

Does physical activity reinforce adolescents' body-esteem? A cross-sectional study from Finland

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Abstract

Background Physical activity promotes a positive physical self-image, but less is known about whether the positive effect covers the general self-evaluation of adolescent appearance. The purpose of the study was to explore the association between physical activity and body-esteem in 15-year-old Finnish adolescents, via a country-representative cross-sectional study.

Methods The data for the study were drawn from the Health Behaviour in School-aged Children (HBSC) study from 122 schools, comprising 15-year-old adolescents (N=1956) in Finland in 2014. The main measures were self-reported (i) moderate-to-vigorous physical activity (MVPA) and (ii) Body-esteem Scale for Adolescents and Adults (BESAA). The measures also covered other relevant factors for body image, as highlighted in previous studies. A mixed effects linear regression analysis for body-esteem was conducted. The explanatory variables included were (i) MVPA; (ii) weight status, as defined by the international (IOTF) body mass index with cut-offs for thinness, overweight, and obesity; (iii) self-esteem; and (iv) socio-economic status. The covariates in the model were maturation state and ethnic background.

Results In both genders, the body-esteem score increased linearly with physical activity. It was highest among adolescents who reported having been engaged in MVPA corresponding to the international recommendation for adolescents' physical activity. MVPA was a significant determinant for body-esteem in boys, but not in girls. In both genders, lower body-esteem was in part explained by obesity, but general self-esteem was by far the most significant factor determining body-esteem.

Conclusions The several positive effects of physical activity provide feasible explanations as to why body-esteem was higher among physically active adolescents than among those who were less physically active. However, physical activity was a significant determinant for body-esteem only in boys. The difference between genders should be taken into consideration in efforts to promote health and physical activity.

Background

Adolescents undergo various physical, mental, cultural, and social changes that shape their perceptions of themselves, and change their attitudes towards their own appearance [1–3]. Young people's perceptions of their physical appearance and physical competence seem to have an important role in the development of their global self-concept [4].

Body dissatisfaction varies, depending on various factors such as body weight and gender [5, 6]. In general, body dissatisfaction increases when the body mass index (BMI) rises, and it generally has a stronger impact on girls than on boys [7]. Several studies have demonstrated that boys perceive their own physical appearance more positively than girls [7–10]. The observed gender differences can be associated with adolescents' physical and mental qualities, and also with gendered, socially and culturally determined conceptions of the ideal body [2, 11, 12]. In addition, early-onset puberty in girls and

late-onset puberty in boys are risk factors for a negative body image [13]. According to Kopcakovan et al. [14], gender also shapes the connection between body image and physical activity in adolescence.

Middle- and upper-class adolescents are in general more critical of their looks [15]. Physical self-esteem, measured according to the evaluation of one's own looks, has been found to be lowest among overweight middle- or upper-class girls, and highest among boys in the lowest social class [16]. Wang et al. [17] reported stronger body dissatisfaction among adolescents from non-mainstream ethnic backgrounds. Grago and Shisslak [18] mentioned weight and self-esteem, the timing of sexual maturation, gender roles, the degree of discrimination and cultural adaptation, and the unity of the ethnic group as factors that influence the eating behaviours of girls and women in different ethnic groups. However, the differences in the body image of various ethnic groups cannot be explained only by national culture; intervening factors such as bodybuilding, the media, and the internalization of a muscular and slim body ideal also affect them [19].

Adolescents encounter appearance-related role expectations precisely at the phase of life when their physical activity decreases. The universal drop-off phenomenon—in other words, a decrease in physical activity at the transition from childhood to adolescence—has been relatively strong among Finnish adolescents in international comparisons [20, 21]. This being so, physical activity (defined as deliberate muscular activity that increases energy expenditure and usually leads to movement [21]) has been presented as a factor that protects adolescents against body dissatisfaction [23].

Physical activity brings with it several physical and mental health benefits [24, 25]. Some studies have explored the positive relationships between physical activity and body image [26, 27] as well as the association with general self-esteem [28]. Moreover, Chae et al. [29] concluded that physical activity might reduce the risk of depression in addition to supporting body-esteem in adolescents. Studies by Kantanista [10] and by Duncan et al. [30] have also indicated that physical activity promotes body-esteem. Conversely, Finne et al. [31] discovered a correlation between body dissatisfaction and low physical activity among adolescents in Finland. Nevertheless, there have also been studies giving no indication of an association between physical activity and higher body-esteem [32].

Overall, the findings on the relationship between physical activity and body-esteem in adolescence have been limited. In addition, most of the existing studies have concentrated on physical competence. In seeking to shed new light on the factors related to body-esteem that have been highlighted in previous research, there seems good reason to go more deeply into the associations between adolescents' physical activity and body-esteem.

Methods

The aim of the present study was to explore the relationship between physical activity and body-esteem among 15-year-old adolescents, in association with the factors highlighted in earlier studies (i.e. gender, weight status, maturation, self-esteem, family wealth, and ethnic group).

Empirical data of Finnish adolescents were obtained from the *Health Behaviour in School-aged Children* (HBSC) study. This World Health Organization collaborated, cross-national survey uses findings at both national and international level (i) to gain new insights into young people's health and wellbeing, (ii) to understand the social determinants of health, and (iii) to inform policy and practice with a view to improving young people's health. Physical activity has been one of the research areas in the HBSC study since the first survey in 1984. Further details on the HBSC study procedures can be accessed elsewhere [33, 34].

The nationally representative cross-sectional data for the present study were obtained from 15-year-old pupils in Finland in the spring of 2014. The schools (N = 122) were chosen from the Finnish school register via a cluster sampling method, and sampling was adjusted to take into account the province, the municipality, and the size of the school (with probability proportional to size, PPS). The participating class/group was selected randomly in each school. Participants responded voluntarily and anonymously to a standardized paper-and-pen questionnaire during a school class, after being informed of the confidentiality of the data, and of the fact that only group-level results would be reported. Data collection took place in the classroom environment under exam conditions. The data for the present study was selected so that 90% of the respondents were aged 15.5 years \pm 6 months (N = 1965; 956 boys, 1009 girls). The response rate for boys was 84%, and for girls 86%. The characteristics of the participants are presented in Table 1.

Measures

Moderate-to-vigorous physical activity (MVPA) was assessed by asking students 'Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?' [35]. To ensure that respondents considered the whole range of physical activity and took into account the intensity, the item was accompanied by the following introductory instruction: 'Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, school activities, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, slalom, cross country skiing, soccer, basketball or Finnish baseball.' The MVPA was categorized into four groups according to the distribution of responses: *low active* 0–2 days; *light active* 3–4 days; *active* 5–6 days; *very active* 7 days (Table 1). The last category matches the global WHO recommendation for sufficient physical activity [22].

Body-esteem relates to self-evaluations of one's body or appearance, and was measured here using the *Body-Esteem Scale for Adolescents and Adults* (BESAA) [36]. The original measure was pre-tested in Finland in the autumn of 2013, and an abbreviated 11-statement measure (Cronbach α = 0.87) was selected for this study. Young people were asked to evaluate how often they agreed with the statement (Appendix 1). The response options were: *never*, *rarely*, *sometimes*, *often*, and *always*. The sum score of the variables was generated in such a way that a more positive body estimate was represented by a

higher sum variable (Range 11–55). The distributions of the sum scores for boys and girls are presented in Figures 1 and 2. In total, 94% of the respondents responded to all the BESAA statements.

The BMI was calculated according to the self-reported height and weight (Table 1). Weight status was defined by international (IOTF) gender- and age-specific body mass index cut-offs for thinness, overweight, and obesity [37].

The measures of maturation and ethnic background were dichotomized. Young people were classified in a positive category if (for girls) they had begun to menstruate, or (for boys) they had had an ejaculation. For ethnic background, the dichotomy was set according to whether the respondent was born outside Finland, or had one or both parents born outside Finland (Table 1).

Self-esteem was assessed via the Rosenberg self-esteem scale (RSES) [38]. The exact statements of the RSES are presented in Appendix 2. The mean values on the RSES with standard deviations by gender are shown in Table 1.

Self-evaluated family wealth was assessed by asking 'What do you think of your family's financial situation?' with responses: *My family is doing very well financially/ My family is doing quite well financially/ My family's financial situation is about average/ My family is not doing very well financially/ My family is doing very poorly financially*. For statistical analysis, the variable was classified into three categories, the proportions of which are shown in Table 1.

Statistical analyses

The effects of different categories of MVPA on body-esteem were analysed via mixed effects linear regression. Regression coefficients with 95% confidence intervals (CI), p -values, and R squares (R^2) were calculated.

The association between MVPA, weight status, self-evaluated family wealth, self-esteem, and body-esteem was examined by a mixed effects linear regression, adjusting for the potential modifying effects of maturation and ethnic background. In addition to β -coefficients, there was calculation of 95% CIs, p -values, the R^2 for the individual variables, and cumulative models. The statistical analyses were conducted separately for the girls and the boys, and were performed by SPSS statistical software (version 24.0) and Stata (version 15).

Results

Boys engaged in more MVPA (Table 1) and exhibited higher body-esteem scores (Figure 1 and 2) than girls.

The body-esteem score increased linearly with physically active days in both genders (Table 2). Body-esteem was highest among adolescents who reported having been engaged in MVPA for a minimum of 60 minutes on the 7 days of the week that preceded the inquiry, in both genders. Also in both genders, the

positive effect of physically active days on body-esteem emerged when there were more than two physically active days, and was extremely significant at above four days. The positive effect of physically active days was stronger for boys than for girls.

MVPA was a significant determinant for body-esteem in boys only in the analyses, considering with other relevant determinants (Table 3). The size of the R-squared measure for the MVPA ($R^2 = 5.0$) corresponded to the magnitude of the weight status ($R^2 = 5.2$) and family wealth ($R^2 = 4.9$) among boys. In both genders, lower body-esteem was explained by obesity and overweight. In the model for girls, the weight status was the only significant determinant for body-esteem, in addition to self-esteem (Table 4).

In the girls' mixed effects linear regression model for body-esteem, approximately half ($R^2 = 46.8\%$) of the observed variation was explained by the model's inputs (Table 4). Corresponding share in boys' model was just about a quarter ($R^2 = 26.3\%$) (Table 3). In both genders, family wealth had no significant effect on body-esteem. On the contrary, self-esteem was the most significant independent variable explaining body-esteem. The variance of self-esteem explained 20.8% of the variance of body-esteem in boys' model, and 39.2% in girls' model.

Discussion

Physical activity does appear to reinforce adolescents' body-esteem, particularly among boys. According to our study, the body-esteem was highest among adolescents who reported having been engaged in physical activity corresponding to the international recommendation for children and adolescents' PA [21]. The positive effect of physical activity appeared as soon as there were more than two physically active days.

The positive effects of physical activity—such as improved physical endurance, mood, and self-esteem [28, 39, 40]—providing a feasible explanation for why the body-esteem of physically active participants was higher than that of physically inactive respondents. The effect may indicate a positive circle, with high body-esteem promoting physical activity, and vice versa. According to Kantanista et al. [10], a positive body image does indeed correlate with higher physical activity among 14- to 16-year-olds. In addition, among students aged from 12 to 17 years, physical activity has lately been found to improve body satisfaction and physical self-concept [41].

The higher body-esteem of boys was demonstrated here, in line with several previous studies [7–10]. For boys, physical activity had an independent positive impact on body-esteem, even when other determinants were taken into account. It should be noted that the link between physical activity and body-esteem depends on various factors, such as the amount and type of physical activity. However, our study highlighted a difference between genders as regards the connection between physical activity and body-esteem.

In addition to physical and mental qualities, the gender differences in the findings can be related to ideal body images that are gendered, and socially and culturally determined [2, 11]. Our findings correspond to

the results by, for instance, Lawler and Nixon [42], according to which there is a statistically significant association between overweight and body dissatisfaction among 16-year-olds in both genders, but with a clearer association among girls. It seems that the pressures for slimness are particularly important for girls, and are thus more strongly linked to a negative body image [12]. Spencer et al. [43] concluded that girls' relationships with PA are complex. This complexity arises, for example, in relation to notions of femininity, involving for example prevalent gender stereotyping in PA and the "femininity deficit": girls are concerned about their appearance when they engage in PA. Nevertheless, girls enjoy PA, which they experience as offering enhanced self-esteem, social benefits, health, and satisfaction, as providing a creative outlet, and as allowing them to feel proud [43].

Previous studies have indicated that various factors influence adolescents' PA, and do so in many different ways [28]. A national study revealed that for Finnish 13- and 15-year-olds the most important personal reasons for physical activity girls and boys in these age groups [44]. The most common reasons to be physically active were related to good feelings of trying one's best, joy and play, health and fitness, and being together with friends. The desire to look good because of exercise increases in parallel with age during secondary school, but its significance seems to have decreased in Finland in recent years [44]. By contrast, every second 13-year-old mentioned prevention of obesity, or weight control. In addition, losing weight has been found to be a relatively common motive for adolescent girls [45–47]. In this context, it should be noted that exercise frequency is related to positive body image, but high levels of appearance-based exercise motivation might actually weaken the positive relationships between physical activity and higher body image among young women [48].

In our study, general self-esteem was by far the most significant factor determining body-esteem in both genders. Furnham et al. [49] have noted that (in contrast with boys), only girls associate body dissatisfaction with the concept of self-esteem. However, perceived body dissatisfaction arises from a complex interplay of factors, including gender, self-esteem, and actual body mass [50]. According to our results, overweight and obesity were the only factors that lowered body-esteem in both genders. A recent study has obtained similar results [41]. It has also been noted previously that in Finland, dieting attempts among overweight and obese teenage boys became more common in the 2010s [45]. The findings by Galli et al. [51] have highlighted the pressures on male athletes related to appearance expectations. Taken together, the findings related to male adolescents may indicate the increasing prevalence of weight-related appearance pressures among men and boys.

The study has several strengths, the most important being the representative sample and high response rates. Since the sampling was meticulous and comprehensive, the results of this study can be generalized to 15-year-old pupils in Finland. The respondents answered the survey questions anonymously, and were supervised in school premises, making it possible to obtain confidential information from the adolescents themselves. The students had the opportunity to refuse to answer by leaving a blank form in a closed envelope. The aim was to minimize the influence of the group by emphasizing the voluntary nature of the survey, and the importance of honest, personal answers. The response rates were therefore high.

The fact that the results are based on information given by the adolescents themselves may raise questions concerning data reliability. With respect to inquiries on PA answered by adolescents, the repeatability has been found to be good [52], even though the reliability compared to objective indicators is, at best, moderate [53]. Prochaska et al. [35] note that the MVPA scale correlates somewhat weakly with objective PA results, but that it is a good and reliable indicator for surveys because of its repeatability. The reliability of the scale is also supported by other studies [54–56].

Another target of criticism has been the use of the BMI in determining weight status and obesity. According to prior research, the heights and weights reported by 15-year-old adolescents are sufficiently reliable for classifications based on the BMI in extensive surveys [57, 58]. However, particularly with regard to boys who engage in sports, the critique is based on the fact that the BMI does not indicate the proportion of muscles that are heavier than fat. We would accept that exceptional cases do exist, but that our findings are broadly sound, being based on an extensive, nationally representative sample of the entire age group.

Some of the original BESAA statements had to be omitted because of limits to questionnaire length of this study. The statements in the abbreviated version were selected from a complete BESAA scale that had been tested in a pilot study using statistical analyses. The internal consistency of the abbreviated version was high, and the distribution of the score was normal (Figures 1 and 2).

The cross-sectional design of our study makes it impossible to make conclusive inferences about causality based on the findings. A longitudinal study would permit more thorough research into the development of the phenomenon, and the potential gendered differences and mechanisms therein.

Conclusions

Our study showed that physical activity plays a role in the development of a positive body image in adolescents. The likelihood of higher body-esteem increased linearly with physically active days. This positive relationship can be utilized as a further justification for the physical activity recommendations for the adolescents. It is important to ensure that young people have opportunities and places to be physically active in their daily lives.

In promoting young people's health and wellbeing it is essential to create favourable conditions for strengthening the factors that provide protection from a poor body image. These include good self-esteem, which was the most significant determinant of high body-esteem in both genders in our study, resilience to stress, and faith in self-efficacy. It might be that physical activity has a positive connection with the previous ones when utilized by skilled actions. Gender differences in attitudes towards one's own appearance should be bearded in mind as well as to avoid appearance-centred reasons for exercise.

List Of Abbreviations

BESAA Body-esteem Scale for Adolescents and Adults

BMI body mass index

CI Confidence intervals

HBSC Health Behaviour in School-aged Children study

IOTF International Obesity Task Force

MVPA Moderate-to-vigorous physical activity

PA Physical activity

RSES Rosenberg self-esteem scale

Declarations

Ethics approval and consent to participate

The survey was carried out voluntarily, through passive or active consent, depending on the procedures of individual municipalities. Respondents had the right to withdraw. No personal identifiers were used, and the data were anonymous. The HBSC Finland study was approved by the Finnish Teachers' Trade Union and by the Finnish National Agency for Education when the survey was conducted initially. Approval has not subsequently been sought for each survey year, since the procedure has been the same in each year, and no objections have been brought to our attention.

Consent for publication

Not applicable

Availability of data and materials

The dataset supporting the conclusions of this article is available in the HBSC Data Management Centre. The HBSC Data Management Centre coordinates the work with the international data file and the trend data, and is the Data Bank for the HBSC study. The centre distributes data in accordance with the HBSC data access policy. The HBSC Data Management Centre is based at the Department of Health Promotion and Development in the University of Bergen, Norway. Professor Oddrun Samdal is the Data Manager of the HBSC study. Email: dmc@hbsc.org, Web: <http://www.uib.no/en/hbscdata>

Competing interests

The authors have no competing interests to declare.

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Authors' contributions

KO designed the study and led the writing of the manuscript. KO participated in data collection, analysis, and interpretation. PH and JT participated in study design and interpretation of study results. JV coordinated study implementation, data collection, and data analysis. All authors read and approved the final manuscript.

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Tables

Table 1. Descriptive statistics.

Variables	Boys (n= 949)	Girls (n= 1007)
Age, years M (SD)	15.8 (0.3)	15.8 (0.3)
Height, cm M (SD)	175.9 (7.6)	165.3 (6.1)
Weight, kg M (SD)	67.5 (12.5)	58.2 (10.1)
Body mass index, kg/m ² M (SD)	21.7 (3.4)	26.8 (5.8)
Weight status ^a		
underweight %	6.8	9.2
normal weight %	75.2	77.0
overweight %	13.9	11.6
obese %	4.1	2.3
Self-esteem scale RSES, M (SD)	29.6 (5.6)	26.8 (5.8)
Body-Esteem Scale for Adolescents and Adults BESAA, M (SD)	36.8 (7.4)	31.5 (7.8)
Maturation ^b		
yes %	94.6	98.5
no %	5.4	1.5
Ethnic background ^c		
Finland %	96.2	97.0
other than Finland %	3.8	3.0
Physically active days/week ^d		
low active 0-2 days/week %	18.1	22.1
light active 3-4 days/week %	33.4	36.5
active 5-6 days/week %	26.9	27.9
very active 7 days/week %	21.6	13.4
Family Wealth ^e		
under the average %	8.0	10.6
average %	26.3	30.8
good %	65.7	58.5

Note. M means; SD standard deviation; ^aWeight status by international (IOTF) gender- and age-specific body mass index cut-offs for thinness, overweight, and obesity; ^bMaturation yes: had had an ejaculation for boys; had begun to menstruate for girls; ^cEthnic background other than Finland: the respondent was born outside Finland, or had one or both parents born outside Finland; ^dPhysically active days based on moderate-to-vigorous physical activity (MVPA) `Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?`; ^e Self-evaluated based on the question `What do you think of your family's financial situation?` with responses: *My family is doing very well financially/ My family is doing quite well financially/ My family's financial situation is about average/ My family is not doing very well financially/ My family is doing very poorly financially.*

Table 2. Effects of physically active days on body-esteem.

Physically active days/week	Boys			Girls		
	Coefficient	95 % CI	p	Coefficient	95 % CI	p
0-2	1.00			1.00		
3-4	1.65	0.31-2.99	0.016	1.56	0.27-2.85	0.018
5-6	2.93	1.53-4.33	<0.001	2.63	1.27-3.99	<0.001
7	4.40	2.91-5.89	<0.001	2.77	1.07-4.46	0.001
Model R ²	4.32			1.72		

Note: CI confidence intervals

Table 3. Multilevel linear regression analysis for the body-esteem of 15-year-old boys.

	Coefficient	95% CI	p	R ²
Physically active days/week				5.0
0-2	1.00			
3-4	0.52	-0.75-1.78	0.425	
5-6	1.83	0.52-3.16	0.006	
7	2.61	1.19-4.02	<0.001	
Weight status				5.2
normal weight	1.00			
thinness	-1.13	-2.90-0.64	0.209	
overweight	-2.60	-3.82--1.38	<0.001	
obese	-6.05	-8.31--3.79	<0.001	
Family wealth				4.9
under the average	1.00			
average	1.80	0.08-3.50	0.040	
good	2.65	1.07-4.23	0.001	
Self-esteem	0.54	0.46-0.61	<0.001	20.8
Model R ²				26.3

Adjusted for maturation and ethnic background.

Table 4. Multilevel linear regression analysis for the body-esteem of 15-year-old girls.

	Coefficient	95% CI	p	R ²
Physically active days/week				1.3
0-2	1.00			
3-4	0.69	-0.29-1.66	0.166	
5-6	0.93	-0.11-1.97	0.079	
7	0.89	-0.41-2.19	0.179	
Weight status				8.0
normal weight	1.00			
thinness	0.94	-0.33-2.20	0.152	
overweight	-4.53	-5.67--3.39	<0.001	
obese	-5.39	-7.98--2.80	<0.001	
Family wealth				2.2
under the average	1.00			
average	0.01	-1.28-1.29	0.990	
good	0.77	-0.46-2.00	0.220	
Self-esteem	0.79	0.73 - 0.85	<0.001	39.2
Model R ²				46.8

Adjusted for maturation and ethnic background.

Figures

Body-esteem score for boys

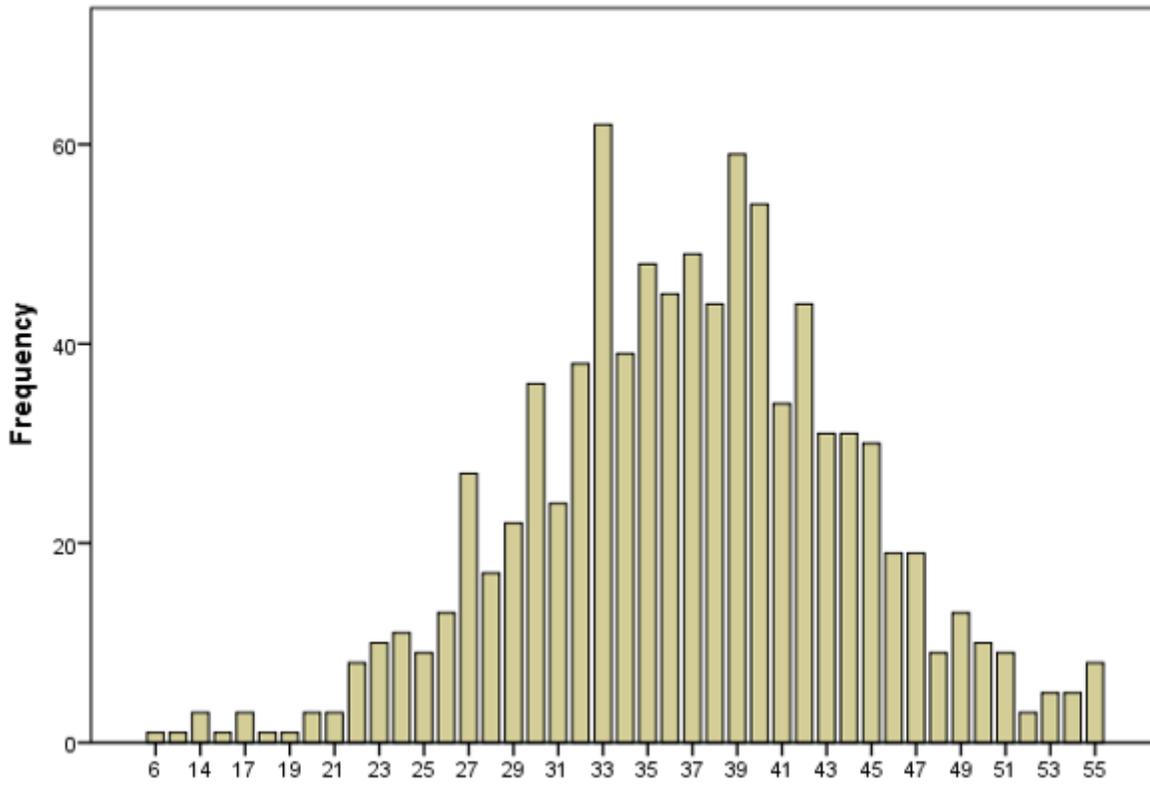


Figure 2

Distribution of body-esteem sum scores for 15-year-old boys. Range 11–55.

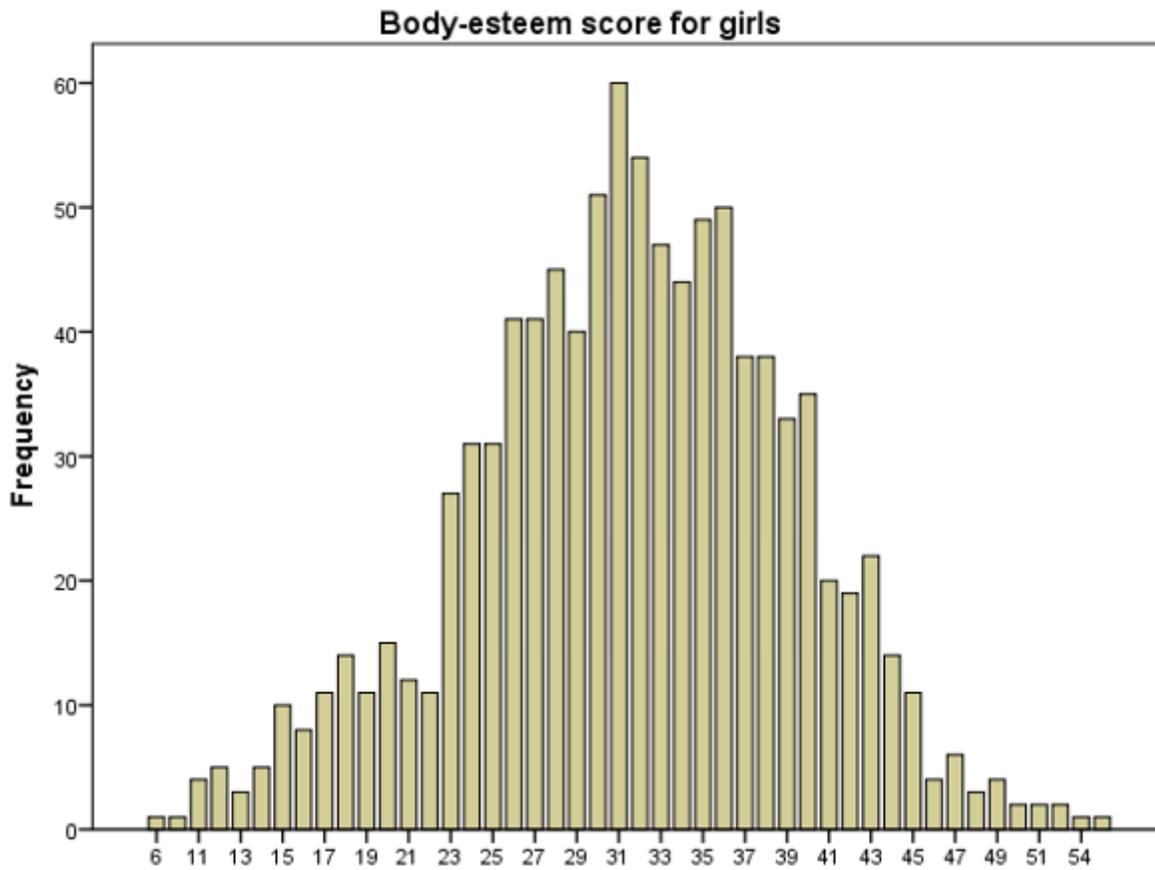


Figure 4

Distribution of body-esteem sum scores for 15-year-old girls. Range 11–55.

Supplementary Files

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