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Anti-fat bias and school adjustment among primary school children in Spain

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Título: Estereotipos hacia el sobrepeso/obesidad y ajuste escolar en niños de educación primaria en España.
Resumen: El objetivo del presente estudio fue investigar los estereotipos y prejuicios de los niños y maestros hacia el sobrepeso/obesidad. Dos mil cincuenta y cinco niños de 8 a 12 años y sus profesores participaron en el estudio. Se midió el Índice de Masa Corporal y la percepción hacia el sobrepeso/obesidad en los niños, y la evaluación de ajuste escolar por parte de los profesores. Los escolares, particularmente los más jóvenes, eligieron menos atributos positivos y más negativos para las figuras gruesas. Además, en una tarea para evaluar su disposición a participar en actividades sociales y recreativas en función del tamaño corporal, la figura gruesa fue la elegida con menos frecuencia. Los profesores puntuaron con un menor ajuste escolar a los estudiantes con sobrepeso/obesidad. Futuras investigaciones deberían centrarse en intervenciones de prevención eficaces y en promover un clima escolar saludable.
Palabras clave: Estereotipo; Sobrepeso/obesidad; Niño/a; Profesor/a; Ajuste escolar.

Abstract: The aim of the present study was to investigate stereotypes and prejudices among children and schoolteachers toward overweight/obesity. Two thousand fifty-five 8- to 12-year-olds and their teachers took part in the study. Children's body mass index, children's perceptions of overweight/obesity and teachers' assessment of school adjustment were measured. Students, particularly younger children, ascribed less positive attributes and more negative attributes to fat figures. Furthermore, in a task to assess their behavioral intentions to participate in social and recreational activities according to target's body size, the fat figure was the least frequently chosen. Teachers reported lower overall school adjustment for overweight/obese students. Future research should examine cost-effective interventions to prevent anti-fat bias and to promote healthy school climate.
Keywords: Anti-fat bias; Overweight/obesity; Child; Teacher; School adjustment.

Introduction

Obesity is considered a global epidemic. Almost 337 million children worldwide are classified as overweight or obese (Abarca-Gómez et al., 2017). In Spain, 35% of children aged 2-16 years are overweight/obese (Pérez-Farinós et al., 2013). The health consequences of being overweight or obese in childhood are well-known. Nevertheless, social and psychological consequences of overweight/obesity have been less studied at young ages.

Obesity is one of the most stigmatizing and least socially acceptable conditions in childhood (Puhl, Luedicke, & Heuer, 2011). Indeed, children rate overweight/obese peers as less preferred as friends than normal-weight peers (Patel & Holub, 2012). Negative characteristics, such as being lazy, hungry or less socially skilled, are more likely to be attributed to overweight/obese children (Sagone & De Caroli, 2013). These children also are more likely to suffer from peer rejection and victimization, academic underachievement and depression (Greenleaf, Petrie, & Martin, 2014; Kenney, Gortmaker, Davison, & Bryn Austin, 2015; Puhl & King, 2013).

Children's gender, age and Body Mass Index (BMI) may affect attitudes toward overweight/obesity, but research results have been inconclusive. Some studies have observed no differences in gender (Penny & Haddock, 2007; Solbes & Enesco, 2010), but others have found that girls rate overweight/obese peers less favorably than boys (Koroni, Garagouni-Areou, Roussi-Vergou, Zafiropoulou, & Piperakis, 2009; Latner & Stunkard, 2003). Participants' age might also influence their ratings. In the Durante, Fasolo, Mari, and Mazzola study (2014) anti-fat prejudices toward overweight/obese peers decreased as a function of participants' age. However, Kornilaki (2015) found that obesity bias was strenghtened with age. Children's BMI might also affect anti-fat attitudes. Cramer and Steinwert (1998) found that overweight children held more anti-fat attitudes than normal-weight children. On the contrary, in the Kornilaki study (2014) obesity bias did not differ between the normal-weight and overweight children. In a primary school Swedish study using a large population-based sample of 1,409 children it was also found that, regardless of their BMI, they held negattive attitudes toward obesity (Hansson, Karnehed, Tynelius, & Rasmussen, 2009). Moreover, in two studies in which perceived body size was taken into account, anti-fat bias was more related with perceived than actual body size; in fact, children who perceived themselves as heavier held fewer anti-fat attitudes (Holub, 2008; Kornilaki, 2015).

Overweight/obese children experience not only stigmatization from peers but also from their own teachers (Warschburger, 2005). It is assumed that teachers have bias-free attitudes toward overweight/obesity, but in a study carried out by De Caroli and Sagone (2015) teachers showed high levels of dislike for obese people. On the contrary, Fontana, Furtado, Marston, Mazzardo, and Gallagher (2013) showed that elementary teachers have positive attitudes

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toward overweight/obese students. Once again, studies show inconsistent results.

Although not many studies have examined this issue, teachers' prejudices could also be influenced by children's gender and age. In the Datar and Sturm (2006) study girls experienced more negative effects of obesity, but Cornwell, Mustard, and Van Parys (2013) found that teachers assessed boys more negatively. Kenney et al. (2015) found that the increase in BMI from 10 to 13 years old worsens teachers' perceptions of academic ability for both girls and boys.

A great deal of research has been conducted on stereotypes toward overweight/obese people, specifically with adolescents and adult population. Nevertheless, few studies have analyzed prejudices and stereotyped beliefs in primary school children, and it is almost absent in the Spanish context. Regarding preschool years, although anti-fat bias has been studied, the sample sizes were small (Cramer & Steinwert, 1998; Holub, 2008; Kornilaki, 2014).

As suggested in the aforementioned studies, it is unclear how gender, age and BMI affect bias toward overweight/obesity. The present study, therefore, sought to investigate stereotypes among children and bias by schoolteachers toward overweight/obesity. This study addresses three objectives. First, it tries to determine children's positive and negative trait attribution toward fat body sizes and if differences are ascribed according to gender, age and BMI. In view of the attitudes toward overweight/obesity reported in the literature (Durante et al., 2014; Koroni et al., 2009), it is hypothesized that girls and younger children would hold more anti-fat bias than boys and older children. Regarding BMI, in line with research with primary school children (Hansson et al., 2009; Koroni et al., 2009), we expect no differences according to it. Second, it explores whether body size affects children's prejudices and their willingness to engage in social and recreational activities, and if differences are based on gender, age and BMI. We hypothetized that boys and older children would show less anti-fat bias and that no differences would be found according to BMI. The last objective is to analyze the differences between normal-weight and overweight/obese students on school adjustment evaluated by schoolteachers and if the differences are maintained in gender and age. It is expected that teachers would report lower school adjustment for overweight/obese boys and for older children (Cornwell, et al., 2013; Kenney et al., 2015). We consider that the specific knowledge of these aspects would help to design and implement prevention and intervention programs to destigmatize overweight and obesity in the school context.

Methods

Participants

Of the 2,055 children, 989 were girls (48.1%) and 1,066 boys (51.9%) from 16 schools of primary education in Gipuzkoa (Spain), ranging in age from 8 to 12 years (M = 9.87, SD = 1.13). Children were excluded if they presented intellectual disability. The assessment was carried out from January to May, 2014. According to Spanish school system, children were divided in two groups, third and fourth grade for the younger group (n = 1,050, M_{age} = 9.01) (hereinafter: 2nd cycle), and fifth and sixth grade for the older group (n =1,005, M_{age} = 10.76) (hereinafter: 3rd cycle). International Obesity Task Force (IOTF) growth standards were established to classify children according to their BMI. Underweight was classified as the equivalent to BMI <18.5 in adults and overweight and obesity to the correspondent BMI ≥25 and ≥30 in adults (Cole & Lobstein, 2012; Cole, Flegal, Nicholls, & Jackson, 2007). According to BMI cut-off points, of all the participants 124 (6%) were considered underweight, 1,417 (69%) normal weight, 429 (20.9%) overweight, and 85 obese (4%). For the analyses, the sample was divided into normal-weight children (underweight and normal-weight children, 75% of the sample) and overweight children (overweight and obese children, 25% of the sample).

Regarding the teaching staff, out of the 114 teachers who participated in the research, 86 (75.43%) completed the provided questionnaires.

Instruments

Children's measurements

Anthropometric measurements were taken by well-trained nursing assistants. Subjects were barefoot and wore only underwear. Weight was measured with a digital electronic balance (Kern MFB digital 1.0) (range 0.1-150 kg, precision 100g); and height with a portable stadiometer (Seca Bodymeter 206) (range 0-220cm, precision 1mm). The BMI was calculated as weight (kg) divided by the square of the height (m^2).

Children's stereotypes were evaluated by the two following tasks. One task measures children's attitudes toward thin and fat body sizes by trait attribution. Pictorial target figures were presented in two vignettes, the first one, a thin couple (a girl and a boy) and the second one, a fat couple (a girl and a boy) (Solbes, 2010, p. 87). After a literature search and an *ad hoc* pilot study, the adjectives that appeared most frequently were selected. The final measure consisted of 14 attributes: 8 positive traits (good, good-looking, funny, clean, good friend, clever, famous, hard-working) and 6 negative traits (bad, stupid, ugly, liar, dirty, cheater) referred to physical and psychological features. Participants were asked to pair each attribute with a vignette. Forced choice format was used.

The other task was a socio-metric assignment to assess children's behavioral intentions to engage in certain activities with the thin and/or the fat pictorial target figures presented in the vignettes. Similar task was used in a previous study (Solbes, 2010). Children received the same pictorial figures as in the previous task. In this case, the figures were also presented in two vignettes, but divided by gender, two girls (one

thin, one fat) and two boys (one thin, one fat). The following explanation was provided: *These children are coming to your class. If you're a girl, focus on the girl figures and if you're a boy, focus on the boy figures. Answer the following questions selecting one of them or both figures (both being the indifferent option).* In this task, the indifferent option was included at the explicit request of the schools. There were 7 questions: "Which one do you like most?", "Who would make friends faster?", "Who would you like to sit next to in class?", "Who would you do an assignment with?", "Who does better homework?", "Who would you like to play with on the playground?", and "Who would you invite to your birthday party?".

Teachers' Questionnaire

In order to assess school adjustment in children, teachers completed a 6-item questionnaire adapted by Martínez (2008) of the *Escala de Evaluación del Profesor* (Cava & Musitu, 1999). Responses were given from 1 *(very bad)* to 10 *(very good)* by the students' teachers. The questionnaire assesses school performance, level of effort, academic success expectations, school integration, classroom behavior, and teacher-student relationship. The general school-adjustment index was obtained by adding the scores of the six items. In this study the Cronbach's *a* for the 6 items was .91.

Procedure

Human subjects approval for this study was granted by the Ethics Committee of Clinical Investigation of the Department of Health of Gipuzkoa (Spain). Researchers met with each school principal to obtain permission for school involvement. Permission was granted by all of them. Letters were sent to parents describing the study and asking for consent. Children did not participate in the study when parents responded negatively to the informed consent. The participation rate was approximately 90%. Children were informed that participation was voluntary, that questionnaires would be confidential and that they could withdraw without penalty. First, anthropometric measurements were taken. Gender and date of birth were registered. One week later, qualified psychologists applied the questionnaires to children in their classrooms. The researchers read each item aloud to participants and circulated around the room to answer any questions. Teachers' questionnaires were distributed to each teacher (114 in total) on the same day and collected one week later.

Data analysis

The statistical analyses were carried out by means of the SPSS 24.0 (IBM, 2016). Data were screened for normality and outliers. Descriptive statistics (means, SD, and percentages) were obtained for the demographic variables. Contingency table analyses were carried out to analyze children's attitudes and behavioral intentions toward overweight/obesity in relation to gender, grade and BMI. The magnitude of the differences between variables was examined with Cramer's *V*. Student's *t* was calculated to examine the differences in ratings on the teachers' questionnaire for the normal-weight children and overweight children, controlling effect size with the Cohen's *d* index of effect. A significance level of .05 was used.

Results

Differences in positive and negative trait attribution to fat body sizes according to gender, grade and Body Mass Index

In general, a higher percentage of participants ascribed the positive attributes, except "funny", to the thin figures and the negative attributes to the fat figures. This association was observed regardless of gender, age or BMI.

Table 1. Percentages of positive and negative attributes to fat figures and differences according to gender, grade and Body Mass Index. (Percentages of thin figures not shown as they add to 100%).

	Total	Gender				Grade				BMI			
		Girls	Boys	χ^2	*V*	2nd cycle	3rd cycle	χ^2	*V*	NW	OW	χ^2	*V*
Positive adjectives													
Good	37.5	41.1	34.1	9.49**	.07	24.3	52.5	152.8***	.29	36.2	41.3	3.78	
Good-looking	8.5	9.5	7.5	2.16		8.0	9.0	.62		7.6	11.0	4.93*	.05
Funny	75.0	75.9	74.1	.77		74.7	75.2	.05		74.8	75.3	.04	
Clean	19.5	20.7	18.3	1.58		17.1	22.1	7.37**	.06	17.7	24.6	10.33**	.08
Good friend	41.1	45.8	36.7	15.56***	.09	30.2	53.4	99.85***	.24	39.8	44.9	3.71	
Clever	29.3	31.6	27.2	4.19*	.05	22.7	36.8	43.35***	.15	27.3	35.4	10.82**	.08
Famous	28.1	26.9	29.3	1.3		28.2	28.0	.01		26.8	32.2	4.8*	.05
Hard-working	38.5	43.5	33.9	15.41***	.09	28.0	50.5	84.59***	.23	35.3	48.1	20.3***	.11
Negative adjectives													
Bad	60.1	57.4	62.6	5.16*	.05	73.5	44.8	154.92***	.29	61.5	55.8	4.66*	.05
Stupid	72.5	69.6	75.1	7.01**	.06	80.1	63.8	59.71***	.18	74.3	67	8.82**	.07
Ugly	87.1	86.4	87.7	.69		87.6	86.4	.57		88.2	83.6	6.28*	.06
Liar	62.2	59	65.1	7.25**	.06	75.3	47.1	151.09***	.29	63.7	57.5	5.65*	.06
Dirty	82.4	81.6	83.1	.69		85.7	78.6	15.83***	.09	84.6	75.6	18.88***	.10
Cheater	58.4	53.6	62.9	15.99***	.09	70.6	44.5	127.37***	.26	61.1	50.4	16.14***	.09

Note. NW= Normal weight; *OW*= overweight. *V*= *Cramer's V*.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 1 shows specifically the percentages of trait attribution to fat figures. In the overall sample, the highest percentages for the fat figures in positive attributes were observed in "good" (37.5%), "good friend" (41.1%), and "hard-working" (38.5%), and in negative attributes in "stupid" (72.5%), "ugly" (87.1%), and "dirty" (82.4%).

Regarding gender, no significant differences were found in the positive attributes "good-looking", "funny", "clean" or "famous", or in the negative attributes "ugly" and "dirty". For the rest of the traits, boys ascribed fewer positive traits ("good", "good friend", "clever" and "hard-working") and more negative traits ("bad", "stupid", "liar" and "cheater") to fat figures than girls. However, the magnitudes of these differences were very small.

In relation to age, the results indicated that a higher percentage of 3rd cycle participants ascribed more positive attributes and fewer negative attributes to the fat figures than the 2nd cycle participants. More specifically, moderate significant differences were found in the positive traits "good", "good friend" and "hard-working" and in the negative attributes "bad", "liar" and "cheater". The differences found in the attributes "clever" and "stupid" were minor. Much the same as with the gender variable, no significant differences were found as a function of age in the attribution of "good-looking", "funny", "famous" and "ugly".

Finally, significant differences of very small magnitude were found as a function of BMI. The overweight children compared to normal-weight children attributed more frequently positive traits and less frequently negative traits to the fat figure. The greatest differences were observed in the traits "hard-working" and "dirty". The only attributes that revealed no significant differences were "good", "funny" and "good friend".

Differences in children's behavioral intentions for social and recreational activities according to gender, grade and Body Mass Index

In the socio-metric task, the option chosen most frequently was "indifferent". In other words, it did not matter to them whether they performed the proposed activities with the thin figures or the fat figures (see table 2). This was found across all items except for "Which do you like the most?", which was more frequently associated with the thin figure (62.2%).

Table 2. Percentages of willingness to engage in activities with thin and fat figures and differences according to gender, grade and Body Mass Index.

	TF %	*FF %*	*IND %*	χ^2	*V*
Which one do you like most?					
Gender					
Girls	59.9	2.3	37.8	6.65*	.06
Boys	64.2	3.2	32.6		
Grade					
2nd cycle	67.3	2.9	29.9	25.72***	.12
3rd cycle	56.5	2.6	40.9		
BMI					
Normal weight	63.9	2.4	33.7	8.64*	.07
Overweight	56.8	3.8	39.4		
Who would make friends faster?					
Gender					
Girls	40.2	3.2	56.6	20.98***	.10
Boys	46.9	5.9	47.1		
Grade					
2nd cycle	43.3	6.1	50.6	10.08**	.07
3rd cycle	44.1	3.1	52.8		
BMI					
Normal weight	44.3	4.5	51.2	1.32	
Overweight	41.7	5.3	53.1		
Who would you like to sit next to in class?					
Gender					
Girls	34.2	1	64.9	21.25***	.11
Boys	43.1	2	54.9		
Grade					
2nd cycle	53	1.8	45.2	186.85***	.31
3rd cycle	23.1	1.2	75.7		
BMI					
Normal weight	40.6	1.1	58.3	13.44**	.08
Overweight	33.3	2.7	64		
Who would you do an assignment with?					
Gender					
Girls	28.7	4.2	67.1	16.87***	.09
Boys	34.8	6.8	58.5		
Grade					
2nd cycle	43.1	7.3	49.6	154.39***	.28
3rd cycle	19.4	3.6	77		
BMI					
Normal weight	33.7	5.2	61.2	9.57**	.07
Overweight	26.3	6.7	66.9		
Who does better homework?					
Gender					
Girls	16.8	6	77.2	28.43***	.12
Boys	23.8	9.8	66.4		
Grade					
2nd cycle	28.9	8.7	62.4	101.58***	.23
3rd cycle	11	7.2	81.7		
BMI					
Normal weight	21.1	7.1	71.9	7.24*	.06
Overweight	18.5	10.7	70.7		
Who would you like to play with on the playground?					
Gender					
Girls	20.8	1.4	77.8	17.93***	.10
Boys	28.3	2.3	69.4		
Grade					
2nd cycle	31.1	2.4	66.6	51.65***	.16
3rd cycle	17.7	1.3	81		
BMI					
Normal weight	26	1.2	72.8	20.04***	.10
Overweight	20.6	4	75.4		
Who would you invite to your birthday party?					
Gender					
Girls	20	1.4	78.6	5.59	
Boys	23.6	2.2	74.2		
Grade					
2nd cycle	27.6	2.1	70.3	43.29***	.15
3rd cycle	15.5	1.5	83		
BMI					
Normal weight	21.7	1.4	76.9	4.88	
Overweight	22.5	2.9	74.5		

Note. *TF* = Thin figure; *FF* = Fat figure; *IND* = Indifferent; *V* = Cramer's *V*. *$p < .05$. **$p < .01$. ***$p < .001$.

Taking into account the other two response options, the fat figure was much less frequently chosen (range: 1.5% to 8%) than the thin figure (range: 20.4% to 43.7%). The greatest difference was seen in the item "Who would you like to sit next to in class?", which was selected much more frequently for the thin figure than the fat figure (38.8% *vs* 1.5%).

The analyses according to gender showed significant differences of very small magnitude in all of the items except "Who would you invite to your birthday party?". The greatest differences were seen in the items "Who would make friends faster?", "Who would you like to sit next to in class?", "Who does better homework?" and "Who would you like to play with on the playground?". These differences were due to the girls choosing the indifferent option more frequently than the boys.

With regard to cycle, significant differences were observed in all items, with differences of moderate magnitude in the following items: "Who would you like to sit next to in class?", "Who would you do an assignment with?" and "Who does the best homework?". In all of the items, the older subjects chose the indifferent option more frequently.

As for the BMI, except for "Who would make friends faster?" and "Who would you invite to your birthday party?", in all the other items ("Which one do you like most?", "Who would you like to sit next to in class?", "Who does the best homework?" and "Who would you like to play with on the playground?") the differences were significant yet small in magnitude. The overweight participants chose the indifferent option or the fat figure more frequently than the normal-weight children.

Differences between normal-weight and overweight students in relation to school adjustment according to gender and cycle

The teachers reported lower school adjustment scores for overweight/obese students than for normal-weight students. Other than "Teacher-student relationship", the rest of the items presented statistically significant differences small to moderate in magnitude (see table 3).

Moreover, the analyses showed statistically significant differences as a factor of the BMI in both genders. Statistically significant differences of very small magnitude were observed in the boys in all the items to the advantage of the normal-weight students, except, as mentioned earlier, in the item "Teacher-student relationship". In the case of the girls, in addition to teacher-student relationship, no significant differences were found in the items "School integration" and "Classroom behavior". The rest of the items, "Level of effort", "School performance" and "General School Adjustment index", showed differences of small magnitude. The teachers assigned higher scores across items for both normal-weight boys and girls than for overweight students.

Table 3. Differences between normal-weight and overweight students in relation to school adjustment.

	Normal weight		Overweight			
	M	*SD*	*M*	*SD*	*t*	Cohen's *d*
School performance						
Gender						
Girls	7.53	1.64	7.26	1.57	1.98*	.17
Boys	7.17	1.60	6.74	1.84	2.81**	.25
Grade						
2nd cycle	7.42	1.59	7.25	1.68	1.29	
3rd cycle	7.26	1.67	6.70	1.74	3.67***	.33
Level of effort						
Gender						
Girls	7.82	1.50	7.46	1.48	2.86**	.24
Boys	7.08	1.61	6.66	1.85	2.70**	.24
Grade						
2nd cycle	7.48	1.57	7.24	1.67	1.83	
3rd cycle	7.40	1.65	6.86	1.75	3.59***	.32
Academic success expectations						
Gender						
Girls	7.57	1.55	7.28	1.61	2.21*	.18
Boys	7.26	1.55	6.90	1.83	2.41*	.21
Grade						
2nd cycle	7.62	1.51	7.43	1.65	1.54	
3rd cycle	7.17	1.58	6.68	1.74	3.35***	.29
School integration						
Gender						
Girls	7.89	1.39	7.70	1.39	1.68	
Boys	7.90	1.42	7.33	1.64	4.21***	.37
Grade						
2nd cycle	7.94	1.39	7.66	1.47	2.42*	.20
3rd cycle	7.84	1.34	7.34	1.59	3.67***	.34
Classroom behavior						
Gender						
Girls	7.94	1.37	7.72	1.38	1.94	
Boys	7.25	1.51	6.94	1.70	2.31*	.19
Grade						
2nd cycle	7.61	1.55	7.52	1.53	.78	
3rd cycle	7.55	1.41	7.11	1.64	3.35***	.29
Teacher-student relationship						
Gender						
Girls	8.13	1.07	8.09	1.05	.45	
Boys	7.79	1.19	7.63	1.33	1.48	
Grade						
2nd cycle	8.05	1.16	7.96	1.11	.99	
3rd cycle	7.85	1.12	7.75	1.32	.87	
General School Adjustment Index						
Gender						
Girls	46.88	7.03	45.50	7.16	2.32*	.19
Boys	44.44	7.18	42.20	8.56	3.19**	.28
Grade						
2nd cycle	46.12	7.25	45.05	7.81	1.78	
3rd cycle	45.06	7.12	42.45	8.10	3.72***	.34

Note. NW = Normal weight; *OW* = Overweight.
*p < .05. **p < .01. ***p < .001.

Regarding differences in school adjustment between normal-weight and overweight students according to age, we should point out that there were no statistically significant differences in 2nd cycle students except for the item "School integration". In contrast, statistically significant differences of small to medium magnitude were identified in 3rd cycle students in all items except "Teacher-student relationship". While there were no differences between normal-weight and overweight students in teachers' evaluations of school adjustment among 2nd cycle students, in the 3rd cycle the teachers scored overweight students lower than normal-weight students for school adjustment. Overweight students received lower general school adjustment ratings because the teachers gave them poorer scores in school performance, level of effort, school integration and classroom behavior. The teachers' expectations for academic success were also lower for overweight students.

Discussion

This study examined children's stereotypes toward overweight/obesity by an explicit approach. The first objective analyzed children's assessment toward fat body sizes. Consistent with previous research, the current findings demonstrate that, regardless of gender, age, and BMI, children rated fat figures more negatively than thin figures (Durante et al., 2014; Sagone & De Caroli, 2013). Indeed, all positive attributes were less frequently associated with fat figures, except funny. In line with the findings from Cramer and Steinwert (1998), our results suggest that the 8- to-12-year-old children in this study seem to have internalized the predominant socio-cultural message that "fat is bad" and "thin is good".

Particularly and contrary to our first hypothesis regarding gender, boys associated less positive attributes and more negative attributes to fat figures than girls, but the magnitudes of these differences was very small. This finding concurs with previous studies that reported no differences based on gender (Penny & Haddock, 2007; Solbes & Enesco, 2010). On the other hand, the results concerning age confirm our first hypothesis as older children had less anti-fat prejudices toward overweight/obesity (Durante et al., 2014; Solbes & Enesco, 2010).

Older children particularly chose more positive adjectives related to psychological qualities ("good", "good friend" and "hard-working") and less negative adjectives ("bad", "liar" and "cheater") for fat figures. There were no differences in attributes more closely associated with physical or social aspects ("good-looking", "famous" and "ugly").

Finally, normal-weight children associated less positive attributes and more negative attributes to fat figures than overweight children, but the differences found were almost insignificant. In line with previous results, we confirmed our first hypothesis as no differences were found between normal-weight and overweight children (Hansson et al., 2009; Koroni et al., 2009). Holub (2008) and Kornilaki (2015), as in our study, found that these negative attitudes were also shared by overweight children themselves. Further research should be undertaken to examine the impact of anti-fat bias on children's wellbeing.

The second objective explored whether body size exerts an effect on children's behavioral intentions to engage in social and recreational activities. We hypothesized that boys and older children would show less anti-fat bias, and no differences would be found according to BMI. To our knowledge, this is the first study in which the indifferent option appears as an alternative answer. Indeed, the indifferent option was the most frequently chosen, except in the item "Which one do you like most?", where children chose a greater percentage of thin figures. If the indifferent option is not considered, thin figures were always more frequently chosen than fat ones (2.5 to 26 times more). These results are consistent with related research showing that children are less likely to choose overweight peers to engage in social and recreational activities (Patel & Holub, 2012; Solbes & Enesco, 2010). According to the percentage differences between thin and fat figures, the greatest was found in the item "Who would you like to sit next to in class?" and the lowest was seen in "Who does better homework?".

Differences according to gender showed that boys were less likely to choose overweight peers to engage in social and recreational activities, but the magnitudes of the differences were insignificant. These results refuted our second hypothesis that boys held less anti-fat bias. In line with the abovementioned studies, no differences were found between genders (Penny & Haddock, 2007; Solbes & Enesco, 2010).

Differences according to age showed that 3rd cycle children chose with a higher percentage the indifferent option to engage in social and recreational activities. These findings support our second hypothesis showing a lower anti-fat bias among older children. In fact, as early as in preschool years, children tended to choose peers who were not overweight as best friends and playmates (Patel & Holub, 2012). The decline of the anti-fat attitudes in older children may be explained because they recognize socially unacceptable judgments (they are less likely to be overtly prejudiced) or, as they have a better understanding of the abilities of overweight and normal-weight children, they consider that both have similar abilities (Durante et al., 2014; Patel & Holub, 2012; Solbes & Enesco, 2010). In future studies, implicit measures should be used to assess anti-fat bias in children. Thus, participants would not be aware of what is being measured.

Finally, overweight children more frequently chose the indifferent option than normal-weight children to engage in social and recreational activities, but the magnitude of the differences was small. In line with earlier studies in preschool years, fat figure was the least selected, but no differences were found in BMI (Kornilaki, 2014).

This study also examined the differences between normal-weight and overweight/obese students on school adjustment evaluated by schoolteachers. Consistent with previous research, the last hypothesis that teachers reported

lower scores for overweight students was confirmed (De Caroli & Sagone, 2015). In addition, our results showed that BMI did not affect teachers' ratings in girls as much as it did in boys. Indeed, our results suggested that according to previous studies, boys' BMI affected teachers' assessment about school adjustment more than it did with girls (Cornwell et al., 2013). According to age, BMI affected teachers' bias more in 3rd cycle than in the 2nd cycle. In fact, the lowest scores were obtained for school adjustment among older overweight children. The current findings also demonstrated that, as in previous studies, overweight children are more poorly evaluated from the early primary school years (Datar & Sturm, 2006; Kenney et al., 2015).

Interestingly, "Teacher-student relationship" was the only item where no differences were found between normal and overweight children either in gender or in cycle. A possible explanation is that teachers may have answered to accommodate social desirability bias, as this item could be considered explicit. Teachers should identify and understand their own negative attitudes and beliefs toward overweight children, be aware of weight-teasing risks and promote interventions in order to create weight-friendly schools (Gray, Kahhan, & Janicke, 2009; Greenleaf et al., 2014; Lynagh, Cliff, & Morgan, 2015).

There are certain study limitations that must be considered in future research. One of them is that teachers' BMI and gender were not collected, so it was not possible to establish relations with these variables. In relation to the questionnaire completed by the teachers, in future studies a more specific scale should be applied, considering that school adjustment has been evaluated only with 6 items. Moreover, responses can be conditioned by participants' social desirability because of the forced choice format, having only used two vignettes and the measurement of explicit attitudes. In future investigations, higher ecological validity assessment tools, with multiple-choice format and implicit attitudes measurements, should be used to assess anti-fat bias. Another limitation is that cross-sectional research does not allow drawing conclusions about causal relationships. In further studies, researchers should work with many different sources (children, teachers, parents, guardians, family and society) all at once, because without a large societal change weight-stigmatization will not disappear.

Despite these limitations, the study might provide some promising avenues for school staff. Children stigmatize overweight peers regardless of their own weight and younger children seem to have more negative attitudes toward overweight children. The research results suggest the need for prevention programs at primary schools. Schools could distribute flyers and posters that promote body diversity and could offer an evidence-based school program guided toward positive body image and acceptance of body diversity. Other suggestions are to implement strategies to carry out school-based anti-bullying policies that protect children from being bullied about their weight (Puhl, Neumark-Sztainer, Austin, Luedicke, & King, 2014), to promote coping strategies and to create a bias-free environment as a protective buffer for weight-stigmatization (Gray et al., 2009). Actually, according to Miller et al. (2017), the *Relationship Building Intervention (RBI)* has proven to be an effective program to improve the social and learning environment in primary schools. Teachers can also reduce victimization among obese children by intensifying contacts with overweight children, laying down anti-weight teasing rules, and treating weight-bias with the same degree of inappropriateness as gender discrimination (Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Golu, 2013; Neumark-Sztainer et al., 2002). It would also be convenient to incorporate psychological theories to understand behavioral changes and to promote cost-effective school-based interventions (Amini, Djazayery, Majdzadeh, Taghdisi, & Jazayeri, 2015; Ickes, McMullen, Haider, & Sharma, 2014).

Schools have the challenge of providing a safe and welcoming place for students and staff and creating an accepting environment for all (e.g., children with special medical needs, visually and hearing impaired youth, children with learning disabilities…). Indeed, providing explicit signs of warmth and respect in daily interactions may foster students' school adjustment (Hamre & Pianta, 2001; Zee & Koomen, 2017). Therefore, reducing negative attitudes and promoting acceptance toward children who suffer from overweight should be a cross-sectional objective of educational projects of schools.

Conclusions

Children in this study ascribed less positive traits and more negative traits to fat figures. In the second task, the fat figure was the least frequently chosen to participate in social and recreational activities. Children from primary school have shown anti-fat bias, which can have an impact on the way they interact with their peers. Moreover, teachers have also reported lower school adjustment scores for overweight/obese students. The results of this study provide evidence that highlights the importance of studying anti-fat bias of children and teachers as well as the necessity of implementing school-based childhood obesity interventions.

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