p < .001$ ). Univariate tests showed significant differences between the groups in all subscales of the YSR ( $p < .001$ ).

*Insert table 4 around here*

Games-Howel post hoc tests showed that the over eaters scored significantly higher on anxiety/depression ( $p = .002$ ), withdrawn/depression, somatic complaints, social problems, thought problems, attention problems, oppositional problems, aggressive behavior, internalizing, and externalizing problems ( $p < .001$ ) than the non-picky/non-over eaters. The picky eaters also scored significantly higher on anxiety/depression ( $p = .001$ ), somatic complaints ( $p = .003$ ), social problems ( $p = .008$ ), thought problems ( $p = .03$ ), aggressive behavior ( $p = .001$ ), externalizing problems ( $p = .004$ ), withdrawn/depression, attention problems, and internalizing problems ( $p < .001$ ) than the non-picky/non-over eaters. No differences were identified between the picky eaters and the over eaters. On the total score of the YSR, significant differences were identified between the groups ( $F(890) = 27.72$ ,  $p < .001$ ). Games-Howel post hoc test showed that the picky eaters had higher YSR total scores than the non-picky/non-over eaters ( $p < .001$ ). The overeaters also had higher CBCL total scores than the non-picky/non-over eaters ( $p < .001$ ). No differences were identified between the picky eaters and overeaters.

### **Teacher report**

Table 5 presents the results of the TRF in the three groups regarding the TRF syndrome scales, internalizing, externalizing and total problems. The multivariate analysis showed significant differences between the groups (Wilks lambda = .97,  $F(4218, 18) = 3.40$ ,  $p = .01$ ). Univariate tests showed significant

differences between the groups in somatic complaints, social problems, thought problems, attention problems, oppositional problems, aggressive behavior, externalizing and total problems.

*Insert table 5 around here*

Games-Howel post hoc tests showed that the over eaters scored significantly higher on somatic complaints ( $p = .004$ ), social problems ( $p = .020$ ), attention problems ( $p < .001$ ), oppositional problems ( $p = .020$ ), aggressive behavior ( $p = .020$ ), and externalizing problems ( $p = .009$ ) than the non-picky/non-over eaters ( $p < .001$ ). The picky eaters also scored significantly higher on attention problems ( $p = .010$ ) than the non-picky/non-over eaters. No differences were identified between the picky eaters and over eaters.

For the total score of the TRF, no significant differences were identified between the groups ( $F(890) = 2.88, p = .06$ ).

### **Competence Scales**

The multivariate analysis indicated that there were no significant differences between groups on the competence scales of the CBCL (Wilks' lambda = .99,  $F(1772, 6) = 1.03, p = .41, \eta = .003$ ). Univariate tests showed that there were no significant differences between the groups. Accordingly, no significant differences were identified for the competence scale total score ( $F(2, 888) = 1.75, p = .170$ ).

Table 6 5 presents the results of the competence scales of the YSR in the three groups. The multivariate analysis showed significant differences between the groups (Wilks' lambda = .97,  $F(1772,6) = 4.61, p < .001, \eta = .015$ ). Univariate tests showed significant differences between the groups on the school competence scale. Games-Howel post hoc tests showed that the non-picky/non-over eaters scored significantly higher on the school competence scales than the picky eaters ( $p = .002$ ) and over eaters ( $p < .001$ ). Significant differences were also identified for the competence scale total score ( $F(2,888) = 3.66, p = .026$ ). Games-Howel post hoc tests showed that the non-picky/non-over eaters had significantly higher competence scale total scores than the over eaters ( $p = .017$ ).

*Insert table 6 around here*

### **Correlates of picky eating**

The results of the binary logistic regression analysis are provided in Table 7. Overall, the model correctly classified 74.9% of the children ( $p < .001$ ).

*Insert table 7 around here*

The picky eating group differed on the CBCL's externalizing ( $p < .01$ ) and total problems ( $p < .001$ ), the YSR's internalizing problems ( $p < .05$ ) and the school competence scale ( $p < .10$ ). The CBCL's externalizing and total problems assessed by both parents and the internalizing problems rated by the youth themselves predicted all individuals who were in the picky eaters group. According to their own self-evaluation, children with higher scores on the CBCL's externalizing and total problems, as well as internalizing problems were more likely to be picky eaters.

### **Correlates of over eating**

The results of the binary logistic regression analysis are provided in Table 8. Overall, the model correctly classified 66.5% of the children ( $p < .001$ ).

*Insert table 8 around here*

The overeating group differed with regard to overweight ( $p < .001$ ); the CBCL's internalizing ( $p < .001$ ), externalizing ( $p < .001$ ) and total problems ( $p < .001$ ); and the TRF's internalizing ( $p < .05$ ) and total problems ( $p < .01$ ). Overweight, internalizing, and total problems assessed by both parents and teachers and the CBCL's externalizing problems predicted all individuals who were in the overeating group. Children with higher internalizing and total problems scores according to both parents and teachers and higher externalizing problem scores according to their parents were more likely to be over eaters.

### **Discussion**

Using the ASEBA battery in a Portuguese population-based study, we aimed to examine a broad spectrum of competencies, adaptive functioning, and problems (Achenbach & Rescorla, 2000) with respect to picky eating and overeating behaviors in children and youth. Based on the results identified in a previous study conducted with a pre-school aged sample (Machado et al., 2016), the present study aimed to address questions

and correlates related to picky eating frequency using a Portuguese, population-based, school-aged sample of children evaluated by their parents, their teachers and themselves. Furthermore, we also included overeating behavior in the analyses, taking into account the developmental period in focus.

The present study demonstrated that picky eating is almost equally as prevalent in school-aged children as it is in children of younger ages (23.1% vs. 25.1%, respectively) without noticeable differences between boys and girls, as previously discussed and in accordance with other studies (e.g., Jacoby et al., 2008; Machado et al., 2016). It has been reported that the picky eating prevalence reaches the highest values in early childhood and then declines until 6 years of age (cf. Cano et al., 2015a; Mascola et al., 2010). Despite the slight decline in the picky eating frequency between preschool and school-aged children, our results seem to support the findings obtained in Jacoby and colleagues' (2008) study, in which picky eating was shown to be a relatively frequent behavior in children up to 6 years of age. Furthermore, in a recent study, Van Tine and colleagues (2017) determined that selective eating may persist from childhood to early adult life and that new cases may occur during adolescence or young adulthood. As some authors point out, strategies for parents to help their children overcome picky eating before it becomes persistent are required (cf., Taylor et al., 2019). As the authors summarize, this may include repeated exposure to foods, being realistic about portion sizes, working on a positive approach during mealtimes, not providing snacks or excessive beverages between meals and providing social food experiences and consistency. Based on the results found, we believe that these kinds of guidelines may be encouraged and easily recommended by the first-line professionals in their interventions with parents and children.

With respect to overeating, similar frequency rates were observed in school-aged children (24%), and no sex differences were identified. Despite the similarities between the picky and over eating frequency rates, our study also observed that picky eating participants tended to be younger than over eaters and non-picky/non-over eaters and, in turn, over eaters tended to be older. Our results are in accordance with the majority of the studies that have focused on overeating considering that this eating behavior is more prevalent in older aged children (e.g., Sinclair-McBride & Cole, 2017).

The frequency rates identified in our study seem to be noteworthy, particularly if we consider that we identified high levels of agreement between parents' and preadolescents/adolescents' perceptions of both picky eating and overeating. We speculate that the expressions of these types of feeding difficulties and behaviors are validated inside the family environment and are likely recognized by both parents and children. In their study, Powers et al. (2005) described that problems associated with children's eating and feeding are often stressful for



parents. Thus, we may consider eating behaviors not only related to poor appetite, pickiness and fussiness but also related to excessive eating.

Overeating was also more common in children from lower-income families, while most of the non-picky/non-over eaters were from the medium/high socioeconomic families. Previous studies identified overweight, underweight, poor dietary quality, and picky eating as being more common in families from lower socioeconomic status (Brown et al., 2018). Moreover, insufficient income was associated with picky eating in preschool children in some studies (Brown et al., 2018; Cano et al., 2015a; Machado et al., 2016). More recently, higher household poverty and food insecurity were associated with lower mealtime structure in families with school-aged children (Schuler et al., 2020). We can consider whether lower-income families can have more difficulties to provide a nutritionally balanced diet and guarantee mealtime routines that tend to be associated to healthier eating patterns throughout the life span. No studies were found between overeating in school-aged children and family socioeconomic status. Future studies should consider household income in families with children and youth and assess the potential relationship between socioeconomic status and the presence of picky eating and overeating.

Curiously, picky eating was more common in children of younger mothers. In a previous study, the authors found that the parents of picky eating children tended to be younger than the parents of non-picky eaters (Machado et al., 2016). In another study, younger maternal age and lower maternal educational level were associated with increased maternal pressure to eat and overt control in their child-feeding practices (cf., Gonçalves et al., 2017). The authors considered that the pressure to eat and overt control may be even more prevalent if younger mothers consider their children to have a poor appetite, fussiness, or picky eating, which may be one potential explanation for the association between mothers' age and picky eating behaviors in their children.

Overeating was significantly associated with overweight, and overweight also emerged as a predictor of belonging to the overeating group; overweight school-aged children had 13 times greater odds of overeating than normal weight children. It is important to take into account that overweight children are at increased risks for social stigmatization, adult obesity, and chronic disease (Birch & Fisher, 1998) given that being overweight is a common condition in adolescence (Walther & Hilbert, 2016). Moreover, overeating tends to be best conceptualized as a marker of risk for excess weight gain and obesity (Goldschmidt, 2017). Furthermore, the available research has indicated that binge eating is a common problem in overweight children and adolescents, and the loss of control over eating has been consistently associated with morbidity (cf. Marcus & Kalarchian,

2003). According to Mustelin and colleagues (2018), several mechanisms could explain the confirmed relationship between weight development and overeating, which is considered one of the binge eating disorder features: 1) the possibility that weight gain contributed to the emergence of overeating, i.e., once being heavier than peers may elicit weight loss efforts and loss of control eating, leading to weight gain; 2) the experience of not conforming to the shared body ideal of the social environment may lead to eating in secrecy and feeling guilty after overeating; 3) the internalization of weight bias; 4) the presence of disordered eating during childhood and adolescence and its longstanding nature; and 5) the possible shared genetic etiology between BMI and binge eating disorder. Considering our results, overeating seems to be a relevant potential target for obesity prevention. As Mustelin and colleagues (2018) argue, once weight gain starts early, interventions must be timed accordingly, beginning as soon as it is recognized during the first years of adolescence.

Regarding the presence of emotional and behavioral problems, we concluded that both picky eaters and over eaters scored significantly higher on all CBCL 6-18 syndrome scales, internalizing, externalizing and total problems, than non-picky/non-over eaters. In the CBCL 6-18 DSM-5-oriented subscales, picky eaters and over eaters also scored significantly higher on all six problems assessed: depressive, anxiety, somatic, attention deficit/hyperactivity, oppositional defiant and conduct problems. In accordance with previous studies (c.f. Jacobi et al., 2008; Machado et al., 2016; Micali et al., 2011), the current study also supported that picky eating was associated with a wide range of emotional and behavioral problems in the pre-adolescence/adolescence period, including both internalizing and externalizing behaviors. The same pattern of results was identified in over eaters. The only problems that discriminated picky eaters from over eaters were depressive problems, which were higher in picky eaters, and somatic complaints, which were higher in overeaters. In a recent study (Sinclair-McBride & Cole, 2017), depressive symptoms predicted overeating in a school-based sample of adolescents. In the present study, depressive problems discriminated over eaters from non-picky/non-over eaters; however, picky eater participants exhibited higher scores. Further studies that combine picky eaters and over eaters in non-clinical samples should clarify this potential relationship.

According to the youth reports, the scores for all YSR syndrome scales, internalizing, externalizing, and total problems, were higher for picky eaters and over eaters than non-picky/non-over eaters (with the exception of oppositional behavior with no differences between picky and non-picky/non-over eaters). Considering the teacher reports, we identified a different pattern of results. The syndrome subscales related to anxiety/depression, withdrawn/depression and internalizing problems did not discriminate the three groups. The remaining TRF syndrome scales, internalizing, externalizing, and total problems, were scored higher by over

eaters than by non-picky/non-over eaters. However, picky eaters only scored higher on attention problems than non-picky/non-over eaters. Teacher reports showed the presence of a pattern of higher emotional and behavioral problems with respect to the over eaters group. These results are in accordance with the results obtained in the validation of the ASEBA preschool and school-age forms in the Portuguese population (Achenbach et al., 2014; Dias et al., 2017). With respect to cross-informant agreement, our results support previous studies that indicated a greater agreement between parents than between parents and the teacher (Hudziak et al., 2007). As indicated by other authors (Stanger & Lewis, 1993), parents reported more internalizing and externalizing problems than teachers; however, the latter problems were also identified in overeating children.

Considering the subjects' perceptions of their own competencies, both picky eaters and over eaters obtained lower scores on the YSR school competence scale (ratings in academic subjects) than non-picky/non-over eaters. Moreover, overeaters obtained lower competence scale total scores, which may indicate worse functioning in the activities, social and school areas. According to Ackard and colleagues (2003), youths who overeat may be at increased risk for serious psychological distress, including lower self-esteem, compromised mood, and suicide risk. In this sense, overeating may be a tangible behavior that signals the need for intervention, particularly when considering that internalizing and externalizing problems tend to co-occur in this group.

Finally, considering the correlates of picky eating and overeating, we tested a model that considered the perceptions of parents, youths, and teachers with respect to internalizing and externalizing problems, ASEBA total problems and age and overweight variables. Overall, internalizing and externalizing problems, together with total problems, emerged as predictors for both picky eater and over eater groups of school-aged children. In accordance with previous studies (e.g., Jacobi et al., 2008), our results also supported the possibility that a broader pattern of potentially non-adaptive emotional and behavioral problems could also be associated with both pickiness and excessive eating. Feeding and eating problems seemed to be linked with other emotional and behavioral problems not only in pre-school aged children (Machado et al., 2016) but also in school-aged children. In the present study, the strength of this association was even stronger, thus highlighting the role of internalizing and externalizing problems as relevant correlates of picky eating and overeating. These results indicate the relevance for professionals who work with children and adolescents to assess eating behaviors, including restrictive eating and overeating, and to understand these behaviors in a broader spectrum of problems that may be related to the presence of emotional and behavioral difficulties. Similarly, these aspects should be considered in prevention programs, in which the perception of both parents and youths regarding the

potential presence of eating problems may be relied upon. In that sense, prevention efforts should consider picky eating and overeating in school-aged children together with socio-demographic features, weight status, competency perception based on school activities, and the presence of emotional and behavioral problems. Regarding practical recommendations and prevention efforts, empirically-based guidelines should be considered based on a broader spectrum of competencies, adaptive functioning and problems. Clinicians and health professionals must start to assess school aged-children with measures that comprise internalizing and externalizing problems, involving the perceptions of parents, youth and teachers. Feeding and eating problems must then be understood in the context of a broader pattern of emotional and behavioral difficulties. For prevention programs, identifying high-risk groups during the pre-adolescence years seems to be crucial. Moreover, in addition to those in high-risk groups, preventive efforts may also include psychoeducation and dietary guidelines for healthier eating habits, coping skills, and emotion management for all pre-adolescence. Overweight should be targeted along with the presence of emotional and behavioral difficulties.

The strengths of the present study lie in the substantial number of school-aged participants in the sample, the population-based feature of the sample and the inclusion of three types of informants: parents, teachers, and youth. Using a widely established instrument, we were able to easily assess picky-eating and overeating behaviors, thus effectively contributing to informing the prognosis, course and outcome of a behavior that may be transient or have a long-term duration.

## **Future research**

Future studies should further investigate this possibility by crossing the results obtained in the CBCL / YSR with results obtained through specific measures for eating behavior assessment. Moreover, future research should extend the current results by assessing both eating behaviors in a broader eating spectrum and employing a longitudinal approach that also includes other relevant variables, such as BMI and risk factor assessments, for picky eating and overeating problems in school-aged children, using an integrative approach that combines children's global functioning and eating behavior emergence. Additionally, doing a latent profile analysis may add more clarity about common presentations of dysregulated eating behaviors and the role of other psychosocial concerns.

## **Limitations**

The major limitation of this study was its cross-sectional nature preventing to infer causality and a deeper understanding about possible bidirectional relationships between children's and youth's eating behaviors and sociodemographic characteristics, overweight, competencies, adaptive functioning, and emotional and behavioral problems. We also used an unspecific instrument to evaluate picky eating and overeating using 2 items of the CBCL. As Cano et al. (2015b) showed, there is no gold standard for picky-eating assessment, and the CBCL items correlated well with other single-point measures of picky eating in previous studies. We then assumed the same criteria to assess overeating. Although, we consider that CBCL is not meant to supplant careful clinical assessment but, instead, be a part of it.

Additionally, when a .05 level of significance is used, the chance of making a Type I error (the incorrect rejection of a true null hypothesis) is 5% for each statistical test. However, we used more than a single test. Across a group of tests, the probability of making a Type I error increases. On the other hand, a lower level is vulnerable to type II errors (the failure to reject a false null hypothesis), and typically, in psychology, an  $\alpha$ -level of .05 is used, based on Fisher's criterion (Field, 2009). Thus, as in previous studies (e.g., Machado et al., 2016), we used a .05 level of significance. Another limitation of the present study is associated with the fact that, although we found a significant association between the caregiver's perception and the children's own perception concerning picky eating and overeating, we must take into account that only participants aged  $\geq 11$  years were considered for the YSR analyses (i.e., a smaller group of respondents). Finally, the absence of height and weight assessments was also a limitation of the present study once we consider overweight based on parents' report and not in the BMI percentile from the participants.

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**Table 1.**

Demographic information.

	N (%)
<b>Children (N = 2647)</b>	
Position in family	
Firstborn	1411 (56.9)
Second child	820 (33.1)
Third child	186 (7.5)
Fourth or more child	58 (2.5)
Referral to mental health services	390 (15.1)
Household	
Parents and siblings	1060 (62.2)
Parents	379 (22.2)
Mother	64 (3.8)
Mother and siblings	67 (3.9)
Father	4 (.2)
Father and siblings	10 (.6)
With others (not parents)	7 (.5)
One parent and other family members	113 (6.6)
Race	
Caucasian	721 (93.8)
Other	48 (6.2)
<b>Mother (N = 2647)</b>	
Education	
PhD/Master	60 (2.4)
Bachelor's degree	657 (25.8)
Professional specialization/Secondary education	538 (21.2)
9th grade	561 (22.0)
6th grade	455 (17.8)
4th grade	262 (10.3)
Did not complete any grade	13 (0.5)
Marital status	
Married	2047 (79.9)
Divorced	289 (11.3)
Single	135 (5.3)
Non-marital partnership	51 (2.1)
Widower	33 (1.4)
Professional status	
Employed	1843 (82.0)
Unemployed	379 (16.9)
Retired	19 (.8)
Student	6 (.3)
SES (Graffar)	
Low	529 (9.9)
Medium low	790 (30.2)
Medium	568 (21.7)
Medium high	360 (13.7)
High	640 (24.5)
<b>Father (N = 2647)</b>	
Education	
PhD/Master/MBA	40 (1.7)
Bachelor's degree	450 (18.4)
Professional specialization/Secondary education	513 (20.3)
9th grade	549 (22.0)
6th grade	567 (22.5)
4th grade	358 (14.3)
Did not complete any grade	21 (.8)
Marital status	
Married	2056 (81.7)
Divorced	278 (11.2)
Single	110 (4.5)
Non-marital partnership	50 (2.2)
Widower	11 (.4)

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Professional status	
Employed	1995 (91.4)
Unemployed	149 (6.8)
Retired	34 (1.6)
Student	4 (0.2)

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SES (Graffar)	
Low	231 (9.0)
Medium low	974 (38.0)
Medium	546 (21.3)
Medium high	357 (13.9)
High	457 (17.8)

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**Table 2.**

Information regarding sex, age, and social income in picky eaters, overeaters and non-picky/non-over eaters.

	<b>Picky eaters N = 596 (23.1%)</b>		<b>Over eaters N = 619 (24%)</b>		<b>Non-picky/non-over eaters N = 1363 (52.9%)</b>		$\chi^2$
	<b>Female</b>	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>	<b>Male</b>	
<b>Sex</b>	322 (24.8%)	274 (21.5%)	291 (22.4%)	328 (25.7%)	688 (52.9%)	675 (52.9%)	5.978†
	<b>M (SD)</b>		<b>M (SD)</b>		<b>M (SD)</b>		<b>F</b>
<b>Children's age</b>	10.87 (3.63)		12.21 (3.56)		11.71 (3.69)		21.328***
<b>Mother's age</b>	39.83 (6.01)		40.66 (6.07)		40.85 (5.96)		5.948**
<b>Father's age</b>	42.46 (6.38)		43.36 (6.86)		43.12 (6.58)		2.995†
	<b>Low</b>	<b>Medium/high</b>	<b>Low</b>	<b>Medium/high</b>	<b>Low</b>	<b>Medium/high</b>	$\chi^2$
<b>Socioeconomic status</b>	207 (41.7%)	289 (58.3%)	263 (52.5%)	238 (47.5%)	374 (32.8%)	765 (67.2%)	57.599***

† $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Notes: The Games-Howel post hoc tests showed that over eaters were older than the non-picky/non-over eaters ( $p = .01$ ) and picky eaters ( $p < .001$ ) and the picky eaters were younger than the non-picky/non-over eaters ( $p < .001$ ). No significant differences were identified for the father's age. The mothers of picky eaters were significantly younger than the mothers of non-picky/non-over eaters ( $p < .01$ ;  $p < .001$ ). No differences between parents' age and over eaters vs. non-picky/non-over eaters were identified.

**Table 3.**

Differences in the CBCL 6-18 syndrome scales, internalizing, externalizing and total problems between picky eaters, overeaters, and non-picky/non-overeaters.

	<b>Picky eaters</b> N = 596 (23.1%) M (SD)	<b>Overeaters</b> N = 619 (24%) M (SD)	<b>Non-picky/non-over eaters</b> N = 1363 (52.9%) M (SD)	<i>F</i>
Anxiety/depression	5.13 (3.47)	5.15 (3.60)	3.28 (2.78)	4575.09***
Withdrawn/depression	2.92 (2.43)	2.70 (2.29)	1.72 (1.72)	3181.93***
Somatic complaints	2.52 (2.48)	3.03 (2.66)	1.50 (1.76)	2594.58***
Social problems	2.52 (2.61)	3.03 (2.83)	1.51 (1.29)	2651.26***
Thought problems	2.61 (2.28)	2.83 (2.69)	1.29 (1.46)	1971.49***
Attention problems	4.78 (2.38)	4.76 (2.69)	2.49 (1.46)	3584.29***
Oppositional behavior	2.15 (2.13)	2.36 (2.25)	1.16 (1.48)	2329.64***
Aggressive behavior	5.50 (4.61)	5.76 (5.08)	2.78 (3.21)	2957.79***
Internalizing	10.88 (6.66)	10.56 (6.94)	6.50 (4.93)	5594.99***
Externalizing	7.66 (6.26)	8.12 (6.79)	3.94 (4.22)	3267.57***
Total problems	31.47 (18.30)	33.94 (20.53)	16.99 (12.91)	112.67***

\*\*\*  $p < .001$

Notes: The Games-Howel post hoc tests showed that the picky and over eaters scored significantly higher on all subscales of the CBCL than the non-picky/non-over eaters ( $p < .001$ ). No differences were identified between the picky and over eaters, with the exception of somatic complaints ( $p = .002$ ), with the overeaters scoring significantly higher on this measure. The Games-Howel post hoc showed that the picky eaters scored higher on the CBCL total score than the non-picky/non-over eaters,  $p < .001$ . The overeaters also scored higher on the CBCL total score than the non-picky/non-overeaters,  $p < .001$ , and the picky eaters,  $p < .01$ .

**Table 4.**

Differences in the YSR<sup>1</sup> syndrome scales, internalizing, externalizing and total problems among picky eaters, overeaters and non-picky/non-overeaters.

	<b>Picky eaters</b> N = 596 (23.1%) M (SD)	<b>Overeaters</b> N = 619 (24%) M (SD)	<b>Non-picky/non-over eaters</b> N = 1363 (52.9%) M (SD)	<b>F</b>
Anxiety/depression	6.25 (3.73)	6.14 (3.89)	5.34 (3.56)	9.51***
Withdrawn/depression	4.28 (2.59)	3.90 (2.39)	3.36 (2.36)	17.06***
Somatic complaints	3.38 (2.86)	3.53 (2.90)	2.75 (2.42)	13.57***
Social problems	2.71 (2.19)	2.87 (2.44)	2.25 (1.99)	11.95***
Thought problems	3.26 (2.91)	3.49 (2.91)	2.76 (2.59)	9.37***
Attention problems	4.95 (3.24)	5.24 (2.96)	3.94 (2.95)	27.33***
Oppositional behavior	3.07 (2.60)	3.53 (3.05)	2.77 (2.48)	10.42***
Aggressive behavior	6.37 (3.96)	7.08 (4.73)	5.37 (3.87)	22.92***
Internalizing	13.92 (7.58)	13.58 (7.63)	11.44 (6.76)	18.09***
Externalizing	9.45 (5.64)	10.61 (7.11)	8.15 (5.69)	21.61***
Total problems	38.20 (17.65)	41.16 (20.60)	31.99 (17.62)	27.72***

\*\*\* $p < .001$

<sup>1</sup>For these analyses, only participants aged  $\geq 11$  years were considered.

Notes: The Games-Howel post hoc tests showed that the over eaters scored significantly higher on anxiety depression ( $p = .002$ ), withdrawn/depression, somatic complaints, social problems, thought problems, attention problems, oppositional problems, aggressive behavior, internalizing, and externalizing problems ( $p < .001$ ) than the non-picky/non-over eaters. The picky eaters also scored significantly higher on anxiety/depression ( $p = .001$ ), somatic complaints ( $p = .003$ ), social problems ( $p = .008$ ), thought problems ( $p = .03$ ), aggressive behavior ( $p = .001$ ), externalizing problems ( $p = .004$ ), withdrawn/depression, attention problems, and internalizing problems ( $p < .001$ ) than the non-picky/non-over eaters. No differences were identified between the picky eaters and over eaters. The Games-Howel post hoc showed that the picky eaters had higher YSR total scores than the non-picky/non-over eaters,  $p < .001$ . The overeaters also had higher CBCL total scores than the non-picky/non-overeaters,  $p < .001$ .

**Table 5.**

Differences in the TRF syndrome scales, internalizing, externalizing and total problems between picky eaters, overeaters and non-picky/non-overeaters.

	<b>Picky eaters</b> N = 596 (23.1%) M (SD)	<b>Overeaters</b> N = 619 (24%) M (SD)	<b>Non-picky/non-over eaters</b> N = 1363 (52.9%) M (SD)	<i>F</i>
Anxiety/depression	2.81 (3.16)	2.96 (3.16)	2.71 (3.16)	1.04
Withdrawn/depression	1.49 (2.23)	1.47 (2.03)	1.35 (1.85)	1.17
Somatic complaints	.35 (1.02)	.43 (1.06)	.27 (.76)	6.26**
Social problems	.81 (1.73)	.91 (1.74)	.66 (1.51)	4.34*
Thought problems	.35 (1.02)	.33 (.97)	.24 (.83)	3.30*
Attention problems	5.40 (7.36)	5.73 (7.52)	4.30 (6.61)	8.90***
Oppositional behavior	.83 (1.73)	.99 (1.89)	.73 (1.67)	3.97*
Aggressive behavior	1.84 (3.63)	2.27 (4.30)	1.65 (3.87)	4.41*
Internalizing	4.66 (5.20)	4.86 (4.96)	4.33 (4.68)	2.24
Externalizing	2.67 (4.89)	3.26 (5.79)	2.38 (5.24)	4.88*
Total problems	14.20 (16.44)	15.67 (17.16)	12.28 (15.41)	2.88†

† $p < .10$ ; \* $p < .01$ ; \*\* $p < .005$ ; \*\*\* $p < .001$

Notes: The Games-Howel post hoc tests showed that the over eaters scored significantly higher on somatic complaints ( $p = .004$ ), social problems ( $p = .020$ ), attention problems ( $p < .001$ ), oppositional problems ( $p = .020$ ), aggressive behavior ( $p = .020$ ), and externalizing problems ( $p = .009$ ) than the non-picky/non-over eaters ( $p < .001$ ). The picky eaters also scored significantly higher on attention problems ( $p = .010$ ) than the non-picky/non-over eaters. No differences were identified between the picky eaters and over eaters.



**Table 6.**Differences in the YSR<sup>1</sup> competence scales.

	<b>Picky eaters</b> N= 596 (23.1%) M (SD)	<b>Overeaters</b> N= 619 (24%) M (SD)	<b>Non-picky/non-over eaters</b> N= 1363 (52.9%) M (SD)	<b>F</b>
Activities	2.57 (.45115)	2.54 (.47301)	2.53 (.51644)	.46
Social	2.34 (.34578)	2.26 (.34076)	2.29 (.36480)	2.35
School	2.18 (.44037)	2.17 (.46271)	2.32 (.40746)	11.45***
Competence scale Total score	7.10 (.79217)	6.98 (.73563)	7.14 (.76769)	3.66**

\*\*  $p < .005$ ; \*\*\* $p < .001$ <sup>1</sup>For these analyses, only participants aged  $\geq 11$  years were considered.

Notes: The Games-Howel post hoc tests showed that the non-picky/non-over eaters scored significantly higher on the school competence scales than the picky eaters ( $p = .002$ ) and over eaters ( $p < .001$ ). The Games-Howel post hoc tests showed that the non-picky/non-over eaters had significantly higher competence scale total scores than the over eaters ( $p = .017$ ).

**Table 7.**

Correlates of picky eating in school aged children.

		Non-picky/non-over eaters vs. Picky eaters	
		Odds Ratio	(95% CI)
<b>Block 1</b>	Age	.989	.906-1.080
	Mother's age	.993	.960-1.026
$\chi^2 (2) = .369, p = .831$			
<b>Block 2</b>	CBCL Internalizing	.952	.887-1.021
	CBCL Externalizing	.888**	.813-.971
	CBCL Total problems	1.106***	1.058-1.155
$\chi^2 (3) = 85.09, p < .001$			
<b>Block 3<sup>a)</sup></b>	YSR Internalizing	1.097*	1.014-1.186
	YSR Externalizing	1.011	.93-1.105
	YSR Total problems	.968	.923-1.015
	YSR School Competence scale	.620†	.352-1.093
	YSR Competence scale Total score	1.205	.897-1.618
$\chi^2 (5) = 11.50, p = .042$			
<b>Block 4</b>	TRF Internalizing	1.049	.966-1.139
	TRF Externalizing	1.052	.935-1.184
	TRF Total problems	.969	.922-1.019
$\chi^2 (3) = 1.87, p = .600$			

† $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ <sup>a)</sup>For these analyses, only participants aged  $\geq 11$  years were considered .

**Table 8.**

Correlates of over eating in school aged children.

		<b>Non-picky/non-over eaters vs. Over eaters</b>	
		<b>Odds Ratio</b>	<b>(95% CI)</b>
<b>Block 1</b>	Age	1.050	.968-1.138
	Overweight	12.449***	7.802-19.864
$\chi^2 (2) = 141.50, p < .001$			
<b>Block 2</b>	CBCL Internalizing	.806***	.741-.876
	CBCL Externalizing	.782***	.704-.868
	CBCL Total problems	1.217***	1.154-1.283
$\chi^2 (3) = 156.68, p < .001$			
<b>Block 3<sup>a)</sup></b>	YSR Internalizing	.985	.909-1.067
	YSR Externalizing	1.043	.957-1.137
	YSR Total problems	.992	.946-1.040
	YSR School Competence scale	1.212	.723-2.308
	YSR Competence scale Total score	.865	.641-1.169
$\chi^2 (5) = 4.16, p = .527$			
<b>Block 4</b>	TRF Internalizing	1.101*	1.015-1.196
	TRF Externalizing	1.097	.973-1.236
	TRF Total problems	.934**	.888-.983
$\chi^2 (3) = 11.15, p = .011$			

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ <sup>a)</sup>For these analyses, only participants aged  $\geq 11$  years were considered.