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Article

Eating Disorder Symptoms and Body Image in Adolescents from Public Schools in Brazil

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Abstract: There is growing recognition of the adverse effects of body image dissatisfaction (BID) and eating disorder (ED) symptoms on adolescent health. The aim of this study was to estimate the prevalence of ED symptoms, BID, and their relationship in adolescents from public schools in Southern Brazil. A total of 782 schoolchildren (male: n=420, female: n=362); age: 15 ± 0,4 years) answered a self-administrated questionnaire to identify sociodemographic data. Children´s Figure Rating Scale was adopted to identify body image and Eating Attitudes Test (EAT-26) was applied to investigate ED symptoms. Inferential statistics and hierarchical model-controlled logistic regression were used for association between variables. Most of the schoolchildren reported being satisfied with their bodies. However, we observed a higher prevalence of dissatisfaction among girls for being overweight and thinness among boys. Female students and students from schools located in the central area of the city showed higher chances of developing ED symptoms, and the absence of symptoms of ED appeared to act as a protective factor against BID in schoolchildren. Results of this study show the need to reflect on these factors that influence the development of ED and non-acceptance of their own body in a population concerned with their physical appearance.

Keywords: Obesity; Eating Disorder; Body Image; Adolescents.

1. Introduction

Adolescence is recognized as a critical time for establishing lifelong health behaviors [1] and marked by rapid physical, cognitive, social, emotional, and sexual growth and development [2] when there is tremendous concern about physical appearance [3].

During adolescence, the body assumes a prominent place due to several transformations, and the literature points to evidence of a growing fear of body image among adolescents—a phenomenon that has been progressively occurring at earlier ages [4,5]. Studies have shown the influence of sociodemographic aspects [6] and gender differences in the development of body image dissatisfaction (BID) [7]. BID is an aspect of body image related to negative evaluations of body size, shape, muscle tone, and weight, and generally involves the distorted perception between a personal evaluation of one's own body and the desire for a body considered ideal [8]. Today the conception of body image is based on a combination of perceptual, affective, and cognitive components with behavioral features. Although the results are somewhat contradictory in reports on adolescent patients, many individuals overestimate their body size in

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comparison with healthy controls. Certain body parts are more overestimated than others, especially the thighs and waist.

Table 1. Comparison of variables of students by gender (n; %).

		Gender		
	Variables	**Female (n=362)**	**Male (n=420)**	***p*-value**
Sedentary Habits	Until 3 h	174 (48.1%)	186 (44.5%)	0.087
	> 3 h	188 (51.9%)	234 (55.5%)	0.046*
PA Out of School	Yes	181 (50.0%)	115 (27.4%)	0.047*
	No	181 (50.0%)	305 (72.6%)	0.032*
BMI	No OW	94 (26.0%)	165 (39.3%)	0.042*
	With OW	268 (74.0%)	255 (60.7%)	0.053
BID	Not Satisfied	224 (61.9%)	130 (31.0%)	0.031*
	Satisfied	138 (38.1%)	290 (69.0%)	0.028*
BID Type	Thinness	94 (41.9%)	83 (63.8%)	0.044*
	Excess	130 (58.1%)	47 (36.2%)	0.034*
ED Symptoms	Yes	249 (68.8%)	154 (40.3%)	0.036*
	No	113 (31.2%)	266 (51.7%)	0.032*
School Location	Central	243 (67.1%)	291 (69.3%)	0.062
	Peripheral	119 (32.9%)	129 (30.7%)	0.074
Maternal Education	Elementary School	270 (74.6%)	319 (76.0%)	0.071
	High School	92 (25.4%)	101 (24.0%)	0.086

BMI: Body Mass Index; OW Overweight; ED: Eating Disorders; BID: Body Image Dissatisfaction; PA: Physical Activities;

* Significant values at p<0.05; (n=782).

Table 2. Logistic regression between eating disorder symptoms and independent variables.

					CI (95%)		
Variables	**β**	**SE**	**Wald**	**OR**	**Lower**	**Superior**	***p-value***
Block 1. Control Variables							
Gender	-0.82	0.30	7.449	1.44	1.24	1.79	0.006*
Maternal Education	-0.08	0.53	0.028	0.91	0.32	2.57	0.87
School Location	0.36	0.20	3.334	1.84	1.30	2.14	0.03*
Block 2. Behavioral Variables							
Sedentary Habits	0.13	0.26	0.251	1.14	0.68	1.91	0.61
PA out of School	0.17	0.29	0.003	1.14	0.57	1.80	0.95
Block 3. Nutritional Status and BI							
BMI	0.94	0.27	0.11	1.09	0.64	1.88	0.73
BID	1.76	0.46	14.634	5.83	2.36	14.4	<0.001*

BMI: Body Mass Index; SE: Standard Error; OR: Odds Ratio; BI: Body Image; CI: Confidence Interval; PA: Physical Activities; BID: Body Image Dissatisfaction; *Significant Values *p* (p<0.05).

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Table 3. Logistic regression between Body Image Dissatisfaction and independent variables.

					CI (95%)		
Variables	**β**	**SE**	**Wald**	**OR**	**Lower**	**Superior**	***p-value***
Block 1. Control Variables							
Gender	-0.26	0.19	1.784	0.77	0.52	1.13	0.18
Maternal Education	-0.20	0.70	9.122	2.53	1.86	6.38	0.002*
School Location	-0.09	0.29	0.099	0.91	0.51	1.61	0.75
Block 2. Behavioral Variables							
Sedentary Habits	-0.21	0.18	1.335	0.81	0.56	1.16	0.24
Physical Activities out of School	0.14	0.20	0.48	1.15	0.77	1.70	0.49
Block 3. Nutritional Status and ED							
BMI	1.48	0.25	34.324	4.41	2.69	7.26	<0.001*
ED Symptoms	-0.83	0.31	7.115	0.44	0.24	0.80	0.008*

BMI: Body Mass Index; SE: Standard Error; OR: Odds Ratio; ED: Eating Disorder; CI: Confidence Interval; BID: Body Image Dissatisfaction; *Significant Values *p* ($p<0.05$).

The manner adolescents perceive their body image interferes with their social life and mental health [2]. Consequently, the emergence of BID often ends up affecting their development and well-being, leading to self-esteem problems [9], depressive symptoms [10], and unhealthy eating behavior among adolescents [11]. Eating behavior is multifactorial influenced, including social, demographic, and cultural issues [7,12]. During this phase, adolescents typically consume nutrient-poor diets and fail to meet the minimum recommendations for fruit, vegetables, whole grains, and dairy products, but exceed the maximum recommended intake of saturated fat and sugars, sometimes leading to eating disorders [13].

Eating disorders (ED) are unique attitudes related to food and behaviors and include fear of gaining weight, desire to lose weight, insufficient dietary intake, binge eating, self-induced vomiting, and laxative use [14]. Apart from being predictors for the development of obesity in adulthood, these behaviors are harmful and can affect the development of a growing adolescent [14,15]. Eating disorders are the third most common chronic illness among adolescents, after obesity and asthma [15] ; the peak age of onset occurs between 14 and 19 years.

Therefore, the objectives of this study were to identify the prevalence of ED and BID symptoms and investigate how these characteristics are related in a sample of adolescents living in a city in southern Brazil.

2. Materials and Methods

2.1 Sample Size Calculation

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This study is part of a larger project titled, "Obesity, Dissatisfaction with Body Image and Eating Disorders in a Cohort of School Children in Serra Gaucha" [16]. The target population of the study was composed of students aged 14 to 17 years and enrolled in the municipal public school system of Caxias do Sul in 2014 (N=3180). To calculate the sample size, we used a prevalence of 50%, a confidence interval of 95%, an error of 3%, and a design effect of 1.20, requiring a total of 959 students. Sampling was done by conglomerates, and 22 schools were drawn to complete the minimum number of students to be evaluated. A total of 798 subjects answered the research questionnaire. Sixteen subjects were excluded due to missing data, and 782 students were considered in the final sample.

2.2 Questionnaire

A self-administered questionnaire was used to identify socio-demographic data, schoolchildren's age, gender (female or male), the practice of physical activities outside the school environment (yes or no), sedentary habits (up to 3 hours/day or more than 3 hours/day), and maternal education (complete elementary school or high school). There were no respondents with incomplete elementary school education or college education. The questionnaire was designed by the authors and previously tested in a pilot study conducted with 15 children from a school in the city of Caxias do Sul who did not participate in this study.

BID was evaluated by the Children's Figure Rating Scale [17]. The scale contains nine numbered silhouettes, with extremes of thinness and fatness, with stable height, and is presented separately according to gender, with positive values indicating a desire for a smaller body (dissatisfaction by excess) and negative values indicating a desire for a larger body (dissatisfaction by thinness). To collect anthropometric measurements of total body mass and height, a Plenna digital portable scale (accurate to 100g), a wall-mounted stadiometer, and a set square were used. The body mass index (BMI) was identified and classified according to the cut-off points proposed by Conde and Monteiro (2006) [18].

School locations was classified into two categories (central and peripheral area), and schools in the peripheral area were considered to be all those within a radius greater than or equal to two kilometers from the epicenter of the city of Caxias do Sul (coordinates 29°09'48" South and 51°10'46" West). ED was assessed by the Eating Attitudes Test (EAT-26) summarized and validated for the Brazilian adolescent population [19]. Those assessed are classified according to the score obtained, so that scores greater than or equal to 21 points are considered symptomatic and below 21 as asymptomatic.

2.3 Statistical Analysis

Data were analyzed using the program IBM-SPSS® version 23 using descriptive and inferential statistics. McNemar's test was used to analyze differences between independent variables and logistic regression to verify associations between independent variables and outcomes, controlled by a hierarchical model. The regression analysis was performed in three blocks, being the first block composed by the sociodemographic variables

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(gender, maternal education, and school location area), the second by the behavioral variables (sedentary habits and practice of activities outside school), and the third by the nutritional status (BMI) and the type of dissatisfaction with body image (excess or thinness). The significance level adopted was 5%. This study was approved by the research ethics committee of the Federal University of Health Sciences of Porto Alegre (UFCSPA) with opinion number 1312/11 and registration 741/11.

3. Results

3.1. Group Characteristics

A total of 782 participants completed the questionnaire and were included in the analyses for the present study. Mean age of the participants was 15 ± 0.4 years. The prevalence of sedentary habits was higher for the more than three hours per day category with significant differences between genders. Although most subjects reported not practicing physical activities outside the school environment (n=486; 62.1%), significant differences were observed between genders for both performing (p=0.032) and not performing these activities (p=0.047). Most of the school children were overweight (n=523; 66.9%), however, significant differences were observed between genders only for school children who were not overweight (p=0.042).

Although most of the school children reported being satisfied with their bodies (n=428; 56.2%), significant differences were observed in the BID evaluation for both genders. A higher prevalence of dissatisfaction for overweight was identified among girls and for thinness for boys, and statistically significant differences were found in the desire for a smaller body (p=0.034) to girls and for a larger body (p=0.044) among boys. The prevalence of ED symptoms was higher among girls, and statistically significant differences were identified in the comparison between genders for both the presence (p=0.036) and absence of ED symptoms (p=0.032). Most of the participants attend schools located in the central area of the municipality (n=534; 68.3%) and belong to families whose mothers have completed elementary school (n=589; 75.3%). The group characteristics are listed in Table 1.

Insert Table 1 here

Insert Table 2 here

According to table 2, it is possible to identify that the highest chances of developing ED symptoms are associated with the female gender (OR = 1.44; 95% - CI 1.24 - 1.79) and BID (OR = 5.83; 95% - CI 2.36 - 14.4). In addition, students from schools located in the central area of the city seem to be more exposed to this phenomenon (OR = 1.84; 95% - CI 1.30 - 2.14). Table 3 shows the influence of maternal education (OR = 2.53; 95% - CI 1.86 - 6.38) and overweight (OR = 4.41; 95% - CI 2.69 - 7.26) on the development of BID. The results also show that the absence of ED symptoms seems

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to act as a protective factor for BID (OR = 0.44; 95% - CI 0.24 - 0.80) in schoolchildren. The other predictor variables showed no statistically significant relationship with the outcomes. OR values in tables 2 and 3 are adjusted.

Insert Table 3 here

4. Discussion

Adolescence is an important period full of changes, which can be observed in several areas including anatomical, physiological, behavioral, and social, and the transformations resulting from this phase of life reflect on the behavior of adolescents [20]. Adolescents are targets of campaigns that promote the idea of an ideal body, and their vulnerability to an aesthetic standard imposed by the media often results in the search for a physical image that is very different from their own. The prevalence of BID observed in our study (45.3%), despite differing from the results of some national [21, 22] and international [23, 24] studies, causes great concern, since it reflects the way adolescents conduct the process of identifying and accepting their body shape.

The prevalence was higher among girls, and these results that are in line with previous studies [24,25]. The differences in prevalence are possibly related to differences in the age groups investigated, the cultural diversity of each region, or the different assessment instruments used across the studies. Some studies provide important data about BID and its associated factors, among which we can mention gender, adolescent stage, socioeconomic conditions, local culture, being overweight, exposure to the media and social networks [26,27,28].

Concern over body image may start at the beginning of adolescence, increase during that period, and diminish in young adults, affecting psychological well-being in different phases of life [24]. The kind and degree of body image disorder varies with age, ethnic group, peers, family, and sociocultural influences. Sociocultural influences have been considered the strongest determining factors for developing a negative body image disorder and a predictor of ED due to acceptance pattern of the thin ideal by adolescents [27]. Previous studies in Brazilian populations reported that adolescents presented BD and BID apparently is associated with it.

Uchôa et. al, [29] reported 28.6% of the adolescents presented dissatisfaction with their bodies. Cecon et. al, [30] in their study identified that BID increased by more than 13 times the chance of developing ED, being considered a potential risk factor. Alves et. al, [31], investigate Brazilian schoolchildren and found prevalence around 23.0% of students with ED. In addition, they observed an association between the presence of EF symptoms and BID and the influence of maternal education on body image.

Another factor with a potential effect on the health status of children and adolescents is the level of maternal education. Previous studies have identified positive associations between maternal education and several health events, such as reduced infant mortality [32], maintenance of exclusive breastfeeding [33], and less passive leisure time in front of screens [34].

Although there are factors that make it impossible to generalize the statement that the increase in maternal education level acts as a protective factor for health outcomes in the child and adolescent population, it is reasonable to believe that mothers with high educational levels can stimulate their children to develop autonomy and resist social and media pressures for an unhealthy aesthetic standard.

In our study, more than 70% of the mothers of the adolescents surveyed reported having attended only elementary school. This result reinforces the idea that the educational factor may have contributed to the high number of adolescents dissatisfied with their body image.

The high prevalence of overweight adolescents in our study reflects a common reality in the adolescent population, while at the same time reinforcing an unavoidable concern to undertake greater efforts in prevention and intervention actions for these conditions during childhood and adolescence. Amaral and Ferreira [35] found that aesthetics, self-esteem and health are the main reasons that influenced BID. Overweight teenagers are more likely to become dissatisfied with their body image, and this concern with physical appearance encourages them to seek a beauty pattern linked to an overvaluation of a thin body. They may feel particularly vulnerable and tend lower participation in physical activity programs, and, consequently, more sedentary behavior compared to normal weight teenagers, increasing their vulnerability in a vicious circle between overweight and BID.

Most adolescents in this study overestimate their body size or overvalue their weight or body shape, which directly interferes with their self-esteem. This finding reflects the internalization of a belief process a tool for acceptance and insertion of adolescents in social groups, thus adopting the belief promoted in Western society that thin subjects are more desirable [36]. The diffusion of thinness and the overvaluation of weight are major contributors to the high prevalence of fear of gaining weight, excessive weight control, and unhealthy behaviors [37]; a phenomenon referred to in the literature as "normative dissatisfaction" [38], which is associated with the influence of mass media [29]. The degree of body dissatisfaction is usually high in the obese population, and inadequate nutritional status and body adiposity are determining factors for the increase of this dissatisfaction [39,40,41].

ED are pathological conditions that characterize a distorted relationship between the individual, his eating behavior, and his body shape [42]. Self-esteem and body dissatisfaction are considered predictors of ED and adolescence is a crucial phase for the positive or negative development of body image [14]. Predisposing factors related to ED also included sadness, anxiety, heart disease, diabetes and anemia. Eating behaviors begins to develop in childhood, by genetic determinants under family and social circle influences. Parental food choices are strongly linked to eating behavior of the children, influencing not only food choices, but also the ability to control what is ingested, as well as duration and frequency of meals [43].

BI distortion and BID can form a dangerous link between excessive concern with appearance and sudden and harmful changes in eating behavior, generating

negative feelings and evaluation of one's own body, leading to ED [44]. Other factors, such as ethical or familiar factors, contribute to the development of this disordered eating behaviors [27]. In this sense, previous studies have established that the probability of developing a disordered eating attitude or a diagnosis of eating disorders is higher if the mother had a disordered eating or self-esteem problems [32,33]. Moreover, ethnicity has been linked to the perception of beauty ideals, self-esteem and body perception [27].

The literature shows that ED tends to be reported more commonly among female adolescents. Although the prevalence of ED found in the adolescent population can be masked due to their low rates of self-identification and help-seeking [45], in our study, the prevalence of ED symptoms was higher in girls (68.8%) compared to boys (40.3%). Typically, ED symptoms start among adolescents aged 14 to 17 years [46], being a warning sign for the adoption of habits considered unhealthy, such as smoking, use of illicit drugs, and self-mutilation in adulthood [47]. Previous studies [24,47,48] have found a relationship between ED symptoms in adolescence and illicit drug use in adulthood. Raffoul et al. (2018) [49] found that strict dieting at age 14 was a predictor for smoking among adolescents and that each ED symptom at age 16 increased the odds of drug use by 27% at age 21.

In some studies, the development of ED in boys and girls is reinforced by BID [39], corroborating the findings of previous studies [50,51]. Fortes et al. [51] showed that BID accounts for 51% of the variance of ED. In another study, Fortes et al. [50] showed that BID accounts for 59% of the variance in girls and 47% in boys; these values are rather higher than those found in our study, of 43.4% for girls and 34.7% for boys. The higher percentage found for girls may be due to the fact that they have internalized the 'thin ideal' more strongly than boys [52].

The results of this study allow reflections on the factors related to BID in adolescents of both sexes, a fact closely linked to the development of ED. However, it is known that the onset of both BID and ED symptoms has a multifactorial context. Therefore, parents and the school community must contribute to the development of a support network that encourages adolescents to develop a critical sense regarding the information disseminated by the media, as well as to their life choices, whether they are eating or practicing healthy habits.

In this sense, it reinforces the need for health professionals to be aware that disordered eating behaviors and BID may be present in adolescents, regardless of weight status, because although manifestations of these phenomena are relatively common among overweight adolescents, the same can manifest in subjects with weight considered adequate.

Although the results are of great interest to the health area, some limitations, such as the impossibility of establishing a causal link between the variables and the fact that this is a cross-sectional study, can be attributed to this research. To overcome these limitations, different forms of statistical analysis were employed to obtain consistent results.

5. Conclusions

Main contribution of this study is the identification of eating disorder symptoms that can impact the health of adolescents, a population with a high prevalence of unhealthy eating habits and body image dissatisfaction. The close relationship between ED and BID has been the target of investigation among the adolescent population, and it is urgent to state that the concern of health professionals with this type of behavior is justified in view of the increased incidence of cases of this nature, which is not limited to a certain age group, socioeconomic status, or educational level.

Eating behavior is associated with adolescent´s manner notices his own body makes the situation more complex regarding its resolution. Thus, encouraging the search for situations that bring satisfaction, resilience, and behavioral flexibility is necessary for the maturation of the controversial feelings characteristic of adolescence. Encouraging these conditions is essential for young people to become successful adults who are less affected by conditions such as those investigated in this study.

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Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to ethical restrictions.

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