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# Dissatisfaction and discrepancy in body-image perceptions among adolescents aged 10–17 years from rural areas of southern Poland – a cross-sectional study

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## Abstract

**Introduction and Objective.** Puberty causes changes in body composition and appearance which can lead to impaired self-evaluation and, subsequently, health-risk behaviours among adolescents. The aim of this study was to assess the congruence of self-perception, body dissatisfaction, and self-perception incongruence with the current body weight status of adolescents from rural areas of southern Poland.

**Materials and Method**. A cross-sectional survey was conducted on a sample of 446 adolescents aged 10–17 years, primarily from rural areas of the provinces of southern Poland. Body mass index (BMI) was used to assess the nutritional status of adolescents. The research tool was a questionnaire that included a body silhouette test, a body image dissatisfaction index (BID), and the FAI (Feel weight status minus Actual weight status Inconsistency) index to observe inappropriate perceptions of body weight status.

**Results**. A total of 245 (54.9%) girls and 201 (45.1%) boys with a mean age of 13.6 ± 2.1 years were evaluated. Overall, 66.7% of the boys and 61.6% of the girls had normal body weight based on BMI interpretation, but only 33.5% of the girls and 39.3% of the boys perceived their body weight as normal. Almost 60% of the surveyed boys and girls were dissatisfied (BID) with their own appearance. An incorrect perception of body weight status (FAI) was presented by 49.4% of the girls and 41.8% of the boys. For more than 70% of girls, the ideal figure was one indicated as being underweight in the silhouette test. Dissatisfaction with one's own appearance was significantly associated with adherence to a diet and alcohol consumption.

**Conclusions**. Inappropriate perceptions and negative self-image among adolescents may be associated with hazardous health behaviours, representing a serious public health problem.

## Key words

lifestyle, self-assessment, food, youth, body dissatisfaction, adolescents, incongruence of self-perception.

## INTRODUCTION

According to data from the latest edition of the Health Behaviour in School-aged Children (HBSC) survey conducted between 2018–2022, there was an increase in the prevalence of overweight and obesity in Poland by 2% in girls and 5% in boys, respectively. The prevalence of overweight and obesity was higher among boys (from 41% at age 11 to 28% at age 15) than girls (from 19% – 13%, respectively), and decreases with age in both genders [1]. According to a recent review of studies, the prevalence of overweight among children and adolescents in Poland ranges from 11% to as much as 45% [2]. Adolescence is time of intensive body changes, both physical and psychological. A particularly strong interest in ones own body and its appearance is characteristic of adolescence [1, 3]. The perception of one's own body is a complex construct that includes not only feelings, but also the activities undertaken in relation to one's body. Evaluation of one's own body can be positive, neutral, or negative, and is associated with a variety of health effects, both positive and negative, including nutritional disorders [1]. Body image dissatisfaction (BID) is defined as the person's perceived discrepancy between their current body size and the body shape they would like to have. The greater difference between the current body size and ideal body size, the greater the dissatisfaction [4, 5].

The key factors that influence self-assessment and body image perception during the adolescents include nutritional status, physical activity, and quality of the diet [3, 5]. Unrealistic body shapes (often depicted in the media, including social media, as overly slim, and typically altered by special software) and the dieting culture promoted by mass media contribute to concerns about appearance and unhealthy eating behaviours among adolescents. Adolescents are exposed to unrealistic body shapes and dieting culture, which can lead to behaviours such as dietary restriction, use of supplements, fasting, and also self-induced vomiting (bulimia nervosa). Parents also significantly influence on

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eating habits and perspectives on diet and nutrition [6]. Self-esteem and self-concept impacts the Body Dissatisfaction Index (BDsI) in adolescents [7], with psychological and social factors contributing to body image perception, including influence of the media, parents and peers. An important factor seems to be the socio-economic status. Research shows that living in less urbanized areas, as well as coming from large, low-income families where parents lack higher education, significantly affects malnutrition among young people [8]. Many studies also highlight an association between better socio-economic status and a lower risk of overweight and obesity. However, this association was not found among adolescents from less urbanized regions of Poland, who potentially live in poorer environmental conditions [8].

## OBJECTIVE

The aim of the present study was to assess the congruence of self-perception, dissatisfaction with one's own body (BDI) and incongruence of self-perception (FAI) with current body weight by adolescents from rural areas of southern Poland, dependent on gender, using selected anthropometric indicators and a questionnaire.

## MATERIALS AND METHOD

**Study design.** A cross-sectional study was conducted between 2016–2019 among primary and middle school students, primarily from less urbanised areas of southern Poland. Prior to the commencement of the survey, appropriate consents were obtained from the school authorities, the students' legal guardians, and the students themselves. The survey was administered in the morning, at the start of the first lesson. To ensure full anonymity, each participant was assigned a unique survey code. The survey consisted of two parts, which included the collection of data on self-assessment of the body and selected socio-demographic variables and lifestyle, including eating behaviour. This was followed by anthropometric measurements which were taken by the investigators in separate rooms. The research was approved the Bioethical Commission of the Jagiellonian University in Kraków, Poland (Approval No. KBET/62/B/2015 of 22/10/2015).

**Study participants.** Participants were 446 children between the ages of 10–17 years (mean 13.6±2.1 years), which is an age range wider than those surveyed in the HBSC of 2018–2022, and included 245 (54.9%) girls and 201 (45.1%) boys. The inclusion criteria for the study were the age of the subjects (10 -18 years), being present on the day of the study, having the necessary consents to participate in the study, speaking Polish to be able to complete the questionnaire independently, good general health to be able to take the necessary anthropometric measurements. Criteria for excluding participation in the study were: lack of written consent from the school's director or legal guardian, absence on the day of the examination, inability to fill in the questionnaire themselves, or inability to make anthropometric measurements according to the conditions specified in the study.

**Anthropometric measures.** The study was based on anthropometric measurements and a questionnaire. The anthropometric measurements consisted of measurement of the current body weight using electronic scales, and height using a scoop with a division of 0.1 cm. On the basis of the obtained results, Body Mass Index (BMI) was calculated: weight divided by height (square meters). BMI classification cut-off point for overweight was ≥85 percentile, and ≥95 percentile for obesity, based on BMI references for school-aged children in Poland [9]. Based on the measurements of waist and hip circumferences, the prevalence of abdominal obesity was assessed. The Waist-to-Height Ratio (WHtR) was calculated based on the methodology from a previous Łódź survey [10].

**Lifestyle and eating behaviour.** A questionnaire with closed and single-choice questions assessed eating habits and the frequency of consumption of selected product groups over the past year. The lifestyle section addressed behaviours such as physical activity (a self-assessed as low, moderate or high), time spent in front of a screen, ever being on a diet, or smoking and drinking alcohol (yes/no answers). For the variable of time spent in front of a screen, 6 categories were adopted according to the questionnaire procedure: less than 2 hours (1); from 2 to almost 4 hours (2); from 4 to almost 6 hours (3); from 6 to almost 8 hours (4); from 8 to almost 10 hours (5); and more than 10 hours (6). The lifestyle section also included questions on whether the participant had ever been on a diet, and whether they had ever tried smoking cigarettes or drinking alcohol (yes/no answers). The questionnaire was self-administered by the respondents. However, before completion, the researcher discussed the structure of the questionnaire, explained the procedure for answering it, and clarified, among other details, that alcohol refers to all beverages containing it, including beer. The researcher was present while the respondents completed the questionnaire and was available to answer any questions. The research tool in this part was based on a previously prepared original questionnaire which used age-appropriate selected questions from the KomPAN questionnaire (Dietery Habits and Nutrition Beliefs Questionnaire) [11].

**Body image assessment.** The section assessing attitudes towards one's own body shape and diet included drawings of 5 weight categories, based on Storz and Green's silhouette test, which has been validated in earlier studies. The 5 silhouettes represent underweight, at risk of being underweight, normal weight, overweight and obese, separately for boys and girls. Respondents chose the one that was most similar to their own (perceived) and ideal silhouette [12].

The body image dissatisfaction (BID) variable was created by subtracting the participant's current body size perception score from the ideal body size silhouette choice. A BID score ≥ 1 was considered as indicating that the participant 'wanted to be thinner'; a BID score < 1 was considered as indicating that the participant 'wanted to be fatter'; a BID score of zero was considered as indicating that the participant was satisfied with his/her body [5].

The FAI (Feel weight status minus Actual weight status Inconsistency) index was used to assess the inconsistency of perceived weight status, using the figure-matching method. This index indicates whether there was, or was not, a realistic perception of the subject's weight status based on body size assessment (BMI) and felt body shape. The FAI was calculated by subtracting the code assigned to the subject's

actual weight status from the code corresponding to the felt silhouette, separately in gender groups. FAI scores range from -3 (indicating underestimation of weight) to +3 (indicating overestimation of weight status). An FAI score of 0 indicated a realistic perception of weight status [13].

**Statistical analysis.** All necessary analyses were carried out in the statistical programme PS Imago Pro 10 (IBM SPSS Statistics 30) under the license of the Jagiellonian University. For quantitative variables, the mean, standard deviation, median, lower and upper quartile, minimum and maximum, were calculated. The results for qualitative and ordinal variables were presented as counts and percentages. The Shapiro–Wilk test was used to test the normality of distribution analysed variables. Since the distribution of the analyzed variables was different from the normal distribution, non-parametric tests were used: Kruskal–Wallis test and U Mann-Whitney test. The chi-square test was used to check for differences for qualitative variables. The level of significance was set at $\alpha = 0.05$.

## RESULTS

The socio-demographic characteristic of the study population are shown in Table 1. The majority of the participants were residents of rural areas of southern Poland (79.8%). Girls were significantly more likely to be attending middle school than boys (p=0.038). The majority of surveyed students had no problems at school (86.5%) and had siblings (91.3%). More than half of the parents (50.4%) of the surveyed teenagers worked professionally, and most had no financial problems at home (86.8%). Boys (22.9%) were significantly more likely to have high physical activity than girls (9.8%; p=0.007). The respondents most often slept 6–9 hours on weekdays (68.8%), while on weekend days they slept more than 9 hours (48.5%). They usually spent 2–4 hours in front of screens (39.9%). The majority of respondents ate 4 meals a day, but the boys were significantly more likely to eat 3 or less meals/day than the girls (p=0.014). Girls (30.2%) were significantly more likely to go on a diet than boys (20.4%; p=0.023). The majority of respondents, regardless of gender, did not smoke cigarettes (86.5%) and did not drink alcohol (79.4%).

**Table 1.** Socio-demographic and lifestyle characteristics of the study population in gender groups (n=446)

| Variable | Total n=446 % | Girls n=245 % | Boys n=201 % | p-value |
|---|---|---|---|---|
| Place of residence | | | | |
| village | 79.8 | 82.4 | 76.6 | 0.270 |
| small town | 7.0 | 6.5 | 7.5 | |
| city of Kraków | 13.2 | 11.0 | 15.9 | |
| School | | | | |
| primary | 41.9 | 37.6 | 47.3 | **0.038** |
| middle | 58.1 | 62.4 | 52.7 | |
| School problems | | | | |
| no | 86.5 | 87.8 | 85.1 | 0.409 |
| yes | 13.5 | 12.2 | 14.9 | |
| Siblings | | | | |
| no | 8.7 | 8.6 | 9.0 | 0.886 |
| yes | 91.3 | 91.4 | 9.1 | |
| Parental work activity | | | | |
| no | 10.8 | 11.0 | 10.4 | 0.311 |
| yes. only mum | 8.3 | 9.0 | 7.5 | |
| yes. only dad | 30.5 | 33.5 | 26.9 | |
| yes. both | 50.4 | 46.5 | 55.2 | |
| Having sufficient money to buy food | | | | |
| no | 3.6 | 3.7 | 3.5 | 0.876 |
| sometimes no | 4.5 | 4.9 | 4.0 | |
| sometimes yes | 5.2 | 4.5 | 6.0 | |
| yes | 86.8 | 86.9 | 86.6 | |
| Physical activity self-assessed | | | | |
| low | 23.1 | 25.7 | 19.9 | **0.007** |
| moderate | 61.2 | 64.5 | 57.2 | |
| high | 15.7 | 9.8 | 22.9 | |
| Sleep on week days | | | | |
| < 6h | 20.0 | 23.0 | 16.4 | 0.092 |
| 6–9h | 68.8 | 68.0 | 69.7 | |
| >9h | 11.2 | 9.0 | 13.9 | |
| Sleep on weekends | | | | |
| < 6h | 11.0 | 8.2 | 14.4 | 0.056 |
| 6–9h | 40.4 | 39.3 | 41.8 | |
| >9h | 48.5 | 52.5 | 43.8 | |
| Screen time | | | | |
| <2h | 41.0 | 40.0 | 42.3 | 0.871* |
| 2–4h | 39.9 | 41.2 | 38.8 | |
| 4–6h | 13.9 | 15.1 | 12.4 | |
| 6–8h | 4.5 | 3.7 | 5.5 | |
| 8–10h | 0.7 | 0 | 1.5 | |
| >10h | 0 | 0 | 0 | |
| Following a diet | | | | |
| Yes | 25.8 | 30.2 | 20.4 | **0.023** |
| No | 74.2 | 69.8 | 79.6 | |
| No. of meals per day | | | | |
| 1 | 0.4 | 0 | 1.0 | **0.014*** |
| 2 | 4.3 | 2.9 | 6.0 | |
| 3 | 31.2 | 28.6 | 34.3 | |
| 4 | 48.2 | 49.8 | 46.3 | |
| 5 | 15.9 | 18.8 | 12.4 | |
| Smoking cigarettes | | | | |
| Yes | 13.5 | 12.7 | 14.4 | 0.584 |
| No | 86.5 | 87.3 | 85.6 | |
| Drinking alcohol | | | | |
| Yes | 20.6 | 20.4 | 20.9 | 0.899 |
| No | 79.4 | 79.6 | 79.1 | |

Chi square test, * U Mann-Whitney test, statistically significant p-values in bold

**Table 2.** Anthropometric characteristic of study population in gender groups (n=446)

| | Girls n=245 | | | | | Boys n=201 | | | | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean±SD | Me | P25 | P75 | Min-Max | Mean±SD | Me | P25 | P75 | Min-Max | |
| Waist circumference [cm] | 65.0±8.2 | 64.0 | 60.0 | 69.0 | 48.5-91.0 | 69.1±9.6 | 67.3 | 63.0 | 74.0 | 50.5-103 | **0.001** |
| Hip circumference [cm] | 86.4±10.0 | 86.5 | 80.0 | 92.2 | 63.0-113.0 | 85.6±11.0 | 85.0 | 77.0 | 93.0 | 61.0-118 | 0.240 |
| Height [m] | 1.58±0.10 | 1.6 | 1.53 | 1.65 | 1.3-1.8 | 1.62±0.14 | 1.63 | 1.49 | 1.74 | 1.34-1.9 | **0.004** |
| WHtR | 0.41±0.05 | 0.40 | 0.38 | 0.43 | 0.33-0.57 | 0.43±0.05 | 0.42 | 0.40 | 0.45 | 0.33-0.61 | **0.001** |
| Body weight [kg] | 49.7±12.5 | 49.1 | 41.2 | 57.2 | 21.2-88.0 | 53.4±3.82 | 52.3 | 40.4 | 63.2 | 26.0-114.3 | **0.045** |
| BMI | 19.7±3.7 | 19.1 | 17.0 | 21.7 | 12.8-33.7 | 19.9±3.8 | 19.3 | 17.2 | 21.7 | 13.1-36.8 | 0.605 |

Sd- standard deviation; Me –median; P25- 25th percentile;, P75–75th percentile; Min-minimum; Max-maximum; U Mann-Whitney test; statistically significant p-values in bold
Chi square test

On average, girls were significantly shorter and had a slimmer waist and lower body weight than boys. The boys were statistically significantly heavier than the girls. The exact anthropometric characteristics of the study population by gender group are shown in Table 2.

A large proportion of the study population had (based on BMI interpretation) normal weight status (66.7% boys and 61.6% of girls), while 12.9% of the boys and 18.8% of the girls were underweight. Furthermore, one-fifth of the surveyed boys and girls had excessive body weight. There were no statistically significant differences in the assessment of nutritional status by BMI in the study groups (p=0.385) (Fig. 1).

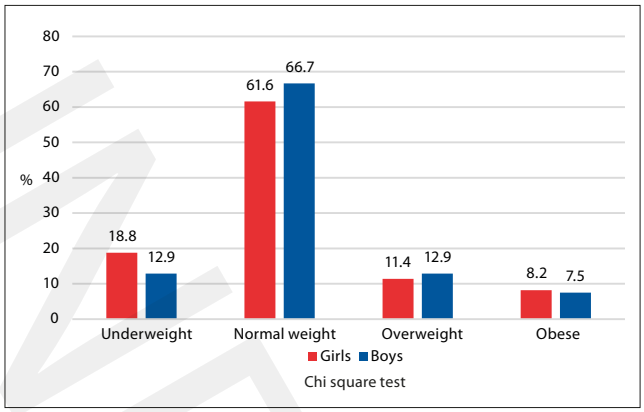


**Figure 1.** Assessment of nutritional status in gender groups (n=446)

Figure 2 presents the actual, ideal and perceived body weight of the study adolescents in both gender groups. Only nearly 40% of boys perceived their BMI as normal, while 66.7%. actually had the correct body weight. Most of the boys perceived themselves as being underweight (45.3%). Perceived BMI was significantly different than the actual BMI in group of boys (p<0.01), as well as ideal body silhouette (p<0.01). For more than half of the boys, the ideal figure was that with normal BMI; however, 46.8% chose an underweight silhouette as the ideal figure. While 61.6% of girls had a normal BMI, only 33.5% perceived that own body weight. Most of the girls perceived themselves as being underweight (44.1%) and 22.4% as overweight or actually obese. Perceived BMI was significantly different than the actual BMI in the group of girls (p<0.01). This group also significantly differed in the selection of ideal body silhouette in relation to actual BMI (p<0.01). For more than 70% of the girls surveyed, the ideal figure was one showing underweight.

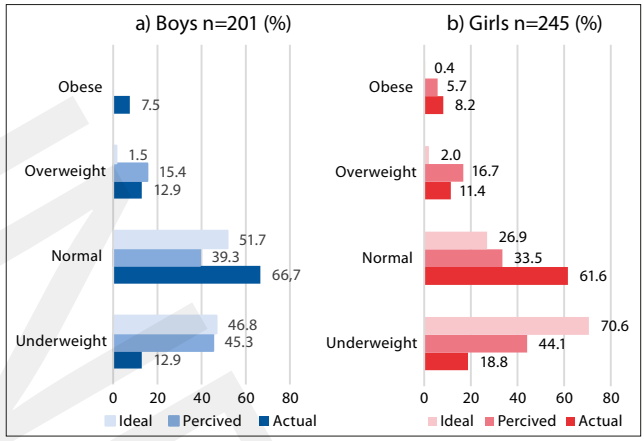


**Figure 2.** Self-perceived and ideal body mass in relation to actual body in gender groups.

Wilcoxon test; Boys: perceived to actual; p<001; ideal to actual, p<001; Girls: perceived to actual, p<001; ideal to actual, p<001

The dissatisfaction and perception inconsistency in both gender groups is shown in Table 3. Nearly 60% of the surveyed boys and girls were dissatisfied with their own appearance. Girls (45.3%) were significantly more likely than boys (34.3%) to be thinner, while boys (23.4%) wanted to be fatter than girls (10.2%; p<0.01).

The FAI index was significantly different between the participating girls and boys (p<0.01). Improper perception of weight status was presented by 49.4% of the girls and 41.8% of the boys. More than half of the boys underestimated their perceived weight status, whereas 13.5% of the girls overestimated their perceived weight status, compared to 8% of the boys (Tab. 3).

Dissatisfaction with one's own body (BID) was significantly related to the age of the respondents in both gender groups. In the younger group of boys (10–13 years), 46.6% were satisfied with their own body, and in the older groups (14–17 years) as much as 10% less (p=0.01) (Tab. 4). More than half of the younger girls (10–13 years, 51.1%) were significantly more satisfied with their bodies than in the older group (14–17 years), where only 36.8% were satisfied (p=0.03) (Tab. 4).

Realistic body perception based on the FAI index was not related to age in the study group (p<0.05) (Tab. 4).

Table 5 shows that adolescents dissatisfied with their own appearance (BID) were significantly more likely to have ever followed a diet (52.8% vs 16.5%; p<0.01) and to report ever drinking alcohol (54.1% vs. 14.9%; p=0.007).

**Table 3.** Distribution of body image dissatisfaction (BID) and improper perception of weight status (FAI) in gender groups

| BID category | Girls n=245 % | Boys n=201 % | p-value | FAI category | Girls n=245 % | Boys n=201 % | p-value |
|---|---|---|---|---|---|---|---|
| Desire to be thinner (BID ≥ 1) | 45.3 | 34.3 | | Weight status underestimated (FAI < 0) | 37.1 | 50.2 | |
| Satisfied (BID = 0) | 44.5 | 42.3 | p<0.01 | No inconsistency in weight status perception (FAI = 0) | 49.4 | 41.8 | p<0.01 |
| Desire to be fatter (BID ≤ 1) | 10.2 | 23.4 | | Weight status overestimated (FAI > 0) | 13.5 | 8.0 | |

Chi square test

**Table 4.** Distribution of body image dissatisfaction (BID) and improper perception of weight status (FAI) in age groups, according to gender

| | BID category | 10–13 n=249 % | 14–17 n=197 % | p-value | FAI category | 10–13 n=249 % | 14–17 n=197 % | p-value |
|---|---|---|---|---|---|---|---|---|
| Total | Desire to be thinner (BID ≥ 1) | 37.3 | 44.2 | **p=0.03** | Weight status underestimated (FAI < 0) | 45.0 | 40.6 | p=0.64 |
| | Satisfied (BID = 0) | 49.0 | 36.5 | | No inconsistency in weight status perception (FAI = 0) | 44.2 | 48.2 | |
| | Desire to be fatter (BID ≤ 1) | 13.7 | 19.3 | | Weight status overestimated (FAI > 0) | 10.8 | 11.2 | |
| Boys | Desire to be thinner (BID ≥ 1) | 37.3 | 30.1 | **p=0.01** | Weight status underestimated (FAI < 0) | 46.6 | 55.4 | p=0.41 |
| | Satisfied (BID = 0) | 46.6 | 36.1 | | No inconsistency in perception of weight status (FAI = 0) | 44.1 | 38.6 | |
| | Desire to be fatter (BID ≤ 1) | 16.1 | 33.7 | | Weight status overestimated (FAI > 0) | 9.3 | 6.0 | |
| Girls | Desire to be thinner (BID ≥ 1) | 37.4 | 54.4 | **p=0.03** | Weight status underestimated (FAI < 0) | 43.5 | 29.8 | p=0.09 |
| | Satisfied (BID = 0) | 51.1 | 36.8 | | No inconsistency in perception of weight status (FAI = 0) | 44.3 | 55.3 | |
| | Desire to be fatter (BID ≤ 1) | 11.5 | 8.8 | | Weight status overestimated (FAI > 0) | 12.2 | 14.9 | |

Chi square test

The inconsistency in weight status perception was not associated with any lifestyle factors identified in the survey. However, in relation to the frequency of consumption of selected products, it was shown that adolescents who overestimated their weight status, differed significantly in the frequency of drinking water (p = 0.047) – drinking it less often than several times a day (42.9%), compared to those who underestimated (60.4%) their status or had a realistic perception (56.6%).

## DISCUSSION

The current study considers the perceptions of body image in a sample of secondary school students living in rural areas of southern Poland, and assessed indicators of body dissatisfaction and congruence of body perception. An attempt was made to investigate the relationship between these indicators and selected behaviours. To the best of the authors' knowledge, this is the only study conducted in this region of Poland from the aspect of self-reported body weight during the stipulated period. The results obtained may therefore be helpful when comparing them with the results of currently conducted research, providing the opportunity to analyze the variability of the problem over the years. In addition, the results of the study include indicators of body dissatisfaction (BID) as well as body weight perception consistency (FAI) and factors related to them, which are not the subject of the national HBSC study of 2018–2022. Therefore, the data presented in the current study are valid and relevant for public health policy in planning targeted education, including the primary prevention of unhealthy weight-related behaviours.

**Table 5.** Distributions of body image dissatisfaction (BID) and selected life style features

| Variable | Desire to be thinner (BID ≥ 1) n=179 | Satisfied (BID = 0) n=194 | Desire to be fatter (BID ≤ 1) n=72 | p-value |
|---|---|---|---|---|
| Following a diet | | | | **p<0.01** |
| Yes | 41.7 | 16.5 | 11.1 | |
| No | 58.3 | 83.5 | 88.9 | |
| No. of meals per day | | | | 0.400* |
| 1 | 1.1 | | | |
| 2 | 2.2 | 5.7 | 5.6 | |
| 3 | 32.2 | 33.0 | 23.6 | |
| 4 | 55.0 | 40.2 | 52.8 | |
| 5 | 9.4 | 21.1 | 18.1 | |
| Cigarette smoking | | | | 0.133 |
| Yes | 12.2 | 11.9 | 20.8 | |
| No | 87.8 | 88.1 | 79.2 | |
| Drinking alcohol | | | | **0.007** |
| Yes | 22.2 | 14.9 | **31.9** | |
| No | 77.8 | 85.1 | 68.1 | |
| Physical activity, self-assessed | | | | 0.239 |
| low | 26,1 | 21,6 | 19,4 | |
| moderate | 62,8 | 59,8 | 61,1 | |
| high | 11,1 | 18,6 | 19,4 | |
| Sleep on week days | | | | 0.260 |
| < 6h | 25.0 | 16.5 | 16.7 | |
| 6–9h | 63.3 | 71.6 | 73.6 | |
| >9h | 11.7 | 11.3 | 9.7 | |
| Sleep on weekends | | | | 0.674 |
| < 6h | 12.8 | 8.8 | 12.5 | |
| 6–9h | 40.6 | 41.8 | 36.1 | |
| >9h | 46.1 | 49.5 | 51.4 | |

Chi square test; * Kruskal-Wallis test; statistically significant p-values in bold

The report of the recent national survey, among a group of adolescents (10–17 years), showed that mean values for height and weight increased with age in both gender groups. Larger mean values for these parameters in boys than in girls were particularly observed in adolescents aged 14–17 years (boys: 66.1 kg; girls: 55.9 kg) [14], which was also confirmed in our study. However, among the studied boys and girls from southern Poland, the mean values of body weight were lower in both gender groups than in the national study (boys: 52.3 kg; girls: 49.1 kg) [14]. The mean BMI values in the study group – boys ($19.9 \pm 3.8$ kg/m$^2$) and girls ($19.7 \pm 3.7$ kg/m$^2$) – were comparable to those from the national research (boys: $22.5 \pm 2.7$ kg/m$^2$; girls: $20.7 \pm 2.9$ kg/m$^2$), where mean BMI increased with the age of the studied adolescents, with slightly higher values in boys than in girls [14]. The prevalence of underweight (boys: 12.9%; girls: 18.8%) was significantly higher among respondents from southern Poland than among respondents of all age groups in the HBSC study. Compared to 15-year-olds in the HBSC study, the prevalence of underweight was almost 6 times higher for both genders [1]. The majority of respondents from southern Poland had a normal body weight, overweight and obesity concerned about 1/5 of the surveyed boys and girls. The prevalence of overweight and obesity was lower in the group of boys surveyed than in all age groups from the HBSC study [1]. Among girls, the prevalence was similar, except for 15-year-old girls, where only 13% were overweight in the HBSC study, compared to 19.6% in the current study. In an earlier study Wojtyła-Buciora et al., among high school students, overweight and obesity affected 9% of girls and 18% of boys [15]. In a study of more than 14,000 adolescents from Poland aged 13–19 years, 76.7% of the subjects had normal body weight according to BMI, while overweight and obesity affected 18.2% [16].

A review of recent data regarding the nutritional status of adolescents aged 10–16 in several regions of Poland, also showed that the problem of overweight and obesity varies from 26.2% – 42.79% [2]. With regard to central obesity, the mean WHtR index value in the study group from southern Poland, neither the girls (0.41±0.05) nor the boys (0.43±0.05) indicated the occurrence of abdominal obesity. Similarly, in the study by Toselli et al., only a small proportion of the subjects had abdominal obesity according to WHtR [3], which also occurred in Chilean respondents [17]. However, in older age groups, among adolescents aged 10–18 years, abdominal obesity according to WHtR already affected 21.5% of participants [18].

Changes in body image that are characteristic of adolescence may contribute to a misperception of body image. The boys and girls from southern Poland, in the silhouette test, differed significantly in their self-assessment of body weight and choice of ideal silhouette in relation to their current body weight ($p<0.05$). Notwithstanding the fact that in the current study more girls (22.4%) than boys (15.4%) perceive themselves as being too fat, these results are decidedly low compared to the last HBSC survey of 11–15 year-old adolescents. Polish adolescents assessed themselves the most critically of all adolescents from other countries and regions, with as many as 60% of girls aged 13 assessing themselves as fat (11 years:46%; 15 years:56%), and 38% of boys aged 11 (13 years:35%; 15 years:32%). This increase was twice that among girls than boys. In a study of adolescents from Brazil, 70% of normal-weight boys and 88% of girls misperceived their nutritional status [18]. Boys in the current study, however, were most likely to perceive themselves as underweight, which is in the line to the results obtained by other authors [4, 5, 18], but the inverse of the girls, whose surprisingly high outlier also perceived themselves to be thinner than they actually were. In an earlier study of self-perceived body shape and body mass index of adolescents in Poland, boys were also more likely to state that they were thin, while girls were convinced they were overweight [15]. Girls from southern Poland were significantly more likely to prefer the ideal figure and being underweight (70.6%). Interestingly, similarly, almost half of the boys indicated this figure as ideal. Nevertheless, the increased prevalence of excess body weight among male adolescents, which was particularly notable in a recent study [1], could explain why also in this gender group so many respondents chose the thin figure as their ideal.

In the current study, the majority of respondents were dissatisfied with their body weight, according to the BID index. Regardless of the gender, most respondents wanted to be thinner, although the boys wanted to be fatter twice more often than the girls. Interestingly, a study conducted in a group of adolescents aged 13–17 in south-east Brazil, the most populous region of the country, the results from the majority of participants were similar to the current study. Regarding body image, 28.6% of the boys and 26.7% of the girls perceived themselves as thin or very thin, while the prevalence of those who considered themselves fat or very fat was higher among girls (24.7%) than boys (15.1%) [19]. In a study conducted among Australian adolescents aged 11–15 years, a significant proportion of boys (44.7%) and girls (40.2%) experienced some level of body dissatisfaction [20], as in the current study. Among participants aged 10–17 years, in the study by Tebar et al., the prevalence of dissatisfaction with body size was 77.0%, with 29.8% of respondents wanting to increase their body size, and 47.2% who wanted to be slimmer [21].

The results obtained in the current study, the same as results obtained by other authors, confirmed the presence of gender differences in the perception of body image [1,3]. Many studies have reported that females tended to be more dissatisfied with their own bodies than males, as measured on a dissatisfaction scale [3,5]. In a study group from Lithuania, girls (55.4%) overestimated body their weight more frequently than boys (13.2%), while more boys (61.2%) than girls (10.2%) underestimated their body weight ($p<0.001$) [7]. This was in contradiction to the current study in which almost 60% of boys and 55.5% of girls were dissatisfied with their bodies. Nonetheless, girls showed concern about higher values of weight [4]. The majority of students also did not have abdominal obesity, similar to the study by Toselli et al. (2021) [3]. However, in Chilean students, body image dissatisfaction was associated with WtHR, despite the fact that more than 70% of them did not have abdominal obesity [17]. This also applied in a group of adolescents in the Justino et. al study whose self-perceived body image was also associated with abdominal obesity using the Waist-to-Height ratio index [18].

The results of the current study indicate that age is significantly associated with body dissatisfaction (BID), which is also confirmed by another Polish study by Wawrzyniak et al [16]. Foreign studies, on the other hand, have shown that in a 3-year follow-up among Italian adolescents aged 11–14 years, there was no association between age and BID [3]. This

was similar to a study in groups of 10–14 and 15–18 year-olds in Brazil [18] and the Al-Musharaf study [22].

In southern Poland, the respondents who desired to be thinner were indeed more likely to follow weight-loss diet than those satisfied with their bodies and desiring to gain weight. Furthermore, participants in a previously-cited study [22] who followed a diet to lose weight, had a higher body dissatisfaction score compared to those who did not follow a diet. Among university students, more than 50% of female respondents who wanted to be thinner reported that they followed a diet (54.3%); however, 62.9% did not undertake any physical activity. On the other hand, the majority of male students who wanted to be slimmer exercised (88.9%) without following any diet (55.6%). The surveyed students who wanted to be fatter did not follow a diet (females: 79.2%; males:85.4%) and did not undertake any physical activity (females:62.5%; males: 83.3%) [5].

Incorrect perception of the body shape leads to risky behaviours, as shown in the current study, in which teenagers who were satisfied with their appearance were significantly less likely to report that they had ever drunk alcohol (14.9%). Furthermore, smoking, cannabis use, drug use, self-harm, and high-risk drinking, particularly among females, were related with BID [23]. Adolescents with clinically significant body dissatisfaction were also shown to be at very high risk of having a possible, probable or major depressive disorder [20]. The prevalence of body dissatisfaction was associated with body change strategies, highlighting the impact of lifestyle on mental health and perception of body image. Furthermore the association between body dissatisfaction and depressive symptoms was found to be dynamic, with different patterns observed in males and females during different developmental stages [20].

Among the adolescents in the HBSC national study carried out between 2018–2022, both boys (49.2 %) and girls (47.7 %) were most likely to eat 4 meals a day; 5 meals a day were eaten by 25.6% of boys and 21% of girls [14]. In adolescents aged 15–18 who lived in the peri-urban areas of Depok and Bogor, western Java, Indonesia, there was no relationship between the frequency of daily meal consumption (p-value=0.3972) and body image [24]. In the current study, body image dissatisfaction was also not related with the number of meals consumed per day. Poorer eating behaviours, higher body mass index (BMI) and overestimating body weight in adolescents is linked with higher body dissatisfaction and lower self-esteem [25].

As research shows, body image perception has a greater influence on extreme behaviours than the nutritional status, with a significant association between extreme weight control behaviours and self-perception of being very fat [19]. It is related to the adolescents' food preferences which determine their nutritional status. A wrong perception of body image from actual nutritional status can affect snacking habits and the implementation of a strict diet among adolescents [24].

Improper perception of weight status evaluated by means of FAI, showed that half of the study boys from southern Poland underestimated their own weight, compared to 37.1% of girls ($p<0.05$). Among University students, the mean FAI values were, similar to own research, indicated that positive values in females and negative values in males, indicated the tendency of women to overestimate their weight status, and of the men to underestimate it [13]. In a cohort study of Italian adolescents by Toseli et al., being a female was associated with a higher overestimation of one's own weight [3]. Concerning FAI, among High School adolescents in Italy, being underweight, normal weight, and never trying to lose weight, appeared as negative predictors of weight status estimation [4]. The number of adolescents who perceived themselves as overweight, as in the previously-cited HBSC study, constantly increasd [1], and they adopted unhealthy strategies to lose weight [4].

Many researchers indicate that health education and nutritional interventions can play a crucial role in addressing body image concerns and promoting healthy eating and physical activity behaviours among adolescents [19, 23]. Strategies involving health services and schools have the potential to positively impact the self-esteem and health of students by addressing body image concerns and promoting healthy dietary habits [21, 24]. Moreover, body dissatisfaction in adolescence tends to persist into adulthood, with various factors such as depression, self-esteem, and peer influences predicting differing trajectories [23]. In the prevention of overweight and obesity, a big role is attributed to the family in which eating habits are shaped from birth. Research shows that meals eaten together, as well as conversations between parents and children about a healthy life style, significantly contribute to maintaining a healthy body weight [6]. Wawrzyniak et al. also emphasize that health promotion and health education programmers for adolescents should include topics related to positive body image, correct weight assessment, and healthy lifestyles [16]. The monitoring of self-esteem and perception of one's own body is also recommended as part of an eating disorder presentation strategy [3].

**Strengths and limitations of the study.** The current study is one of the few showing the perceptions, including self-esteem, of young people's perception of own bodies in Poland. The strength of the study lies in the use of indicators, such as the Body Dissatisfaction Index (BDsI) and self-perceived body inconsistency (Feel weight status minus Actual weight status Inconsistency – FAI). The study also adds to knowledge the factors related to the health of adolescents from a rural community. As the results obtained demonstrate, inadequate assessment of one's own body is associated with negative health behaviours that can affect adolescent health.

Limitations of the study include the limited sample size which did not include a representative sample of interviewed adolescents. Further research with a larger sample is needed to verify the validity of the present results. Another limitation was the instrument used – the figure test assessment tool which, however, although validated in earlier studies, may not be relevant for newer body weight presentation techniques. Self-reported data can contain several potential sources of recall bias, which could affect the accuracy of the results obtained.

## CONCLUSIONS

In conclusion, the results show that more than half of the girls and almost 60% of the boys were dissatisfied with their body weight, according to the BID. Girls overestimated their body weight significantly more often than boys, whereas half of the boys underestimated their body weight. The incorrect self-perception of body weight was also confirmed by the erroneous perception of an ideal body figure which, for more

than 70% girls and nearly 50% of boys, represents a body mass deficiency. The study also demonstrates that adolescents from rural areas are equally likely to have misperceptions of and dissatisfaction with their own bodies, as well as associated unhealthy behaviours. Although the study provides valuable insights into the relationship between lifestyle and body dissatisfaction in adolescents, further research is necessary to explore the specific mechanisms through which lifestyle factors influence body image perceptions and related behaviours. However, it is important to note that while some life style factors, e.g. diet or alcohol drinking, have been studied individually, further research is needed to fully understand their complex interplay in influencing adolescents' body dissatisfaction, which should be viewed as a concern for public health.

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