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Original Article

The association between self perceptions of psychological well-being and overweight in Brazilian children

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Abstract

Our objective was to estimate the prevalence and test the association between psychological well-being and overweight in children. We conducted a cross-sectional study using anthropometrical measures and interviews with 1048 6–10-year-old school children from a Brazilian town. Overweight was assessed by the body mass index and included obesity. Psychological data of children and their parents were collected using a face scale. Poisson regression models were used to test the associations and to obtain unadjusted and adjusted prevalence ratios (PR). The prevalence of overweight was of 15.3% (95% CI: 13.2–17.6) and of only obesity was 3.8% (2.8–5.2). After controlling for age, sex, school type and parental overweight, the prevalence of overweight was 52% and 44% higher in children who reported a psychological dissatisfaction in themselves and in their mothers when compared with those with positive self perception (PR = 1.52 95% CI = 1.02–2.28; $P = 0.038$) and (PR = 1.44 95% CI = 1.00–2.09; $P = 0.049$), respectively. The study suggests that actions aiming weight control of children should take into account psychological aspects of children and their families.

Keywords: overweight, psychosocial factors, child psychology, obesity, children, cross-sectional.

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Introduction

Among the non-transmissible chronic diseases, obesity is among the most worrisome public health problems in the world with the problems arising from it and the consequent increase in the cost of social health care (Rossner 2002). According to the World Health Organization (WHO 2000), obesity is identified as the second cause of all deaths that can be prevented in the world, second only to smoking. The literature also shows a trend of increasing prevalence of childhood obesity in the world (Ebbeling *et al.* 2002; Wang *et al.* 2002). Despite the different methods and cut-off points used for the age group of 4–11, the rates of childhood obesity increased 2.3 times in the United States over a 25-year period, and 2–3 times in England over a 10-year period (Ebbeling *et al.* 2002). In Brazil, the prevalence of obesity in children from 6 to 9 years of age almost quadrupled between 1974 and 1997, increasing from 4.9% to 17.4% (Wang *et al.* 2002).

The risks associated with obesity in adults include high rates of morbidity and mortality from diabetes, hypertension, cardiovascular diseases and cancer (WHO 2000). Similarly, the consequences of childhood obesity are equally worrisome. Excess weight in

children has been related to both physical and psychological disorders. In the organic level, consequences include problems in the respiratory, gastrointestinal, musculoskeletal, endocrine, cardiovascular and neurological systems (Must 1996; WHO 2000). Moreover, there is evidence that overweight/obesity in childhood and adolescence increases risk for obesity and its consequences during adulthood (Parsons *et al.* 1999). This association remains strong after looking at a number of confounding variables, both biological and social (Pine *et al.* 2001). In the psychosocial level, childhood obesity has been associated with negative self-perception, behavioural problems, low self-esteem, negative body image, depression and low cognitive abilities (Epstein *et al.* 1994; Friedman & Brownell 1995; Braet *et al.* 1997; Friedlander *et al.* 2003; Franklin *et al.* 2006). Negative self-image has been associated with overweight in obese children and adolescents, whom usually show low self-esteem associated with loneliness, sadness, nervousness and high-risk behaviour (Strauss 2000). The clinical diagnosis of major depression in children has been associated with high body mass index (BMI) in adulthood (Pine *et al.* 2001). Moreover, it has been suggested that obesity may also be related to some family characteristics such as low family cohesion, conflict, disorganization, and lack of interest in social and cultural activities (Banis *et al.* 1988). Given the fact that psychosocial factors may play a role on the exacerbation and/or aetiology of excessive weight (Tershakovec 2004), this study aimed to estimate the prevalence of overweight and test the association between psychological well-being and overweight in children.

Methods

This was a cross-sectional school based study held in the Brazilian town of Medianeira. This town is located in the Western region of Paraná State, 60 km from Foz do Iguaçu, in the triple border region between Brazil, Argentina and Paraguay. The estimated population in 2007 was 38 397 inhabitants (IBGE 2009). The municipality has 15 elementary schools: 13 public (State funded) and 2 private. According to the Municipal Department of Education, about 2964 children were enrolled in 2006. It is estimated that the number of children not attending school is less than 1%. The study population was composed of children enrolled in primary education for all public and private schools in the municipality.

The following parameters were used to calculate sample size: prevalence of overweight by 15% for this age group, margin of error of 2% and confidence level of 95%. With these calculations it was estimated that 867 children were needed. Ten per cent were added for any loss and/or refusals and 15% for confounding adjustment in multivariable analysis. Sample selection was based on a probability proportional scheme, in which the larger schools contributed with a greater number of students.

The criterion for inclusion was 6–10 years of age at the time of the anthropometric assessment. Children with a physical problem that prevented them, temporarily or permanently, from conducting an anthropometric comparison of measurements and special classes for children with diseases that could interfere in weight were all excluded. In all, 1084 children were invited to participate in the study.

Key messages

- There is little research investigating the influence of psychosocial aspects on childhood overweight.
- In our study, children indicating a negative psychological state in themselves and in their mothers had higher prevalence of overweight compared to those with healthy self image.
- Our findings also suggest the need for involvement of families in actions aimed at childhood weight control, including the consideration of the psychological aspects that put children at risk and that may compromise their growth and development.

A pilot study was conducted with 50 children not selected for the main study. The main objectives were to examine the quality of the instruments used to collect the data, evaluate the methods and logistics of field work and monitor the response rates.

The research protocol was submitted and approved by a Research Ethics Committee. Parents were assured of total confidentiality of the data and each signed a free and informed consent term. Survey results were sent to the Town of Medianeira and to each participating school.

Weight was measured by a full brand digital scale with a capacity of 0–150 kg and precision of 100 g, which was always calibrated before being used. The measurements were collected by an experienced antropometrista (S.L.A.) in the school, the children barefoot, wearing shorts and t-shirt. The measurements of height and weigh were made in duplicate, using the average value to calculate the nutritional status. Accuracy between the two measurements was calculated for 10% of children and a perfect agreement was reached.

The outcome was overweight (including obesity) assessed by the BMI, or weight/height^2 and using internationally accepted cut-points proposed by Cole *et al.* (2000), which are based on the age and sex of participants.

Demographic and socio-economic aspects were evaluated through a structured and standardized questionnaire that included demographic information: gender, race ('white/darker or lighter skinned black') and age (6–7/8/9–10 years). Considering that students of private schools in Brazil generally have a better economic condition, we used the type of school (public/private) as proxy of the socio-economic characteristics.

The psychological aspects of the child and parents were assessed by the perception of well-being as measured by a single item face scale (Andrews & Withey 1976; p. 376) (Fig. S1 – available as supplementary material). The scale is composed of seven stylized faces, portrayed with circle with eyes that do not change, and a mouth that ranges from a smile to a frown, demonstrating the varying degrees of happiness to the feeling of sadness. Respondents were told 'here are some faces expressing various feelings, which face comes closest to you'. They were also asked to indicate the faces that represented their parents' feelings best. The three most negative faces were considered as an unfavorable condition. The original authors tested the construct validity (p. 188) of this scale using six items in 222 adults and reported a median coefficient equals to 0.82 (range: 0.77–0.87) for this scale. Children also assessed their parents' nutritional status through figures adapted from Stunkard *et al.* (1983). We replaced adults' figures by children's figures. This was done in order to facilitate children' understanding. The figures symbolized different nutritional states through a 9-point body scale (Fig. S2 – available as supplementary material). Overweight was considered as the four largest figures. Construct validity and reliability were investigated in a Brazilian study with 386 adolescents aged from 10 to 18 years. Comparing the scale with BMI, the reported validity coefficients were 0.61 for boys and 0.52 for girls, whereas the reliability coefficients were 0.86 and 0.80 for boys and girls, respectively (Conti & Latorre 2009).

The data entry was performed in Epi Info 6.0 (Centers for Disease Control and Prevention, Atlanta, GA, USA) by two typists to enable subsequent comparison of the databases, avoiding possible typing mistakes. The associations between the outcome and the independent variables were tested with the Stata 9.0 (Stata Corp LP, College Station, TX, USA). We used Poisson regression with robust variance to obtain prevalence ratios (PR) and their 95% confidence intervals (95% CI). It has been argued that Poisson regression provides correct estimates and is a better alternative than logistic regression for cross-sectional data that uses binary outcomes that are highly prevalent (>10%) (Barros & Hirakata 2003). Although a complex sample design was used, the control for clustering or adjustment for design effect was not used because design effect for the outcome (overweight) indicated that it would not be necessary (Deff = 0.98). Multivariable analysis was performed using four models, one where all demographic, school type, psychological and nutritional variables were adjusted for each other. And three others where each psychological variable (children', mothers' and fathers') were adjusted for all demographic, school type and nutritional variables.

Table 1. Sample distribution and prevalences of overweight according to demographic and psychological variables in Brazilian children

Exposures	*n*	%	% overweight	95% CI
Sex				
Male	530	50.6	15.7	12.8–19.0
Female	518	49.4	14.9	12.1–18.2
Race				
White	449	51.3	16.5	13.7–20.0
Darker or lighter skinned black	439	48.7	13.9	11.2–17.2
Age group				
6 to 7 years	350	33.4	12.6	9.5–16.5
8	265	25.3	17.7	13.6–22.8
9 to 10	432	41.3	16	12.8–19.7
School type				
Public (State-funded)	1017	97	15.1	13.1–17.5
Private	31	3	19.4	9.2–36.3
Children's psychological well being*				
Favorable	945	90.2	14.6	12.5–17.0
Unfavorable	103	9.8	21.4	14.5–30.2
Mother's psychological well being*				
Favorable	916	87.5	14.4	12.3–16.8
Unfavorable	131	12.5	21.4	15.2–29.2
Father's psychological well being*				
Favorable	803	78.1	15.4	13.1–18.1
Unfavorable	225	21.9	15.6	11.4–20.9
Maternal overweight†				
No	826	78.9	13.9	11.7–16.5
Yes	221	21.1	20.4	15.6–26.2
Paternal overweight†				
No	752	73.1	14.5	12.2–17.2
Yes	277	26.9	18.1	14.0–23.0
Prevalence of overweight/obesity	1048	100	15.3	13.2–17.6

*Children's perceptions measured by a face scale adapted from Andrews & Withey (1976). †Children's perceptions measured by a body scale adapted from Stunkard *et al.* (1983).

Results

Out of the 1084 children selected, 1048 (96.7%) children participated in the survey. There were about 3% of losses and refusals. The participants were mainly male (50.6%), white (51.3%), 8–10 years of age (66.6%) and from public schools (97%) (Table 1). The prevalence of overweight was 15.3% (95% CI = 13.2 to 17.6%) and of only obesity was 3.8% (95% CI = 2.8 to 5.2%).

The prevalence of overweight was 48% higher in children indicating negative psychological state of their mothers compared with those who indicated the opposite (PR = 1.48 95% CI = 1.03–2.14, $P = 0.034$) (Table 2).

Only the figures representing mothers' overweight were associated with children's overweight in the model that adjusted for all variables (PR = 1.41 95% CI = 1.02–1.96; $P = 0.038$. Data not tabulated). However, because we detected a strong association showing that children reporting unfavorable psychological well-being in themselves were more likely to report the same state in their parents or vice-versa, we adjusted each of the psychological variables for all other remaining variables (demographic, school type and nutritional variables). After this adjustment, the prevalence of overweight was 52% higher in children reporting unfavourable psychological well-being in themselves (PR = 1.52 95% CI = 1.02–2.28; $P = 0.038$) and 44% higher in those reporting their mothers state as unfavourable (PR = 1.44 95% CI = 1.00–2.09, $P = 0.049$) when compared with those indicating positive self perceptions (Table 2).

Table 2. Unadjusted and adjusted PR for overweight according to exposures in Brazilian children

Exposures	Unadjusted PR		Adjusted PR	
	PR (95% CI)	*P* Value	PR (95%CI)	*P* Value
Sex				0.986
Male	1	0.721	1	
Female	0.95 (0.71–1.26)		1.00 (0.75–1.35)*	
Race				
White	1	0.235	1	0.215
Darker or lighter skinned black	0.84 (0.63–1.12)		0.83 (0.62–1.11)*	
Age group				0.172
6 to 7 years	1	0.203	1	
8	1.41 (0.97–2.06)		1.46 (1.00–2.13)*	
9 to 10	1.27 (0.89–1.80)		1.29 (0.91–1.84)*	
School type				0.733
Public (State-funded)	1	0.512	1	
Private	1.28 (0.61–2.66)		1.14 (0.54–2.39)*	
Children's psychological well being†				0.038
Favorable	1	0.063	1	
Unfavorable	1.46 (0.98–2.19)		1.52 (1.02–2.28)‡	0.049
Mother's psychological well being†				
Favorable	1	0.034	1	
Unfavorable	1.48 (1.03–2.14)		1.44 (1.00–2.09)‡	
Father's psychological well being†				0.652
Favorable	1	0.967	1	
Unfavorable	1.01 (0.71–1.42)		0.92 (0.65–1.31)‡	
Maternal overweight§				0.038
No	1	0.017	1	
Yes	1.46 (1.07–2.0)		1.41 (1.02–1.96)*	
Paternal overweight§				0.498
No	1	0.159	1	
Yes	1.25 (0.92–1.69)		1.12 (0.81–1.55)*	

PR, prevalence raios; *Adjusted for all demographic, school type, psychological and nutritional variables. †Children's perceptions measured by a face scale adapted from Andrews & Withey (1976). ‡Ajusted for all demographic, school type and nutritional variables. §Children's perceptions measured by a body scale adapted from Stunkard *et al.* (1983).

Discussion

The study identified a prevalence of overweight in school children similar to other studies with Brazilian children of the same age and using the same criteria. A national study with 4875 Brazilian children and adolescents (Wang *et al.* 2002) found a prevalence of overweight in children from 6 to 9 years equal to 17.4% (14.7–20.0). Other studies in São Paulo (Mondini *et al.* 2007) and in Feira de Santana, Bahia (Oliveira *et al.* 2007) found similar results: 17% (14.8–19.5) and 13.6% (11.2–16.3), respectively. Higher prevalence rates have also been reported elsewhere (Sotelo Yde *et al.* 2004; Giuliano Ide *et al.* 2005).

Children indicating a negative psychological state in themselves and in their mothers had higher prevalence of overweight compared to those with healthy self image. This result is in some ways consistent with the literature. Childhood obesity has been associated with several negative psychosocial outcomes including behavioural problems, low self-esteem, negative body image, depression and low cognitive abilities (Epstein *et al.* 1994; Friedman & Brownell 1995; Braet

et al. 1997; Friedlander *et al.* 2003; Franklin *et al.* 2006). A school-based cross-sectional study, with American children from 8 to 11 years (Friedlander *et al.* 2003; Latner *et al.* 2005), showed that children with excess weight had a two to four times greater chance of having lower scores in psychosocial health, self-esteem and physical performance. These children were more likely to exhibit aggressive or immature behaviour and were perceived by their parents as having feelings of anxiety, depression, limitations in school work and social activities, when compared with those with normal weight. Moreover, parents also reported high levels of emotional stress and limited personal time for themselves due to the behaviour or health problems of the child.

The social relationships of children, in turn, have important psychosocial consequences therefore those that are rejected, or have few social skills, have a higher risk of developing psychosocial problems, both in childhood, as in adulthood (Parker & Asher 1987). The adequacy of nutritional status of obese children may result in reducing the social stigma and the improvement of interpersonal relationships (Strauss *et al.* 1985). This improvement would help reduce the weight of the child, because spending time with colleagues could compete with the act of eating. Moreover, children reintegrated in the social environment may have more opportunities to participate in physical activity than the children most isolated (Myers *et al.* 1998).

Cross-sectional studies report the association between emotional state and emotional status of parents of obese children (Epstein *et al.* 1994). Stress or psychological discomfort in parents produced overweight children who were already considered healthy. Maternal depression has been linked to a negative relationship between parents and children and to adverse mental health problems in children (Burke 2003). In this sense, interventions aimed at improving the functioning family may have beneficial effects on infant weight control. When children and parents experience positive psychosocial relations, it is more likely that there will be improvement in family relationships, which prevent the excess weight, and facilitate adherence to treatment for its control (Myers *et al.* 1998).

This study has several limitations. The major limitations are regarding the presence of residual bias and the cross-sectional design. First, there are important confounders such as physical activity and eating habits that were not collected and therefore were not take into account in our analyses. These may have overestimated the associations reported here. Second, since cross-sectional studies cannot discern the temporal relationship between an exposure and the disease they generally are more useful to generate than to test hypotheses. It cannot be said whether psychological states develop as a result or are the factors that increase the vulnerability of children to become obese (Tershakovec 2004). Another limitation is the use of a single item to assess psychological well-being. The state variable used may not be the best measure of general psychological well-being. In addition, we could not find studies on the validity/reliability of this face scale in children. Therefore, the existence of measurement error can not be ruled out. Also, children may have had difficulty in assessing theirs and their parents' emotional state, so the presence of information bias can not be excluded. Therefore, comprehensive longitudinal studies using valid and reliable scales are essential to confirm the associations reported here.

On the other hand, our findings of prevalence were consistent with the literature and were representative of children aged 6–10 years in the municipality. This enables accurately estimating the prevalence of overweight children, and formulating strategies for implementation of public health policies at local level. In addition, it should be noted that self-perception in itself is an important part of cognitive development and that at the age of 6–7 years; most children have defined ideas about themselves and their attributes as a person (Chiou & Hsieh 2008). In this sense, face and body scales may be useful tools to collect data about children's perceptions.

To sum up, our study pointed to the importance that the self-image and feelings that the child has for his mother play in the overall health of the child. In terms of public health, the findings of this study suggest the need for the involvement of families in actions aimed at weight control, including the consideration of the psychological aspects that put children

at risk and that may compromise their growth and development.

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Conflict of interest

No conflicts of interest have been declared.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Fig. S1. Face scale used to assess children's and parents' psychological well-being. Source: Adapted from Andrews & Withey (1976).
Fig. S2. Body scales used to assess parents overweigh. Source: Adapted from Stunkard *et al.* (1983).

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