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Childhood Obesity and Bullying in Schools of Argentina: Analysis of This Behaviour in a Context of High Prevalence

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Abstract

Background: Obese children are more exposed to bullying (B). This study aims to analyse such under-researched association among a sample of school-aged children in Argentina.

Methods: This case control study comprised 8 elementary public schools of the county of Morón, Province of Buenos Aires. In 2013, 740 children ages 9-10 completed a questionnaire evaluating type and role played in B. Five types of B were analysed: general, physical, verbal, relational, and cybernetic; analysed roles were victim and perpetrator. Height and weight were measured and body mass index (BMI) was calculated. The relation between bullying and BMI was studied using a general linear mixed model including BMI, gender, and height as fixed effects, and course as random effect.

Findings: Types of B analysed showed a significant association between BMI and physical B (OR-obesity: 2.1; p = 0.001 y OR-overweight: 1.7; p = 0.011), between obesity and verbal B (OR: 1.7; p = 0.010) and between obesity and relational B (OR: 1.7; p = 0.023). Boys reported suffering more physical B than girls (OR: 1.7; p = 0.005), and a tendency to be more often the perpetrators (OR: 1.5; p = 0.070).

Conclusions: Overweight and obese 9-10 year children of public schools of Argentine appear to be at significantly increased risk of bullying. Teachers, physical education instructors, and paediatricians should aim to address this behaviour when designing obesity prevention and treatment interventions.

Keywords: Children; Obesity; Bullying; Weight stigma; Victimization; Argentina

Introduction

Overweight and obesity are serious problems posing one of the most difficult public health challenges of the 21st century in many countries [1]. Latin America is not exempt from the obesity epidemic, which has reached alarming levels both among children and adults [2]. A 2007 study carried out in Argentina, showed that more than 25% of the children of middle and low economic status of Buenos Aires aged 10-11 years old were overweight [3,4]. A 2013 study reported an alarming increase of this trend among 9-12 y old children of low middle and low economic classes of this same region. Prevalence of overweight and obesity for the whole sample was 27.8% and 21.1% respectively [5]. Childhood overweight and obesity have short and long term consequences, both physical (metabolic, cardiac, among others) as well as psychological (associated to depressive symptoms, low self esteem, stigmatization, and peer intimidation) [6,7]. Although the negative stigmatization towards obese individuals has been widely documented [8], the link between bullying and obesity has begun to receive attention only in the last decade [9]. Evidence indicates that being overweight or obese is one of the most common reasons that children and adolescents are teased or bullied at school and this occurs more often than victimization due to race, religion or disability [10]. A pioneer study carried out five decades ago among children ages 10-11 years old showed that the picture of an overweight child was ranked last in order of whom they would prefer as friends. This choice was preceded by children with physical disabilities, with a facial disfigurement, and by an average weight child with no disabilities [11]. From that time on, research has increasingly focused on social stigma and victimization in its various manifestations. A large-scale longitudinal US nation wide study showing that when compared to average-weight students, overweight adolescents (aged 13-18) were more likely to be socially isolated and less likely to be nominated as friends by their peers [12]. A more recent review underscores previous findings and shows that overweight children are more likely to be victimized by their peers, frequently in a verbal form, and are at higher risk of developing further psychosocial problems [13].

In fact, being teased at is often a painful experience and can even result psychologically traumatic for some individuals [14]. After controlling for BMI, age, gender, and duration of obesity, depression was found to be substantially more represented in

obese children victims of bullying. Moreover, the negative emotional consequences associated to weight stigma entail not only the risk of depression and low self-esteem [15], but also reinforce poor body image, and eventually lead to greater engagement in risk behaviours [16]. A study carried out among public school children aged 7-12 informed that almost one-quarter of girls and 12% of boys who had been victims of weight-based teasing reported attempting suicide, which is significantly higher compared with 8.5% of girls and 4% of boys who were not teased [17].

These findings indicate that the psychological sequelae are not simply derived from weight status, but mainly result as a consequence of being victimized [18]. Additionally, weight-based bullying in overweight or obese children and adolescents may contribute not only to peer rejection and academic failure [6,19], but also to negative implications for weight related health correlates and behaviours such as increased risk of disordered eating behaviours and limited physical activity [20].

In 2002, a study of middle and high school students showed that 30% of girls and 24% of boys reported weight-based teasing from peers. Notwithstanding, among students with the highest BMI (at or above the 95th percentile), prevalence rates of teasing jumped to 63% for the girls and to 58% for boys [21]. A prospective study assessing children showed that 36% of obese boys and 34% of obese girls reported being victims of weight-based teasing and of various forms of bullying [22]. A recent meta-analysis showed that among youths, overweight and obesity are both risk factors for being a victim of bullying with no difference between boys and girls [23]. Moreover, the heaviest youth are at higher risk for future stigmatization. Due to all of the above, exploration of the characteristics and prevalence of bullying/weight stigma in a high-risk population of Argentina appears to be warranted in order to properly address this issue in obesity prevention and treatment.

Victimization refers to an aggressive, repetitive and intentional behaviour directed against another person. It can come from peers, parents, educators, and even health care providers and be expressed overtly or in more subtle forms [24]. Specific types of peer victimization, often referred to as bullying, include physical, verbal, relational/social, cyber bullying, assault/scare, and teasing [6]. A review of bullying in 16 countries of Latin America informs this is a serious problem throughout the region and that Argentina exhibits the highest figures (58.62%) of sixth grade primary students having experienced some type of bullying during the month prior to data collection. Insults and threats were the most prevalent among children of the 167 Argentine schools analysed, and 40% of them reported having experienced some sort of physical violence [25].

Bullying or weight stigma – often encountered by overweight and obese youths- is socially acceptable and prevalent [26-28]. It refers to negative weight-related attitudes and beliefs that are manifested by stereotypes, bias, rejection, and prejudice on account of being overweight or obese and can include verbal teasing (e.g., name calling, derogatory remarks, being made fun of), physical bullying (e.g., hitting, pushing), and social victimization (e.g., being ignored, excluded or avoided, the target of rumours). With the advent of social networks, cybernetic bullying was introduced, enabling the perpetrator to directly or indirectly mistreat, stalk and/or threaten the targeted individual [29].

The assessment of bullying typically entails measures of frequency, duration of exposure, type, and source. It is carried out utilizing questionnaires or surveys either in the form of self-reports or reports from peers, parents or teachers. This paper reports the results of a survey assessing bullying. The latter was part of the baseline assessment of a school-based obesity prevention program, designed as a randomized controlled trial, with the goal of evaluating the feasibility and effectiveness of the multi component intervention, further described below. We hypothesized that children who are overweight have a greater risk of being bullied in school. The main objective of this study was to analyse the association between a higher BMI and bullying among 9-10 y children of public schools of Buenos Aires; the secondary objective was to analyse the relationship between the different types of bullying and the condition of being overweight or obese.

Methods

Design: Case-control study

The data currently reported belong to the baseline evaluation implemented as part of the assessment of participant boys and girls of SALTEN, acronym for the Spanish initials of: Healthy, Active, and Free from Non Communicable Chronic Diseases (NCCD), conducted between 2013 and 2014, in eight public schools of similar socio-demographic characteristics of Moron, a town in the province of Buenos Aires, Argentina. The Institutional Review Board (IRB) of the Argentine Medical Association granted ethical approval for this study (April 2013).

Eligible children comprised mainly of a Caucasian middle and low-middle class population were and randomly assigned either to receive the intervention or to act as a control group. It was estimated that at least 508 participants were required [n = 254 for the intervention group (1 cluster), and n = 254 for the control group (1 cluster)]. Expecting 20% attrition, the aim was to enrol a minimum of 317 children in each group. Even anticipating a 60% response rate, this was deemed feasible taking into account that more than 1000 children attended the eight participating schools.

The sample comprised 760 boys and girls 9-10 y of age. Participation was voluntary and subsequent to parental signed consent. Children with severe intellectual difficulties, with limitations to engage in physical activity, suffering from illnesses that compromise nutrition or food selection, or taking medication known to affect body weight, were excluded from the analysis.

Trained nutritionists, using standardized techniques and calibrated equipment, carried out anthropometric measurements including height, weight, and waist

circumference. Weight was measured to the nearest 0.1 kg using an electronic scale (CAM; Buenos Aires, Argentina). Height and sitting height was measured to the nearest 0.1 cm with a wall-mounted stadiometer (Seca Stadiometer 208, Seca Corporation, Hamburg, Germany). BMI [weight/height^2 (kg/m^2)] was calculated using the 2007 WHO reference growth charts [30,31] for sex and height; with cut off points to determine overweight and obesity of ≥ + 1 SD and ≥ +2 SD Z scores respectively.

The bullying questionnaire implemented is a 10 item adaptation of the one utilized by Lumeng et al. [8]. This instrument was selected mainly due to its simplicity, which made it suitable to be completed by our study sample as a self-report. Additionally, it allowed for comparison of responses between the children and teachers. The translated version was piloted with 150 cases and the adaptation consisted of the addition of two questions at the out start: a) Do you feel comfortable and integrated to your classmates? b) Do you enjoy meeting with your classmates at school? Seven questions explore the type of bullying (general, physical, verbal, relational, and cybernetic), assuming the respondent is the victim. The eighth, explores the role of perpetrator "Do you ever say or do any of this to anyone in your grade? For these 8 questions, the possible responses are: "Always", "Almost always", "Sometimes", "Almost never", "Never". Another question explores if the child felt at ease and integrated in the classroom and if he/she enjoyed meeting his classmates at school. Possible responses to the former are "Yes" or "No". The complete questionnaire can be seen in Appendix 1.

Children's level of physical activities was assessed with a shorter version of the Child and Adolescent Physical Activity and Nutrition Survey [32]. Questions about attitudes and barriers toward physical activities were individually self-reported on paper and pencil, as part of a classroom activity. For the current study, only that which explored teasing while practicing PA was analysed as a potential barrier to this activity. "Do other children tease or make fun at you when you practice PA? Possible responses were: "Yes"; "Sometimes" or "No".

Sample size calculations (n > 640 children) were based on the main findings from SALTEN, a pilot cluster-randomized trial. Considering 8 schools, and assuming an average of 4 classrooms in each school (2 fourth and 2 fifth grades), 20 children per classroom and a 0.1 intra-class coefficient correlation associated to classroom, a 90% power was anticipated for detecting a difference of 10% in the prevalence of bullying, at a 5% statistical significance level (two-tailed). This calculation reflects the most sombre scenario, such that one of the comparison groups had a 50% prevalence of bullying.

Anthropometric variables between genders were compared using a generalized linear mixed (GLM) model (logit link and binary distribution) for central distribution of fat tissue and a linear mixed (LM) model for BMI. In both cases the model included gender as a fixed effect and course as random effect. The association between the presence/absence of different types of bullying with BMI was assessed using a GLM, logit link and binary distribution, including BMI categorized as obesity, overweight, normal weight and underweight), with gender and height as fixed effects and course as random effect. All estimations are expressed with a 95% CI. All analyses were performed with SAS software, version 9.3 (SAS Institute, Cary, NC).

Results

Table 1 shows baseline characteristics of the children participating in SALTEN by school. Prevalence of overweight and obesity for the whole sample was 27.8% and 21.1% respectively with no significant differences by gender (boys: 50.2% and girls 47.8%). However, obesity was significantly more prevalent in boys than in girls (25.7% vs. 16.9%, p = 0.005, OR = 1.7, 95%CI: 1.2, 2.4), corresponding to a difference in the average age/BMI Z-score of 1.21 for the boys and 1.10 for the girls.

Table 1: Baseline characteristics of study population by intervention group and by school. BMI-Z score displayed by gender.

	Intervention					Control					
	Total	**School 1**	**School 2**	**School 3**	**School 4**	**Total**	**School 5**	**School 6**	**School 7**	**School 8**	**p value**
Children N†	424	116	97	113	98	336	101	33	85	117	
Grade n (%)											
Fourth	225 (53.1)	63 (53.9)	58 (59.8)	51 (45.1)	53 (54.1)	159 (47.3)	45 (44.6)	13 (39.4)	39 (45.9)	62 (53.0)	
Fifth	199 (47.0)	53 (46.1)	39 (40.2)	62 (54.9)	45 (45.9)	177 (52.7)	56 (55.5)	20 (60.6)	46 (54.1)	55 (47.0)	
Gender n (%)											
Boys	213 (50.2)	59 (50.9)	51 (52.6)	51 (45.1)	52 (53.1)	152 (45.2)	51 (50.5)	10 (30.3)	43 (50.6)	48 (41.0)	0.177 [a]

Girls	211 (49.8)	57 (49.1)	46 (47.4)	62 (54.9)	46 (46.9)	184 (54.8)	50 (49.5)	23 (69.7)	42 (49.4)	69 (59.0)	
BMI categories n (%)											
Normal	204 (50.1)	48 (42.9)	47 (52.2)	63 (56.8)	46 (48.9)	158 (52.3)	46 (50.0)	15 (46.9)	39 (50.7)	58 (57.4)	NS [b]
Overweight	115 (28.3)	36 (32.1)	23 (25.6)	29 (26.1)	27 (28.7)	82 (27.2)	24 (26.1)	6 (18.8)	24 (31.2)	28 (27.7)	
Obese	88 (21.6)	28 (25.0)	20 (22.2)	19 (17.1)	21 (22.3)	62 (20.5)	22 (23.9)	11 (34.4)	14 (18.2)	15 (14.9)	
Age Mean (SD)	9.51 9.44, 9.57)[d]	9.5 (0.6)	9.45 (0.75)	9.58 (0.62)	9.5 (0.63)	9.67 (9.59, 9.75)[d]	9.69 (0.69)	9.75 (0.62)	9.6 (0.61)	9.64 (0.63)	0.002 [d]
BMI Z-score Mean (SD)											
All children	0.95 0.82, 1.07)[d]	1.16 (1.15)	0.96 (1.38)	0.73 (1.26)	0.95 (1.35)	0.97 (0.80, 1.13)[d]	0.88 (1.28)	1.23 (1.41)	1.05 (1.27)	0.72 (1.28)	0.847 [d]
Boys	1.07 0.89, 1.25)[e]	1.21 (1.14)	1.18 (1.56)	0.88 (1.34)	1.03 (1.28)	1.06 (0.83, 1.29)[e]	0.91 (1.36)	1.68 (1.59)	1.00 (1.48)	0.92 (1.43)	Gender p = 0.037 [e]
Girls	0.83 0.65, 1.00)[e]	1.10 (1.16)	0.72 (1.12)	0.61 (1.18)	0.86 (1.44)	0.90 (0.69, 1.10)[e]	0.85 (1.20)	1.03 (1.30)	1.10 (1.03)	0.58 (1.16)	

[†] All children with data at baseline.

[a]Obtained under a generalized linear mixed model (logit link and binary distribution) with intervention as a fixed effect and school as a random intercept.

[b]Model as in (a) comparing normal vs (overweight + obese) p = 0.65; comparing (normal + overweight) vs obese p = 0.75.

[c]Obtained under a generalized linear mixed model (logit link and binary distribution) with intervention, gender and their interaction as a fixed effects and school as random intercept. Interaction gender*intervention (p = 0.54), intervention (p = 0.92), gender (p = 0.91).

[d]Mean (95%CI) - Estimates and p-values obtained under a mixed linear model with intervention as a fixed effect and school as a random effect nested within treatment group

The bullying questionnaire was responded to by 740 children out of the 760 (94%) who participated in SALTEN (Table 2). As can be seen, the overweight (BMI between +1SD-+2 SD) or obese (BMI >+ 2SD) children usually reported more bullying than their normal weight peers. Notably, in all the types of bullying, and after controlling for the other factors, the OR associated to obesity was higher than the one associated to overweight. Particularly, obesity was significantly associated to being a victim of general bullying (OR = 1.79; 95% CI: 1.19; 2.68; p = 0.005), physical (OR = 2.09; 95% CI: 1.34; 3.27; p = 0.001), verbal (teasing or being made fun of) (OR = 1.74; 95% CI: 1.14; 2.64 p = 0.010), relational (via rumours) (OR = 1.54; CI 95%), and relational (via rejection) (OR = 1.69; 95% CI: 1.07; 2.67; p = 0.023). Additionally, overweight was associated with increased frequency of physical bullying (OR = 1.71; 95% CI: 1.13; 2.60; p = 0.011). Boys reported being more often subject to physical attacks than girls (p = 0.005), and were more often the perpetrators (p = 0.070).

Table 2: Association between type/role of bullying and categories of excess weight, gender, and height in children of 9-10 years of age.

Role in Bullying	Type of Bullying	Question[a]	Prevalence	Covariable	Category	Reference Category	OR (95% CI)	p-value
Victim	General Bullying	¿Does anyone in your class consistently bother you?	318 (43.0%) (n = 739)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	1.79 (1.19;2.68)	0.005
					Overweight (> SD)		1.36 (0.94;1.95)	0.099
				Gender	Boy	Girl	1.03 (0.75;1.41)	0.864
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	0.82 (0.49;1.36)	0.435
					Tall (> + 2SD)		1.28 (0.61;2.67)	0.510

	Physical Bullying	¿Does anyone in your class, hit, kick, or push you?	189 (25.6%) (n = 739)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	2.09 (1.34;3.27)	0.001
					Overweight (> +1SD)		1.71 (1.13;2.60)	0.011
				Gender	Boy	Girl	1.66 (1.16;2.38)	0.005
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	0.64 (0.33;1.24)	0.182
					Tall (> + 2SD)		1.24 (0.56;2.73)	0.591
	Verbal Bullying	¿Does anyone in your class call you with insulting or cruel names?	231 (31.4%) (n = 736)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	1.50 (0.97;2.31)	0.069
					Overweight (> +1SD)		1.20 (0.81;1.79)	0.363
				Gender	Boy	Girl	1.30 (0.92;1.82)	0.136
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	0.91 (0.52;1.58)	0.727
					Tall (> + 2SD)		0.61 (0.26;1.45)	0.262
		¿Does anyone in your class joke or make fun at you making you feel bad?	237 (32.0%) (n = 740)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	1.74 (1.14;2.64)	0.010
					Overweight (> +1SD)		1.28 (0.87;1.89)	0.207
				Gender	Boy	Girl	1.00 (0.72;1.39)	0.984
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	0.80 (0.46;1.40)	0.438
					Tall (> + 2SD)		0.96 (0.45;2.07)	0.926
	Relational Bullying	¿Does anyone in you class say nasty things about you to your classmates?	225 (30.5%) (n = 738)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	1.54 (1.00;2.37)	0.049
					Overweight (> +1SD)		1.14 (0.77;1.70)	0.515
				Gender	Boy	Girl	1.13 (0.81;1.59)	0.467
				Height	Short (< -1SD)	Normal Height (-1SD; +2SD)	0.85 (0.48;1.50)	0.566
					Tall (> + 2SD)		1.23 (0.57;2.65)	0.600
		¿Does anyone in your class reject, ignore or exclude you from the class group?	172 (23.5%) (n = 733)	BMI	Obesity (> +2SD)	Normal or under-weight (≤ +1SD)	1.69 (1.07;2.67)	0.023
					Overweight (> +1SD)		1.18 (0.77;1.81)	0.456
				Gender	Boy	Girl	0.87 (0.61;1.25)	0.464
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	1.24 (0.70;2.18)	0.466
					Tall (> + 2SD)		0.83 (0.35;1.99)	0.678
	Cybernetic Bullying	¿Does anyone send you offensive or cruel messages	93 (13.4%) (n = 692)	BMI	Obesity (> +2SD)	Normal or under-weight (≤ +1SD)	1.53 (0.84;2.77)	0.162

		through the e-mail or any other way?			Overweight (> +1SD)		1.11 (0.63;1.95)	0.717
				Gender	Boy	Girl	0.90 (0.56;1.44)	0.652
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	1.11 (0.53;2.33)	0.781
					Tall (> + 2SD)		1.28 (0.46;3.54)	0.640
Agressor		¿Do you do any of the above things to anyone in your class?	121 (17.3%) (n = 699)	BMI	Obesity (> +2SD)	Normal or under-weight (≤ +1SD)	1.13 (0.67;1.92)	0.642
					Overweight (> +1SD)		0.75 (0.44;1.25)	0.267
				Gender	Boy	Girl	1.48 (0.97;2.26)	0.070
				Height	Short (< -1SD)	Normal height (-1SD; +2SD)	1.54 (0.83;2.85)	0.167
					Tall (> + 2SD)		0.62 (0.21;1.88)	0.401

[a]Five options of answers scored "No" (never or almost never) and "Yes" (Sometimes, Almost always, Always)

BMI/AGE (Z Score) Childrens Growth Charts WHO, 2007

Height/Age (Z Score) Childrens Growth Charts WHO, 2007.

Odds Ratio (OR), Confidence intervals (CI) and p-values Obtained under a generalized linear mixed model (logit link and binary distribution) with intervention as a fixed effect.

As can be seen in Table 3, when asked about having a sense of belonging to their classroom and peers, obese children reported feeling less comfortable and integrated and enjoying less the company of their peers, as compared to normal weight children (p = 0.048). Additionally, obese children more often reported being made fun of while practicing PA, when compared to those of normal weight and height (p = 0.061), and to those that are shorter (0.029). Boys more often than girls reported being made fun of when practicing PA (p = 0.088).

Table 3: Association between feeling integrated/enjoying classmates and being teased while practicing physical activity by categories of weight, gender, and height in children 9-10 years of age.

Question	Prevalence	Covariable	Category	Category reference (SD)	OR (95% CI)	p-value
¿Do you feel comfortable and integrated in your class and do you enjoy meeting your classmates at school?[a]	668 (90.3%) (n = 740)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	0.54 (0.29; 0.99)	0.048
			Overweight (> +1SD)		0.96 (0.51; 1.81)	0.899
		Gender	Boy	Girl	0.74 (0.44; 1.23)	0.246
		Height	Short (< -1SD)	Normal height(-1SD; +2SD)	1.48 (0.56; 3.89)	0.424
			Tall (> + 2SD)		1.98 (0.45; 8.67)	0.365
¿Do other children tease you when you practice physical activity?[b]	154 (21.0%) (n = 732)	BMI	Obesity (> +2SD)	Normal or underweight (≤ +1SD)	1.56 (0.98; 2.48)	0.061
			Overweight (> +1SD)		0.84 (0.53; 1.33)	0.463
		Gender	Boy	Girl	0.72 (0.49; 1.05)	0.088
		Height	Short (< -1SD)	Normal height(-1SD; +2SD)	0.42 (0.19; 0.91)	0.029
			Tall (> + 2SD)		1.11 (0.48; 2.59)	0.803

Discussion

Main findings

Results of this study show that a higher BMI was significantly associated to increased risk of bullying among 9-10 y old children attending public schools in Argentina. When genders were compared, boys were more often associated to physical bullying and more often reported being both the perpetrator and the victim. Additionally, there was a significant association between bullying expressed as being made fun of while practicing PA, and with being a male, obese, and of shorter height.

What is already known

Our finding of obese children being more likely to be victims of bullying than their overweight peers is congruent with those of a recent meta-analysis showing that among youths, both overweight and obesity are risk factors for being a victim of bullying with no difference for boys and girls [23]. Other research suggests that adolescents report weight-based teasing to be one of the most common forms of teasing and that obese youth are targets of bullying regardless of their gender, race, social skills, or academic achievement [8]. Moreover, the heaviest youth are at highest risk for future stigmatization. However, there are mixed outcomes regarding sex differences and it may be that they are more related to the type rather than the amount of stigma [33]. With regard to type of bullying, although the review reported by CEPAL [25] did not differentiate general from weight-based bullying, our findings seem to underscore their results characterizing the Argentine sample: physical bullying being more common, and this frequency followed by that of verbal bullying. Our overweight boys reported suffering more bullying in addition to boys showing a tendency to be more often the perpetrators.

Obese children of our study reported feeling more isolated and less comfortable in the company of their peers. This is in line with findings of a study of overweight children (9–11 y old) suggesting that they seem to know that their weight is the reason for their social rejection, believe their excess weight impedes their social interactions with peers, and presume that if they lost weight they would have more friends [34].

When compared to those of normal weight, obese children of our sample more often reported being made fun of while practicing PA. Previous research has shown that in order to avoid peer victimization, overweight children elude taking part in activities, such as physical education classes or sports [35]. Weight criticism during physical activity has been hypothesized to decrease overweight children's motivation to be active because not surprisingly, children who are teased are less likely to be active when given the choice to do so.

What this study adds

Although weight-based bias and discrimination account for a significant proportion of the health impairment suffered by obese children, entailing psychological, social, and health-related consequences, there is a striking dearth of research assessing its presence, and very especially in Latin America. Direct access to the data of SALTEN, made it possible to articulate bullying with overweight and obesity and to analyse the association of these with PA, all of which have been under researched in the region. Although BMI categories of weight are important for identifying health risks among children, it is not clear from existing research to what extent BMI cut-offs are meaningful for understanding weight stigma in youths [6]. This study underscores that when addressing a population such as this, where 49% of the children are either overweight or obese, it is important to take into account that a greater BMI seems to affect the amount of intimidation and stigmatization a child is exposed to at school; more so because it is a particularly likely environment for bullying to occur.

Because evidence suggests that psychological consequences often disappear after controlling for stigmatizing experiences such as teasing and victimization, it appears likely that reducing weight stigma may in turn reduce adverse outcomes for emotional well being. This study is a starting point in that direction.

Future directions

Because bullying behaviour appears to ultimately be a core issue to children's health, informing parents, early intervention with preventive programs, and expanding the analysis of its association with body image ought to be included in future directions of paediatric research. Moreover, given the scarcity of intervention studies especially designed to reduce peer victimization among children with chronic conditions, implementation of such programs are urgently needed. Although it appears that the negative attitudes under study tend to decrease during adulthood, further prospective studies are needed to ascertain these aspects. Lastly, because teasing, bullying, and victimization may have a lasting, harmful effect, more research is needed to examine weight stigma as a moderator for negative psychological outcomes.

Limitations

The study sample was not intended to be nationally representative of Argentina, but only of middle, low, and very low-income 9-10 y old Caucasian boys and girls of the public school district of Moron. Thus, these findings cannot be generalised. Furthermore, the children that were excluded from the study could have obesity related co-morbidities and/or complications related to obesity; if this were the case, the odds ratios in the study could have been underestimated. Although it would have been useful to establish, if the socioeconomic status was associated to outcome with a validated questionnaire, this analysis was not viable, because only a minimal proportion of the population responded to this request. Moreover, the targeted socioeconomic status could have been a major confounder. Additionally, the questions assessed by the bullying questionnaire were not specifically weight-based bullying involvement. Hence, although most likely, we cannot be certain these children were bullied on account of their weight.

Conclusion

The association this study found between bullying and obesity (and between bullying, PA, and obesity) suggests that a school-based multi-component obesity prevention program must take into consideration - when designing the intervention - that overweight and obese children are frequently exposed to some extent of the different types of bullying, regardless of whether they express this. The latter becomes even more critical, when taking into account the global obesity epidemic, which renders one out of every two children exposed to a greater risk of obesity.

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Competing interests

The authors declare that they have no competing interests. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of manuscripts.

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