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The relationship between body weight and self-perception among young individuals in the Silesian Voivodeship

Postrzeganie własnego ciała przez młodzież województwa śląskiego w zależności od masy ciała badanych

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Abstract

Introduction and objective: The perception of one's own body is determined by many factors, including gender, media, societal expectations, and the quality of life. The aim of this study was to assess how young people from the Silesian Voivodeship perceive their own bodies in relation to weight and gender. **Materials and methods:** The study involved 560 (100%) female and male secondary school students in the Silesian Voivodeship. The subjects were aged 16 to 18 ($\bar{x}$ = 17.19 ± 0.8). The study used a proprietary questionnaire consisting of questions regarding the basic data of the surveyed adolescents and their body weight and height, as well as the Polish version of the Body Esteem Scale (BES). **Results:** Spearman's rank correlation test showed a statistically significant negative relationship between body mass index (BMI) and scores on the "Physical Condition" subscale ($p < 0.012$) in the subgroup of boys and a statistically significant negative relationship between BMI and scores on the "Sexual Attractiveness" ($p = 0.021$) and "Weight Control" ($p < 0.0001$) subscales in the subgroup of girls. **Conclusions:** An increase in BMI negatively affects body perception among young people in the Silesian Voivodeship, causing a decrease in self-esteem. Girls with increased BMI focus on the negative perception of body parts that can be changed through physical exercise or diet. Boys, on the other hand, base their self-esteem on parameters related to endurance, agility, strength and functionality, and efficiency, and not necessarily on appearance.

Keywords: obesity, children, perception, body

Streszczenie

Wprowadzenie i cel: Postrzeganie własnego ciała jest determinowane wieloma czynnikami, m.in. płcią, wpływem mediów, oczekiwaniami innych ludzi, a także jakością życia. Celem badania była ocena postrzegania własnego ciała przez młodzież województwa śląskiego w zależności od masy ciała i płci. **Materiał i metody:** W badaniu wzięło udział 560 (100%) uczennic i uczniów szkół średnich z województwa śląskiego. Badani byli w wieku od 16 do 18 lat ($\bar{x}$ = 17,19 ± 0,8). Do jego przeprowadzenia wykorzystano autorski kwestionariusz ankiety zawierający pytania dotyczące podstawowych danych badanej młodzieży oraz jej masy i wzrostu, a także polską wersję Body Esteem Scale (BES). **Wyniki:** Test korelacji rang Spearmana wykazał w podgrupie chłopców istotną statystycznie ujemną zależność między wartością wskaźnika masy ciała a punktami uzyskanymi w podskali „Kondycja fizyczna" (p <0,012), natomiast w podgrupie dziewcząt – istotną statystycznie ujemną zależność wartości wskaźnika masy ciała od punktów uzyskanych w podskali „Atrakcyjność seksualna" (p = 0,021) i „Kontrola masy ciała" (p < 0,0001). **Wnioski:** Wzrost wartości wskaźnika masy ciała wpływał na postrzeganie własnego

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ciała przez młodzież województwa śląskiego, powodując spadek ich samooceny. Dziewczęta ze zwiększoną masą ciała skupiały się na negatywnym postrzeganiu tych części ciała, które można zmienić dzięki ćwiczeniom fizycznym lub diecie. Poczucie własnej wartości chłopców koncentrowało się na parametrach związanych z wytrzymałością, zwinnością, siłą oraz funkcjonalnością i wydajnością, a niekoniecznie z wyglądem.

Słowa kluczowe: otyłość, dzieci, postrzeganie, ciało

INTRODUCTION

Body image is one of the components of personal identity and can be defined as the mental image formed on the basis of anthropometric measurements, shapes, and contours, along with the emotions associated with them, affecting satisfaction with it in its entirety or its specific parts[1]. The perception of one's own body is determined by many factors. These include, among others, gender, media influence, societal expectations, the level of self-esteem, cultural factors, and the quality of life[2]. Dissatisfaction with one's own appearance often focuses on the physical aspect and develops already in adolescence under the influence of these factors. It is also associated with negative consequences, often leading to risky behaviours (e.g. the use of anabolic steroids, drugs allegedly accelerating fat burning, or calorie restriction) and the development of mental health disorders such as depression or anxiety[3]. Mentioning these disorders additionally deepens the negative effects of dissatisfaction with one's appearance.

One of the main determinants of body perception is its mass and related disorders. Overweight and obesity are defined as an abnormal excess of adipose tissue that negatively affects both mental and physical health. These conditions are becoming a global issue with serious health implications, the most severe of which are related to cardiovascular diseases and cancer[4]. Determining the presence of overweight or obesity is based on calculating the body mass index (BMI), which, despite its limitations, has remained the main method of diagnosis for many years[5].

The opposite of increased body weight is being underweight. In 2016, approximately 75 million girls and 117 million boys worldwide were below a normal body weight. Studies have shown that reduced body weight is often underestimated and constitutes a serious health concern, especially among children and adolescents[6]. It may also contribute to the development of disorders of the nervous and musculoskeletal systems, as well as increase the risk of cancer and infertility[7].

Young people, especially those in the process of forming their body image, often struggle with the perception of their own bodies. A particularly challenging period is early adolescence and secondary school years, when changes taking place in the body become more pronounced. Millions of students struggle with emotional and behavioural problems related not only to peer pressure, but also to the demands placed on them, also have a problem with the correct image of their own body. The aim of the study was to assess body image perception among young people from the Silesian Voivodeship depending on their weight and gender.

MATERIALS AND METHODS

The study involved 560 (100%) female and male secondary school students from the Silesian Voivodeship. The subjects were aged 16 to 18 ($\bar{x} = 17.19 \pm 0.8$). The results presented were obtained as part of a project submitted for evaluation to the Bioethics Committee of the Medical University of Silesia in Katowice, which consented to its implementation in accordance with the principles of Good Clinical Practice (PCN/0022/KB1/36/21). Taking the above into account, before the commencement of the study, written informed consent was obtained from all participants and their legal guardians. The study was conducted while maintaining full anonymity both at the stage of collecting and analysing the obtained data. The inclusion criteria were: current attendance at a secondary school, written parental consent for the child's participation in the study, and the ability to understand the questions and complete the questionnaire.

The study used a proprietary questionnaire consisting of questions regarding the basic data of the participants and their body weight and height. Additionally, the Polish version of the Body Esteem Scale (BES), prepared by Lipowska et al., was used to assess the attitude of the subjects towards their own body[8]. The Polish version of the BES questionnaire consists of 35 items and evaluates body perception across three subscales, taking into account gender.

The subscales for girls include:

- "Sexual Attractiveness" – associated with the perception of body parts whose appearance cannot typically be changed through physical exercise (e.g. assessment of satisfaction with the appearance of the lips);
- "Weight Control" – related to satisfaction with parts of the body whose appearance can be modified through exercise or diet;

and

- "Physical Condition" – pertains to self-assessment of parameters such as endurance, strength, and agility.

The subscales for boys include:

- "Physical Attractiveness" – based on the evaluation of features that, in combination, largely determine the perception of a man as handsome;
- "Upper Body Strength" – based on the assessment of both individual body parts (e.g. chest or arms) and their

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function and fitness, which together form the basis for assessing a man as strong and physically capable;

and

- "Physical Condition" – pertains, as in the corresponding subscale for girls, to the assessment of endurance, strength, and agility.

In individual questions regarding body-related self-esteem, the respondents provided answers on a 5-point Likert scale, where 1 indicated strongly negative feelings, 5 – strongly positive feelings, and 3 – a neutral attitude. Then, according to the available key, the numerical values marked in individual questions were added up, and on their basis, each respondent was classified into a self-assessment category in all assessed subclasses. The numerical values of the summed points and the grades of self-assessment assigned to them are presented in Tab. S1 (Supplementary Material).

Body mass index (BMI) was calculated based on the height and weight values provided by the respondents according to the standard formula: BMI = body weight [kg] / height^2 [m^2]. On the basis of the obtained BMI values, the subjects were classified into one of three categories: reduced body weight (RBW) relative to normal (BMI < 18.5 kg/m^2), correct body weight (CBW) (BMI = 18.50–24.99 kg/m^2), or increased body weight (IBW) in relation to normal (BMI ≥ 25.00 kg/m^2).

Statistical analyses were performed using Statistica 12.1 software. The Shapiro–Wilk test showed that the analysed data did not follow a normal distribution; hence, non-parametric tests were applied in the calculations.

The figures in the Results section include only those analyses that demonstrated statistical significance between the number of points obtained in individual subscales, taking into account the sex and body weight of the respondents. Detailed numerical values are presented in the Supplementary Material to this article.

RESULTS

General characteristics of the study group are presented in Tab. 1.

The majority of the study group were girls (329; 58.75%) and respondents living in cities (510; 91.07%). Over 13% (74; 13.21%) of the respondents were individuals with increased body weight.

Tab. 2 presents the characteristics of the study group with respect to body weight and gender.

Approximately 14% (44; 13.37%) of girls had reduced body weight, while just over 10% (34; 10.33%) had increased body weight. In the group of boys, over 17% (40; 17.32%) were overweight or obese.

Tab. 3 presents the characteristics of boys and girls, taking into account the results of Spearman's rank correlation test, BMI values, and scores on the individual BES subscales.

Spearman's rank correlation test showed a statistically significant negative relationship between BMI and scores obtained on the "Physical Condition" subscale ($p < 0.012$) in the subgroup of boys, while in the subgroup of girls, a statistically significant negative relationship between BMI

Study group (560; 100%)							
Variables						**Data**	
						n	**%**
Sex				**Girls**		329	58.75
				Boys		231	41.25
Place of residence				**City**		510	91.07
				Village		50	8.93
Age [years]				**16**		137	24.46
				17		178	31.79
				18		245	43.75
Body mass index (BMI)				**Reduced body weight (RBW)**	M_{BMI}	69	12.32
					15.26		
					SD		
					0.57		
				Correct body weight (CBW)	M_{BMI}	417	74.46
					21.23		
					SD		
					1.7		
				Increased body weight (IBW)	M_{BMI}	74	13.21
					27.82		
M_{BMI}	***SD***	**Min.**	**Max.**		***SD***		
21.64	3.24	14.93	39.06		2.59		

n – sample size; **BMI** – body mass index; M_{BMI} – average BMI value; ***SD*** – standard deviation.

Tab. 1. General characteristics of the study group

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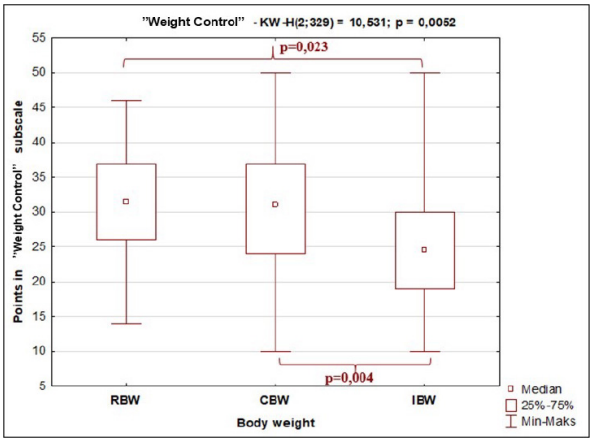
Study group (560; 100%)			
Sex	**Body mass index (BMI)**	***n***	**%**
Girls (329; 100%)	Reduced body weight (RBW)	44	13.37
	Correct body weight (CBW)	251	76.29
	Increased body weight (IBW)	34	10.33
Boys (231; 100%)	Reduced body weight (RBW)	25	10.82
	Correct body weight (CBW)	166	71.86
	Increased body weight (IBW)	40	17.32
n – sample size.			

Tab. 2. Characteristics of the study group with regard to sex and body weight

Variables	R_G	p_G	R_B	p_B
BMI & "Sexual Attractiveness"/"Physical Attractiveness"	–0.127	0.021*	–0.034	0.602
BMI & "Weight Control"/"Upper Body Strength"	–0.267	<0.0001*	0.034	0.609
BMI & "Physical Condition"	–0.092	0.095	–0.166	0.012*
BMI – body mass index; ***R*** – Spearman's rank correlation coefficient; **G** – girls; **B** – boys; ***p*** – test probability. * Statistically significant at $p < 0.05$.				

Tab. 3. Spearman's rank correlation test results

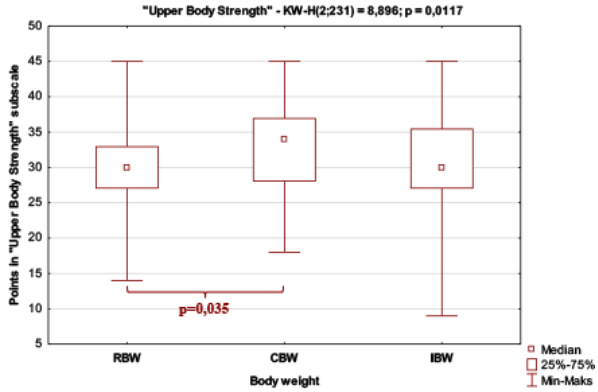


KW–H – Kruskal–Wallis test result; ***p*** – statistical significance; **RBW** – reduced body weight; **CBW** – correct body weight; **IBW** – increased body weight.

Fig. 1. Characteristics of the surveyed group of girls, taking into account the scores on the "Weight Control" subscale

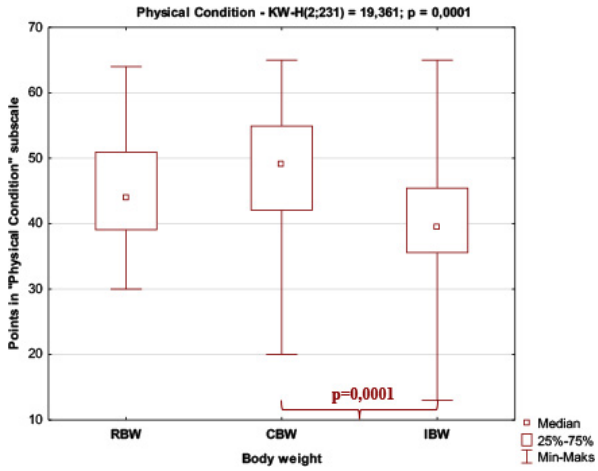
and scores on the "Sexual Attractiveness" ($p = 0.021$) and "Weight Control" ($p < 0.0001$) subscales.

Tab. S2 (Supplementary Material) presents the characteristics of the study group, taking into account BMI and the level of self-esteem obtained in the BES questionnaire, depending on the gender of the respondents. Among the girls with reduced body weight, the highest levels of self-esteem were found in all analysed subscales ("Sexual Attractiveness" – 20; 45.45%, "Weight Control" – 29; 65.91%, "Physical Condition" – 26; 59.09%). Conversely, among girls with increased body mass (34; 100%), most (11; 32.35%) had a low level of self-esteem in the "Sexual Attractiveness" subscale. Identical quantitative and percentage distributions in



KW–H – Kruskal–Walli's test result; ***p*** – statistical significance; **RBW** – reduced body weight; **CBW** – correct body weight; **IBW**– increased body weight.

Fig. 2. Characteristics of the surveyed group of girls, taking into account the scores on the "Upper Body Strength" subscale depending on body weight



KW–H – Kruskal–Wallis test result; ***p*** – statistical significance; **RBW** – reduced body weight; **CBW** – correct body weight; **IBW** – increased body weight.

Fig. 3. Characteristics of the group of boys, taking into account the scores on the "Physical Condition" BES subscale, depending on body weight

this subgroup were observed in the "Weight Control" and "Physical Condition" subscales (low – 4; 11.76%, moderate – 25; 73.53%, high level of self-esteem – 5; 14.71%).

Among the boys with reduced body weight, the majority had a moderate level of self-esteem across all analysed subscales ("Physical Attractiveness" – 12; 54.55%, "Upper Body Strength" – 15; 68.18%, "Physical Condition" – 17; 77.27%). Among boys with increased body weight, the majority also had a moderate degree of self-esteem across all analysed subscales ("Physical Attractiveness" – 20; 50.00%, "Upper Body Strength" – 30; 75.00%, "Physical Condition – 21; 52.50%). However, compared to boys with normal weight, these boys had slightly lower self-esteem in the "Physical Attractiveness" (90; 54.22% vs. 20; 50.00%) and "Physical Condition" (96; 57.83% vs. 21; 52.50%) subscales.

Tab. S3 (Supplementary Material) presents the characteristics of the study group of girls, taking into account the scores obtained in individual subscales depending on

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body weight. Fig. 1 illustrates statistically significant differences in scores obtained in the "Weight Control" subscale. Tab. S4 (Supplementary Material) presents the results of the Kruskall–Wallis test post-hoc analysis of scores obtained by girls on the "Weight Control" subscale in relation to body weight.

Among the examined girls, the Kruskal–Wallis test showed a statistically significant difference between the groups (RBW, CBW, IBW) in terms of points scored on the "Weight Control" subscale ($H = 10.531$, $p = 0.0052$). Post-hoc analysis performed for the aforementioned subscale showed statistically significant differences ($p = 0.023$) between the points scored by girls with reduced versus increased body weight, as well as between girls with normal versus increased body weight ($p = 0.004$).

Tab. S5 (Supplementary Material) presents the characteristics of the group of boys, taking into account their score on individual scales depending on body weight.

Figs. 2 and 3 show the characteristics of the study group of boys, highlighting statistically significant differences in points scored on the "Upper Body Strength" and "Physical Condition" subscales depending on body weight. Tab. S6 (Supplementary Material) provides the post-hoc analysis of points scored by boys in these subscales, as determined by the Kruskal–Wallis test.

In the subgroup of boys, the Kruskal–Wallis test showed a statistically significant difference between the compared groups (RBW, CBW, IBW) in terms of points scored on the "Upper Body Strength" subscale ($H = 8.896$, $p = 0.0117$) and the "Physical Condition" subscale ($H = 19.361$, $p = 0.0001$). Post-hoc analyses performed for the above-mentioned subscale showed a statistically significant difference between the number of points obtained by individuals with reduced and normal body weight on the "Upper Body Strength" subscale ($p = 0.035$) and between those with normal and increased body weight ($p = 0.023$) on the Physical Condition subscale ($p = 0.0001$).

DISCUSSION

The study aimed to assess body self-perception in young people from the Silesian Voivodeship depending on their body weight.

In the standardised questionnaire used, the "Weight Control" subscale assesses satisfaction with body parts whose appearance can be changed through physical exercise or dieting, while the "Sexual Attractiveness" subscale is related to the perception of body parts whose appearance cannot be altered through physical exercise, but only through treatments such as cosmetic procedures. The Kruskal–Wallis test showed a statistically significant difference between the compared groups of girls in terms of points scored on the "Weight Control" subscale. Post-hoc analysis showed a statistically significant difference between the points obtained by girls with reduced and increased body weight, as well as between those with normal and increased body weight. This may indicate that the self-esteem of girls with increased body weight is focused on body parts that can be improved through physical exercise or dieting. Moreover, a statistically significant relationship was found between BMI values and points scored on the "Sexual Attractiveness" and "Weight Control" subscales. Research has shown that an increase in body weight has a negative impact on body self-perception in girls, both in relation to features that can and cannot be changed through physical exercise.

Spearman's rank correlation test showed in the subgroup of boys a negative relationship between BMI and points scored on the "Physical Condition" subscale examining the self-perception of endurance, strength, and agility. However, the above test did not show any correlations in the remaining subscales of the BES questionnaire regarding "Physical Attractiveness", which evaluates the combination of features which largely determine the definition of a man as handsome, as well as "Upper Body Strength", which assesses not only the appearance of individual body parts but also their function and fitness, forming the basis for evaluating a man as strong and physically capable. The Kruskal–Wallis test showed a statistically significant difference between the groups in terms of points scored on the "Upper Body Strength" and "Physical Condition" subscales. Post-hoc analyses performed for the "Upper Body Strength" subscale showed a statistically significant difference between the number of points scored by boys with reduced body weight, and for the "Physical Condition" subscale, between boys with normal and increased body weight. Interpreting the results, it can be concluded that among boys, self-esteem related to physical condition decreased as BMI increased. Boys with reduced body weight had lower self-esteem compared to those with normal body weight, but also function and fitness, particularly regarding body parts that serve as the basis for evaluating a man as strong and physically able. Overweight and obese boys, when compared to their peers with normal body weight, also showed lower self-esteem in terms of physical condition.

As already mentioned, the appearance of individual body parts affects a person's self-esteem, with obesity having a particularly pronounced impact. Over the last 10 years, the number of obesity patients has increased dramatically, both among children, adolescents, and adults[9]. The World Health Organization reported that, in 2022, approximately 650 million adults and 350 million children were overweight or obese[10]. Research conducted by Dale et al. showed that obesity had a negative impact on self-esteem[11], which was also confirmed by studies conducted by Moradi et al., who showed a positive relationship between obesity and the risk of body dissatisfaction and low self-esteem among children and youth. They also demonstrated a significantly positive relationship between overweight status and the risk of developing low self-esteem[12]. A study by Gong et al. involving a group of 48,558 children revealed that late-onset or chronic weight gain was a predictor of

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low overall, social, and learning/school-related self-esteem. According to the researchers, children who managed to lose weight could achieve a level of social self-esteem equal to or even higher than that of children with constantly low or normal body weight[13]. However, the meta-analysis by Wang et al. showed that the incidence of symptoms of depression and anxiety in overweight/obese children/adolescents in China was higher compared to those without these pathologies[14], while the study by Sánchez-Rojas et al., conducted with a group of 295 children, including 116 with abnormally increased body weight and 179 with normal body weight, showed that body image and satisfaction with it differed between the groups, with a relationship between self-esteem and depressive symptoms, which can emerge as early as school age[15]. A meta-analysis conducted by Barnes et al. showed a link between body dissatisfaction in men and the possibility of developing depression[16]. The above relationship was also demonstrated in women[17].

Another factor influencing body perception is the media. They are used by young people almost constantly, and changing trends have a strong impact on how young people shape their self-image. The media encourages young people to adopt the models of physical beauty they propose, which often results in body dissatisfaction. The inability to meet these standards becomes burdensome and demotivating, and the constant pursuit of the "perfect body" may turn into risky behaviours, including the development of eating disorders which, in the most severe cases, pose a threat to health and life[18]. Both restrictive eating and overeating do not provide significant benefits, and research also suggests that long-term media exposure is associated with an increased tendency to develop unhealthy eating habits[19].

The limitations of the present study include a relatively small number of respondents and disparities in the size of the compared groups. Additionally, there is the issue of the accuracy of the information provided by the respondents concerning, for example, body weight. Despite the use of all possible measures to prevent any outside interference during the completion of the questionnaires, it cannot be unequivocally stated that the data provided by the respondents was 100% true. Nevertheless, the study proves that body weight affects the perception and self-esteem of secondary school students in the Silesian Voivodeship. It also outlines the problems faced by individuals with both reduced and excessive body weight, and confirms the need to conduct systematic education in this area, focusing on healthy eating habits and striving to maintain a CBW. Ultimately, this is essential for achieving a good quality of life and overall health.

CONCLUSIONS

1. An increase in BMI affects the body perception among young people in the Silesian Voivodeship, causing a decrease in self-esteem in terms of "Physical Attractiveness" and "Weight Control" in girls, and "Physical Condition" in boys.
2. The observed difference between BMI category and scores on the "Weight Control" subscale suggests that girls with increased body mass focus on the negative perception of body parts that can be changed through physical exercise or diet.
3. The differences in scores between boys with normal and reduced body weight on the "Upper Body Strength" subscale and boys with normal and increased body weight on the "Physical Condition" subscale may indicate that their self-esteem is focused on parameters related to endurance, agility, strength, functionality and efficiency, and not necessarily appearance.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organisations which might negatively affect the content of this publication and/or claim authorship rights to this publication.

Author contribution

Original concept of study; collection, recording and/or compilation of data; writing of manuscript: JD, OS, KS. Analysis and interpretation of data: JD, OS, KS, HM, LP, ZG. Critical review of manuscript: JD, HM, LP, ZG. Final approval of manuscript: JD, OS, KS, HM, LP, ZG.

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