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ORIGINAL ARTICLE

Influence of BMI on self-esteem of children aged 12–14 years ☆

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Abstract
Background: During the last decades, the increase in the rate of children and adolescents who are overweight or obese is alarming and it is related with a lower social competency, and low self-esteem.
Method: A transversal study was conducted with a representative sample of 292 students enrolled in years 8 and 9 at secondary school (13.05 ± 0.97 years) in the city of Jaen, Spain.
Results: Girls wanted a thinner figure than boys ($p < .001$). Regarding self-esteem we observed statistically lower values in the case of girls ($p < .000$) as compared to their male counterparts. Regarding the BMI, students with a healthy weight have a statistically higher self-esteem score than students who are overweight and these have a slightly higher score than those who are obese. Positive correlation exists between the perceived silhouette and the desired silhouette ($r = .485$) and a negative correlation between the BMI and self-esteem ($r = -.248$).
Conclusion: It is necessary to plan actions aimed as reinforcing and increasing self-esteem, focusing on the group of girls and the group of young adults with overweight and obesity problems.
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Influencia del imc en la autoestima de niños y niñas de 12-14 años

Resumen
Introducción: En las últimas décadas se ha producido un incremento alarmante de las cifras de sobrepeso y obesidad y esto se ha relacionado con una menor competencia social y una peor autoestima.

Método: Se realizó un estudio transversal con una muestra representativa de 296 escolares de primer y segundo curso de Educación Secundaria Obligatoria (13.05 ± 0.97) de la ciudad de Jaén (España).

Resultados: Las niñas desean tener una figura más delgada que la de los niños, (p<.001). En cuanto a la autoestima observamos valores estadísticamente inferiores en caso chicas (p<.000) en comparación con sus homólogos de sexo masculino. En cuanto al IMC, los alumnos con un peso saludable tienen una puntuación estadísticamente mayor de autoestima que los alumnos con sobrepeso, y estos ligeramente superior a los alumnos con obesidad. Existe una correlación positiva entre la silueta que se percibe y la silueta que se desea (r = .485) y una correlación negativa entre el IMC y la autoestima (r = −.248).

Conclusión: se hace necesario planificar actuaciones encaminadas a reforzar y aumentar la autoestima durante la adolescencia, centrándonos en el grupo de las chicas y en el grupo de jóvenes con problemas de sobrepeso y obesidad.

Introduction

During the last decades, the increase in the rate of children and adolescents who are overweight or obese is alarming.[1] In Spain, more than 20% of children aged 10–14 are overweight or obese.[2] This prevalence is one of the most significant in Europe.[3] Obesity is not only related with the increase in a series of chronic diseases such as diabetes mellitus, hypertension, dislipemias, osteoporosis, cardiovascular disease or some types of cancer,[4] but it is also related with a lower social competency, adults with behaviour problems and low self-esteem.[5]

Self-esteem seems to be an important factor in predicting symptoms of depression in young adults, showing how low self-esteem predicts high levels of symptoms of depression and eating disorders.[6] Some authors suggest that overweight or obesity in young adults is related with a poor body figure perception, low self-esteem, a low level of confidence in physical abilities as well as a low interest in participating in physical activities.[7]

Depending on their gender, adolescents experience physical, neurological and psychological changes differently. It has been observed that males evaluate their body in terms of strength, while females are worried about their weight and the shape of certain parts of their body.[8] Therefore, the concern with the body image is different according to gender. While boys are concerned with having a muscular body, the ideal beauty according to girls is always related with being thin, where in many cases this thinness is below healthy values.[9] While for males, a low weight is considered a negative trait, for females this trait is desired.[10]

The aim of this study was to analyse the influence of body composition (BMI) on self-esteem in 12–14 year old children in the city of Jaen, Spain.

Method

Participants

A transversal study was conducted with a representative sample of students enrolled in years 8 and 9 at secondary school (equivalent to 1° and 2° ESO, in Spain) (13.05 ± 0.97) in the city of Jaen, Spain (95% confidence interval). Two hundred and ninety-six students were randomly selected from the different private and subsidised/private schools in the province of Jaen.

The students participated voluntarily after they had received a detailed explanation of the objective and implications of the research. Written informed consent was provided by the parents as well as by the participants. The study was approved by the Human Research Ethics Committee of the University of Granada.

Instruments

To assess the body figure we use a variant of the method proposed by Stunkard and Stellard and modified by Collins[11] (Fig. 1). This method shows 9 male figures and the same number of female figures, which are progressively getting stockier. Each silhouette has its corresponding BMI assigned in a manner that the thinnest body equates to a BMI of 17kg/m^2 and the stockiest to 33kg/m^2. Students are not shown the BMI category corresponding to each profile, so they can only use the drawing as a reference to assess the figure. Students must select the figure, which, in their opinion corresponds with the silhouette (perceived silhouette) and which one they would like to have (desired silhouette). Also the BMI of the students was measured and correlated with their figure number (actual silhouette). By comparing the perceived silhouette values with those of the actual silhouette, we obtain a conformity or non-conformity of the individual with their figure and an analysis of the actual subject when assessing their body (realism). The negative values correspond to individuals who possess an actual BMI that is lower than the perceived BMI; in other words, they see themselves stockier than they actually are. On the contrary, the positive values belong to individuals who see themselves thinner than they actually are. The same categorisation was carried out in the analysis of the relationship between the actual silhouette and the desired silhouette (desire). The negative values indicate that the individual wishes to be stockier than they actually are and on the
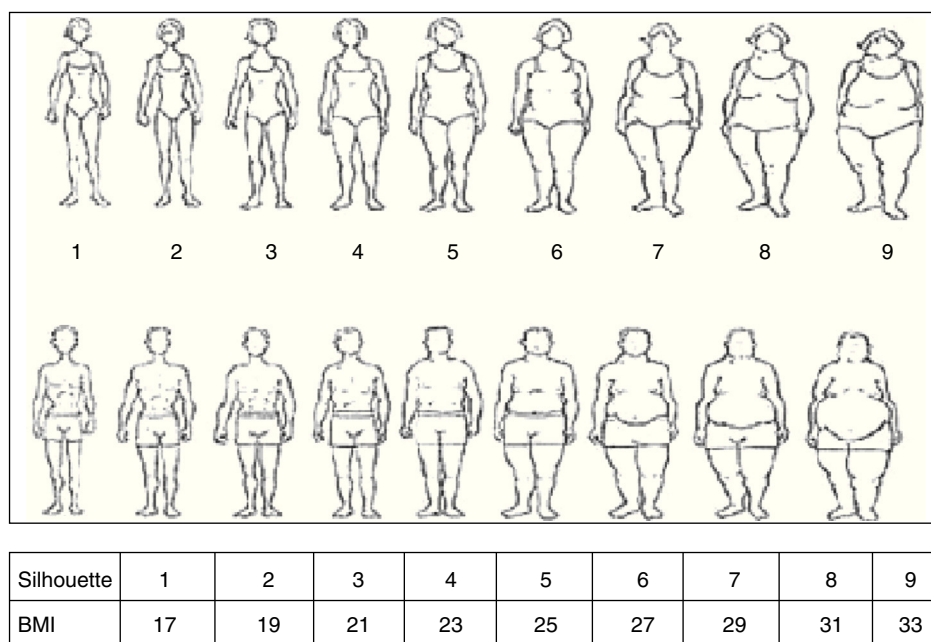
Silhouette	1	2	3	4	5	6	7	8	9
BMI	17	19	21	23	25	27	29	31	33

Figure 1 Body perception analysis.

contrary, positive values indicate individuals who wish to be thinner than they actually are.

Self-esteem was assessed using the Rosenberg scale (RSE). The scale is comprised of 10 questions that are scored between 1 (highly disagree) and 4 (highly agree), which allows obtaining a minimum score of 10 points and a maximum score of 40 points, where the highest points relate to a higher self-esteem. Items 1, 3, 4, 7 and 10 are written in a positive tone (e.g. In general I am satisfied with myself), and items 2, 5, 6, 8 and 9 are written in a negative tone (e.g. sometimes I think that I am not good at anything). This instrument has been adapted and validated for the Spanish language (Cronbach $\alpha = 0.8-0.85$)[12].

BMI was calculated based on the height and weight in accordance with the protocol established by the International Society for the Advancement of Cineanthropometry.[13] A SECA scale with an accuracy of ± 50 g was used to determine the weight and a GPM height rod with an accuracy of ± 1 mm was used to determine the height. According to the BMI, the gender and age, the cut-off points for being overweight and obese were determined following the internationally established cut-off points.[14] The BMI-for-age z-scores of the participants was determined against the WHO growth reference for those aged 5–18 years.[15]

Statistical analysis

The statistics programme SPSS version 20.0 was used to analyse the data. The qualitative variables are presented as average and percentage, while the quantitative variables are presented with the average and the typical deviation. The standardising of the variables was carried out using the Kolmogorov–Smirnov test using Lillieforts correction and the homoscedasticity through the Levene test. After verifying that the variables were not normal, the data were analysed using the U tests from Mann–Whitney (comparison between two groups) and Kruskal Wallis (for comparing more than two groups). Using the Pearson Chi-square test, the association of the qualitative variables was analysed. The association between the variables was carried out using the Spearman correlation. The level of significance was established at 0.005.

Results

The data relative to gender, course, type of school and BMI are represented in Table 1. The sample was divided equally according to gender (50%), where 53% belonged to grade 1 of ESO and where 61.8% were attending public schools. More than 296 of the students evaluated were overweight or obese, where 24.7% and 8.1% were overweight and obese respectively. We did not find any differences between groups for any parameters based on the type of school.

Table 2 examines the sample according to gender and BMI. Regarding gender we find statistically significant differences as far as the age, which is significantly greater in the case of males. No statistically significant differences exist as far as the values obtained in BMI, perceived silhouette, actual silhouette, realism or desire. However, girls wanted a thinner figure than boys and we found statistically lower values in the case of girls ($p < .001$). Regarding self-esteem we observed statistically lower values in the case of girls ($p < .000$) as compared to their male counterparts.

Regarding the BMI, we find desired silhouette values that are statistically higher according to their classification as being obese, overweight or having a healthy weight respectively. Students with a healthy weight see themselves as being stockier than they actually are, students who are overweight see themselves as they actually are, while students who are obese see themselves thinner than

Table 1   Description of the study sample.

Total 296 (100%)						
Grade		School type		BMI		
Year 8 (1° ESO)	Year 9 (2° ESO)	Public	Priv/subsidised	Healthy	Overweight	Obese
157 (53%)	139 (47%)	183 (61.8%)	113 (38.2%)	199 (67.2%)	73 (24.7%)	24 (8.1%)

they actually are and the differences between groups are statistically significant. Students with a healthy weight wish they were stockier, while those who are overweight or obese would like to be thinner, where the differences between groups are statistically significant. Students with a healthy weight have a statistically higher self-esteem score than students that are overweight and these have a slightly higher score than those who are obese.

Finally, Table 3 shows the correlation coefficients between the perceived silhouette, desired silhouette, self-esteem and BMI. The most significant results show that a positive correlation exists between the perceived silhouette and the desired silhouette ($r = .485$) and a negative correlation between the BMI and self-esteem ($r = -.248$) and between perceived silhouette and self-esteem ($r = -.252$). The negative correlation was greater for boys than for girls between self-esteem and BMI ($r = -.362$; $r = -.156$) and between self-esteem and perceived silhouette ($r = -.336$; $r = -.200$) respectively. This remained significant after controlling for the variability in perceived and the desired silhouette.

Discussion

The primary findings of this research suggest that gender and BMI affect self-esteem; and the condition of being a female and having a BMI that is higher than what is considered a normal weight is related with lower self-esteem values in 12–14-year-old students in Jaen.

Our research showed how 24.7% of the students evaluated were overweight while 8.1% were obese. These results are slightly higher than those found in groups of a similar age in other Spanish populations. A recent study conducted in Logroño (north of Spain) on a representative sample of students between 11 and 12 years of age, the overweight and obesity rates are 23.7 and 3.3% respectively.[16] The most important studies at a national level in this population group also show values that are slightly lower than those found in our study. The enKid study[17] that was conducted on a representative study of children between 10 and 13 years of age, showed overweight and obesity percentages of 22 and 5% respectively. The last National Health Survey conducted in our country in 2012 published an overweight percentage of 19.2% and obesity of 3.7% in children aged between 10–14. However, this increased prevalence of overweight and obesity rates coincides with other studies,[18] which show how the Andalusian population has a higher obesity rate than the Spanish average, which is 37% for the Andalusian population versus the 26.6% of the Spanish population. Although

overweight and obesity are present throughout the world, these do not have the same rate in all regions. It appears that regions with a less favourable socio-economic status are at a higher risk. This occurs in Andalusia, where the gross domestic product per capita is the second lowest in Spain, as well as the percentage of persons who are illiterate or non-educated is clearly lower than the national average.[18] The same thing occurs in Europe, where southern countries, among which we have Spain, reported child overweight/obesity rates between 6 and 19% while the rates in northern countries are between 2 and 4%.[19]

Our research shows a negative association between BMI and self-esteem ($r = -.248$). Strauss[20] stated that self-esteem in pre-adolescents who are obese (9–10 years old) was not related with obesity, unlike obese adolescents (13–14 years old), where the overall self-esteem was related with the presence of obesity. Research conducted of samples similar to that of our study indicated that young people who are overweight/obese experienced low self-esteem and depression.[21] Authors such as Kim et al.[22] stated that being overweight/obese as well as environmental stress as a result of low income may affect the psychological health of children. A review conducted by French et al.[23] who analyses transversal studies carried out on children between 13 and 18 years of age concludes that the obese participants have lower levels of self-esteem as compared to participants with a healthy weight. Obese children with lower levels of self-esteem are more prone to engage in high risk behaviour, such as smoking and alcohol consumption; low levels of self-esteem were correlated with the start of tobacco and alcohol consumption among young people.[24] It is worth mentioning that adolescents who are severely obese experience serious psychological problems such as social exclusion[25] and an impairment of the quality of life related to health; the probability that an obese child or adolescent will suffer an impairment of their quality of life related with their health was 5.5 times greater than that of a healthy child or adolescent and similar to that of a child or adolescent diagnosed with cancer.[26]

The students in our study who were overweight or obese wanted to be thinner, which coincides with other studies of students of similar ages where high levels of adiposity are associated with a high level of physical dissatisfaction (the child wants to be thinner).[27] These findings are worrisome because children who are not happy with their appearance, due to social pressures related with the weight or the personal problems that are causing the excess weight are prone to having eating disorders and are less prone to adopting healthy behaviours than children with a positive view of their body.[28]

Table 2 Characteristics of the sample according to gender and state.

	Total (N = 296)	Gender			State			
		Male (N = 148)	Female (N = 148)	P Value	Healthy (N = 199)	Overweight (N = 73)	Obese (N = 24)	P Value
Age	13.05 ± 0.97	13.18 ± 1.01	12.93 ± 0.92	.031*	13.10 ± 1.01	12.90 ± 0.85	13.17 ± 0.96	.297
BMI	21.12 ± 3.62	21.13 ± 3.92	21.12 ± 3.32	.958	19.12 ± 1.86	24.12 ± 1.60	28.59 ± 3.01	.000[a]
BAZ	0.18 ± 1.14	0.25 ± 1.22	0.11 ± 1.05	.308	−0.40 ± 0.84	1.21 ± 0.47	1.92 ± 0.65	.000[a]
Perceived S.	3.80 ± 1.18	3.84 ± 1.35	3.77 ± 0.99	.624	3.30 ± 0.95	4.63 ± 0.79	5.46 ± 0.98	.000[a]
Desired S.	3.18 ± 0.79	3.32 ± 0.87	3.03 ± 0.67	.002*	3.07 ± 0.76	3.29 ± 0.79	3.75 ± 0.79	.000[a]
Actual S.	3.09 ± 1.79	3.12 ± 1.93	3.06 ± 1.66	.771	2.09 ± 0.85	4.62 ± 0.83	6.79 ± 1.56	.000[a]
Realism	−0.73 ± 1.29	−0.73 ± 1.32	−0.72 ± 1.25	.964	−1.23 ± .087	−0.03 ± 1.09	1.33 ± 1.63	.000[a]
Desire	−0.08 ± 1.81	−0.20 ± 1.95	0.03 ± 1.65	.289	−0.98 ± 1.10	1.33 ± 1.18	3.04 ± 1.92	.000[a]
Self-esteem	31.33 ± 5.83	32.59 ± 5.23	30.07 ± 6.14	.000[a]	32.28 ± 5.52	29.51 ± 6.12	29.14 ± 5.70	.000[a]

BMI: body mass index; BAZ: BMI-for-age z-scores; perceived S.: perceived silhouette; actual S.: actual silhouette.
[a] Significant differences at the level of $p \leq 0.05$.

Table 3 Correlation coefficients between prceived silhouette, desired silhouette, self-esteem and BMI.

	Desired S	Self-esteem	BMI
Total			
Perceived S.	.485[a]	−.252[a]	.703[a]
Desired S.		.054	.206[a]
Self-esteem			−.248[a] / −.057
Girls			
Perceived S.	.467[a]	−.200[a]	.677[a]
Desired S.		.170	.214[a]
Self-esteem			−.156 / .021[b]
Boys			
Perceived S.	.500[a]	−.336[a]	.722[a]
Desired S.		−.133	.206
Self-esteem			−.362[a] / −.178[b]

BMI: body mass index; perceived S.: perceived silhouette; actual S.: desired silhouette.
[a] Significant differences at the level of $p \leq 0.01$.
[b] Perceived and desired silhouette adjusted values.

Our study shows how girls obtain lower self-esteem scores than their male counterparts ($p < .000$), and also wish to have a thinner body than what boys would like to have. Studies that research the relationship between gender and self-esteem in adolescents have found that boys have higher self-esteem scores than girls during adolescence.[29] These results coincide with other studies such as that conducted in Valencia on our sample of students in the secondary education cycle.[30] The obtained results demonstrated that boys received a higher score than girls regarding self-esteem and their physical self-concept. Several authors point to adolescence as an especially vulnerable stage, where self-esteem and self-concept problems are frequent, since this is a period characterised by physiological, emotional, cognitive and especially social changes, which contribute to an increase in concern with the physical aspect. The gathered empirical evidence underlines that this concern is different according to gender, placing adolescent girls at risk due to their increased desire to be thinner, which is often times not justified.[31] This has negative connotations, as concluded by Asuero et al.[32] females with low self-esteem suffer from higher levels of anxiety and depression as well as a greater dissatisfaction with their bodies, reflected by a tendency towards self-devaluation when comparing their own silhouette with that of other persons.

OD́ea and Abrahams[33] examined the effect of an interactive, school-based programme which tackled self-esteem on the body image and eating attitudes and behaviours of young male and female adolescents, with measures taken following the programme again after 12 months. The educational intervention programme was based on the educational theories of cooperative, interactive, and student-centred learning. These theories have been proven to enhance student learning, behaviours and attitudes, and skill development in addition to enhancing student self-esteem. The educational intervention significantly improved the body satisfaction, physical appearance ratings, and current weight losing behaviours of students. In addition to

improvements in students' body satisfaction, the education programme also produced significant changes in attitudes and perception of aspects of self-concept. These results suggest that it is possible to modify adolescents' susceptibility to peer group pressure and cultural body image norms. It is also possible to increase body satisfaction within adolescents by focusing directly on cognitive changes aimed at changing beliefs and attitudes and strengthening self-perceptions.

Also, interventions which include engaging in physical activity during childhood have been shown to enhance self-esteem and reduce symptoms of anxiety and depression[34] whilst also reducing body fatness.[35]

Conclusion

The results of this work show the existence of low self-esteem risk groups. Therefore, it is necessary to plan actions aimed towards reinforcing and increasing self-esteem. Girls and young adults with overweight and obesity problems should perhaps be a main focus of intervention, since these groups have a greater likelihood of demonstrating low self-esteem. These interventions should include educational intervention and physical education programmes.

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