

# Perceived and desired body weight among female university students in relation to BMI-based weight status and socio-economic factors

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## Abstract

The aim of the study was to verify if the accuracy of weight perception among young women depends on their socio-economic status and BMI-based weight status. In addition, the survey contained questions whether women were satisfied with their weight and tested if the desire to change weight is affected by real body weight and weight perception. The sample consisted of 1,129 female university students, aged 20–24. BMI was calculated from measured weight and height. The questionnaire contained questions about socio-economic status, weight perception and desired body weight. 71.9% of the surveyed students correctly estimated, 24.2% overestimated and 3.9% underestimated their body weight. Underweight women tended to incorrectly assess their body weight more often than normal weight women or overweight women (43.2% vs. 75.4% vs. 77.2%). Students from families of high socio-economic status slightly more often estimated their weight status correctly than students with average and low status, but the difference was statistically significant only in the case of the factor “mother’s education”. Most of surveyed women expressed the desire to weigh less or/and to have thinner waist, hips or thighs. The desire to be thinner was associated with body weight status and body weight perception.

## Key words

underweight, overweight, weight perception, socio-economic factors, female university students.

## INTRODUCTION

The number of overweight and obese people is increasing year by year, and in many countries it has already exceeded 50% of the population [1]. Weight-loss campaigns have been organised for many years to address this problem. Following a diet or taking up physical activity in order to reduce body weight is a positive phenomenon, providing that a given person is indeed overweight or obese. However, persons with normal Body Mass Index (BMI = 18.5–25 kg/m<sup>2</sup>) also frequently try to lose weight. This problem concerns mainly teenage girls and young women [2, 3].

Unjustified slimming may be the result of an ideal female figure promoted in the media. Two trends can be seen: as the average body weight in many populations rises, the mass media emphasize the increasingly thinner bodies of female models and actors. The current ideals of the beauty of a woman’s body as a slim body is further reinforced by a set of positive characteristics associated with slim people, such as success, health or sexual appeal [4]. Grogan (1999) reports that many British women believe that if they lose weight, their lives will change for the better [5]. As a consequence of the current trends and beliefs, women strive to achieve the perfect figure, which results in risky lifestyle behaviour, such as crash diets and starving, very intensive physical effort or the use of medicines [6, 7]. In the quest for their dream silhouette, women are ready for great sacrifice, even for an extended period of time. 24% of American women state that in order to achieve the desired body weight they are willing to follow

a strict diet and participate in intensive sports activities for three or more years [8]. It was also reported that the decision to start losing weight is influenced more by self-perceived body weight rather than its real excess as defined by the BMI [3, 9, 10, 11, 12]. Weight overestimation in persons with normal weight-to-height proportions is correlated with lower self-confidence, increases the risk of eating disorders (anorexia, bulimia) and depression [13, 14, 15, 16]. For overweight and slightly obese individuals, weight underestimation does not motivate them to change their lifestyle and therefore leads to a further growth of fatty tissue [8, 17].

Considering the fact that self-perception of body weight is an important determinant of eating habits and lifestyle of teenagers and young adults, many studies focus on defining the factors affecting weight underestimation or overestimation. In terms of weight perception, age and gender have been confirmed as significant determinants. Young people perceive themselves as ‘fat’ more frequently than older persons, and women do so more often than men [5, 9, 18, 19, 20]. Results published in scientific literature reveal the importance of social, cultural and economic factors [19, 21]. Differences between the accurate weight perception among individuals from various countries or from the same country but of different ethnic origin were observed [22, 23]. Excessive thinness is glorified and more frequently reported in certain groups, including models, actors, dancers, skaters and gymnasts.

The aim of the presented study was to verify if the accuracy of weight perception among young women depends on their socio-economic status and weight status. In addition, the survey contained questions whether women were satisfied with their weight and tested if the desire to change weight is affected by real body weight and weight perception.

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## MATERIALS AND METHODS

Cross-sectional research was carried out in March and April 2009 on a group of 1,129 female students of three universities in southern Poland: the Jagiellonian University in Krakow, Jan Kochanowski University in Kielce and the University of Opole in Opole. For each subject, body height and weight were measured and the Body Mass Index (BMI) calculated. The measurements were made by the authors of this study, according to the standard procedure for anthropometric measurements. Height was measured without shoes, to the nearest 1 mm, using an anthropometer (Switzerland). Weight was measured to the last complete 0.5 kg with subjects wearing light clothing and no shoes.

In addition, each person filled in a questionnaire which featured questions on their socio-economic status (SES) and self-assessment of body weight and desired body weight. The following socio-economics variables were considered: place of residence before studies, number of siblings, parents' education, and self-esteem of the financial situation of his/her family. The students' economic status was assessed based upon their responses to the survey question: 'Do you consider the economic situation in your home as: (1) bad, (2) below average, (3) average, (4) good, (5) very good, (6) changeable and/or difficult to assess'. As there were only three responses in the last category, it has been omitted.

Socio-economic variables were studied in the following categories:

- 1) place of residence: village, town with up to 100,000 inhabitants, and town with over 100,000 inhabitants;
- 2) parent's education: vocational, secondary, higher;
- 3) assessment of subject's financial status: poor, below average, average, good, very good.

In further analysis, due to the fact that only 7 persons evaluated their financial status as poor, this category was joined with the 'below average' category.

On the basis of all the above variables, a complex socio-economic status evaluation indicator for the subjects was created. Students were divided into three groups with low, average and high status, on the basis of the values of the first component obtained in the principal component analysis (PCA). The eigenvalue of the analysed factor amounted to 2.82 and explained 65.59% of common variation in SES. The socio-economics characteristic of surveyed students is presented in Table 1.

For the evaluation of body image perception, a following questions were asked:

1. Do you think your weight is:
  - too low;
  - correct;
  - too high;
  - correct, but I have too much fatty tissue on my abdomen, hips or thighs;
  - I would like to weight less;
  - I would like to weight more;
  - I would like to have slimmer waist, hips or thighs;
  - I don't want to change anything in my figure.

The statistical analyses were calculated with the data analysis software system Statistica version 10, StatSoft Inc. 2011. Chi-squared tests were used to compare categorical variables. Logistic regression analysis was performed to

**Table 1.** Socio-economic characteristics of surveyed students.

Factor	Category	No.	%
Place of residence	Rural	354	31.36
	Urban	775	68.64
Mother's education	Primary	174	15.41
	Secondary	593	52.52
	University	362	32.06
Father's education	Primary	322	28.52
	Secondary	476	42.16
	University	331	29.32
Material conditions	Poor	123	10.89
	Average	311	27.55
	Good	695	61.56
SES	Low	283	25.07
	Average	640	56.69
	High	206	18.25
Place of study	Kielce	301	26.66
	Kraków	657	58.19
	Opole	171	15.15

assess the risk of under- and over-estimation in relation to SES and weight status. Separate models were constructed for the underestimation and the overestimation by dichotomizing the outcome variable as 'underestimation or not' and 'overestimation or not'. Both models included all observations. The level  $p < 0.05$  was considered as the cut-off value for significance.

## RESULTS

Anthropometric characteristics of surveyed students is presented in Table 2. Most respondents were characterised by a slim figure. Body Mass Index (BMI) below the values of  $18.5 \text{ kg/m}^2$  was reported for 11.1% students, for 6.5% of students BMI ranged from  $25\text{--}30 \text{ kg/m}^2$ , for 0.5% it was more than  $30 \text{ kg/m}^2$ . As the number of obese individuals was small, for the purpose of further analysis, the group was merged with the overweight group. Hereafter, the term 'overweight' is used both for overweight and obese women.

**Table 2.** Anthropometrics characteristics of surveyed students.

BMI category	Accuracy of estimation	Height		Weight		BMI		Age	
		mean	sd	mean	Sd	mean	sd	mean	sd
under-weight	correct	168.4	5.87	50.49	3.58	17.86	0.46	20.25	1.33
	over-estimation	166.7	5.77	50.67	3.59	18.15	0.39	20.86	1.56
normal	under-estimation	163.1	6.97	52.4	4.37	19.53	0.77	20.86	1.65
	correct	166.1	5.82	57.3	5.32	20.76	1.23	20.85	1.79
	over-estimation	163.6	5.72	60.9	5.73	22.06	1.50	20.65	1.69
over-weight	under-estimation	163.2	9.91	69.53	8.76	26.01	0.86	20.94	2.23
	correct	167.2	5.50	75.91	6.26	27.14	1.79	20.88	1.92
Total		166.2	5.93	58.32	7.52	21.09	2.29	20.83	1.77



The first stage involved verifying whether studied individuals had assessed their build accurately. Only 43.2% women from the underweight group considered their body weight as being too low, with the remainder perceiving their weight as correct. 5.9% underweight women also assessed their body weight as correct, but they claimed to have too much fatty tissue on their abdomen, hips or thighs. Among normal weight women, 46.9% considered their body weight as correct, whereas 28.4% indicated that their weight was correct, but their abdomen, hips or thighs were too fat, 2.8% women perceived their body mass as too low, and 21.9% as too high. Among overweight women, 17.7% judged their body weight as correct, 5.1% assessed their body weight as correct but they claimed that their abdomen, hips or thighs were too fat. In the overweight group, 77.2% women assessed their body weight as too high. Across the entire sample, 71.9% female students correctly estimated, 24.2% overestimated and 3.9% underestimated their body weight. Note that among women who saw their weight as correct, a considerable percentage thought that despite their correct weight they had too much fatty tissue on their abdomen, hips or thighs. Underweight women tended to incorrectly assess their body weight more often than normal weight women or overweight women (56.8% vs. 24.7% vs. 22.8%). These differences were statistically significant ( $\chi^2 = 57.55, p = 0.0000$ ).

Students from families of high socio-economic status slightly more often estimated their weight status correctly than students with average and low status, but the difference was statistically significant only in the case of factor "mother's education" (Tab. 3). Students from Kraków significantly more often evaluated their weight correctly, and less frequently overestimated or underestimated it than students from Kielce and Opole (Tab. 3). No statistically significant differences in the accuracy of weight perception were found between first

**Table 3.** Percentage of participants in each perception of body weight category by socio-economic factors.

Factor	Category	Underestimation		Correct		Overestimation		P values
		No.	%	No.	%	No.	%	
Place of residence	Rural	16	4.52	257	72.60	81	22.88	0.6358
	Urban	28	3.61	555	71.61	192	24.77	
Mother's education	Primary	8	4.60	115	66.09	51	29.31	<b>0.0476</b>
	Secondary	29	4.89	432	72.85	132	22.26	
	University	7	1.93	265	73.20	90	24.86	
Father's education	Primary	17	5.28	228	70.81	77	23.91	0.3232
	Secondary	20	4.20	340	71.43	116	24.37	
	University	7	2.11	244	73.72	80	24.17	
Material conditions	Poor	3	2.44	85	69.11	35	28.46	0.5546
	Average	14	4.50	218	70.10	79	25.40	
	Good	27	3.88	509	73.24	159	22.88	
SES	Low	12	4.24	200	70.67	71	25.09	0.3232
	Average	29	4.52	456	71.25	155	24.22	
	High	3	1.46	156	75.73	47	22.82	
Place of study	Kielce	20	6.64	194	64.45	87	28.90	<b>0.0000</b>
	Kraków	13	1.98	511	77.78	133	20.24	
	Opole	11	6.43	107	62.57	53	30.99	

**Bold type** – statistically significant difference

P – values based on  $\chi^2$  results

year and last year students. The risk of inaccurate weight perception was assessed by means of logistic regression. The analysis was performed twice – both for weight over- and weight underestimation. The results of the logistic regression also failed to demonstrate any significant SES-dependent differences (Tab. 4).

**Table 4.** Risk of misclassification of perceived weight status in socio-economic groups.

Factor	Category	Underestimation		Overestimation	
		OR	95% CI	OR	95% CI
Place of residence	Rural	1.19	0.58–2.44	0.79	0.56–1.12
	Urban			Ref.	
Mother's education	Primary	2.0	0.55–7.19	1.15	0.67–2.00
	Secondary	2.15	0.78–5.19	0.75	0.51–1.12
	University			Ref.	
Father's education	Primary	2.01	0.64–6.29	0.80	0.49–1.32
	Secondary	2.57	0.11–5.42	0.92	0.61–1.41
	University			Ref.	
Material conditions	Poor	0.62	0.18–2.07	1.35	0.87–2.06
	Average	1.16	0.60–2.26	1.14	0.84–1.56
	Good			Ref.	
SES	Low	0.77	0.11–5.40	1.66	0.79–3.50
	Average	1.29	0.26–6.46	1.45	0.85–2.49
	High			Ref.	

OR – odds ratio; CI – confidence interval; Ref. – reference category.

Another question concerned what the students wanted to change in their build. Table 5 presents percentage distribution of responses according to the BMI category (underweight, normal, overweight) and weight perception accuracy (underestimation, correct estimation, overestimation). As regards underweight women, almost half of them would not like to change anything in their build. None of women with BMI values lower than 18.5 indicated that they would like to weight less, although 18.9% wanted their waists, hips, or thighs to be slimmer. This desire was expressed both by women who classified their own weight as correct and those who rightly indicated their weight as too low. Among normal weight women, only 22.9% did not want to change anything in their build. Most of women from the normal weight group would like to lose weight, and merely 3.5% desired to weight more. Most overweight women would like to be thinner, which in their case is fully justified (Tab. 5). The responses varied across all groups, depending on how the surveyed women perceived their weight. Underweight women who were aware that their body weight was too low expressed preference for their weight to be higher more frequently than those who perceived their weight as correct. Likewise, overweight women who were aware that their body weight was too high would like to weight less more frequently than those who perceived their body weight as correct. In the group of women with a BMI of 18.5–25 kg/m<sup>2</sup>, most of those who classified their body weight as too high desired to weigh less, whereas those who claimed that their weight was too low desired to weigh more. The most numerous group was comprised of students with normal BMI who accurately assessed their body weight. Interestingly, only 30% of the women in this group did not want to change their silhouette,

**Table 5.** Desired body weight by BMI-based weight status and perceived weight status.

BMI category	Accuracy of estimation	A		B		C		AC		D	
		No.	%	No.	%	No.	%	No.	%	No.	%
under-weight	correct	-	-	35	64.81	7	12.96	-	-	12	22.22
	overestimation	-	-	5	7.04	16	22.54	-	-	50	70.42
<b>p=0.0000</b>											
normal	under-estimation	0	0	23	88.46	0	0	0	0	3	11.54
	correct	61	8.75	9	1.29	403	57.82	15	2.15	209	29.99
	overestimation	136	67.33	0	0	44	21.78	22	10.89	0	0
<b>p=0.0000</b>											
over-weight	under-estimation	2	11.11	-	-	11	61.11	0	0	5	27.78
	correct	47	77.05	-	-	0	0	14	22.95	0	0
<b>p=0.0000</b>											

**Bold type** – statistically significant difference

P – values based on Chi<sup>2</sup> results

A – students who wanted to weigh less

B – students who wanted to weigh more

C – students who wanted have thinner waist, hips or thighs

A, C – students who wanted to weigh less and have thinner waist, hips or thighs

D – students who did not want to change anything in their silhouette.

8.75% desired to weigh less, 57.8% would like to have thinner waist, hips or thighs, 2.15% selected both responses and 1.29% desired to weight more.

## DISCUSSION

The findings of the presented study indicate that nearly 30% of the women incorrectly assessed their body weight. They tended to perceive themselves more often as too fat rather than too thin. Other authors' research yielded similar results [20, 21, 23, 24, 25]. The discrepancy between weight perception and the BMI is noticeable mainly among groups of young people. Adolescence, as well as early adulthood, is characterised by physical, psychological and emotional changes. Significant shifts in terms of defining future social status of a young person occur – such as the choice of school, university or job. Early adulthood is also connected with choosing a partner and starting a family. Since BMI is an important factor determining a person's attractiveness, it should come as no surprise that persons at this age pay special attention to their own appearance and compare themselves to others. Although there are BMI calculators on many health and beauty websites, allowing determination about whether a person's weight-to-height ratio is normal, women tend to compare themselves with models and actresses shown in the media. It has been proved that watching television, in particular TV series with young and very slim actresses, contributes to overestimating one's weight and dissatisfaction with one's appearance [26, 27, 28].

The results of the presented study and data published in scientific literature suggest that obese and overweight women assess their weight accurately and are aware of their excess body mass [24]. Only 22.8% of overweight students perceived

their weight as correct. However, it must be stressed that their BMI exceeded 25 by a mere 1–2 units. Underweight subjects had more problems assessing their weight – 56.8% of them claimed that their weight was correct. Among students with normal weight, 21.9% thought that their body weight was too high, while 24.8% claimed that their weight was correct, but that they had too much fatty tissue on their abdomen, hips or thighs. Other studies reported a higher percentage of individuals who overestimated their weight. Research carried out among Polish adolescents aged 11–15 revealed that 46% girls and 23% boys regarded themselves as 'too fat'. With age, the percentage of girls who considered themselves too fat and boys who considered themselves too thin increased [3]. Similar results were obtained for groups of teenagers of similar age (13–15 years) from Lithuania, Croatia and the United States. Across the entire group, 38.8% of the girls overestimated their weight [29]. In the groups of university students, this percentage was 20–60% [30, 31]. Research by NHANES (National Health and Nutritional Examination Survey) in the USA showed that 38% of women with normal weight thought that they were overweight, and most underweight women saw their weight as normal [18].

Findings reported in many studies show that the respondents more frequently overestimate than underestimate their body mass. As mentioned before, females tend to overestimate their weight more often than males [20, 29]. In addition, differences dependent on ethnic origin were also observed. In societies with high ethnic diversity (Australia, USA), black and Hispanic women, despite having higher BMI values than white women, much less frequently overestimate their weight [11, 23, 25]. This may suggest that women assess their body build less strictly in groups where overweight is more prevalent, since – even if their BMI approaches the upper limit – they are in fact slimmer than most of their counterparts. On the other hand, studies carried out simultaneously in three countries, Lithuania, Croatia and the USA, indicate that much more obese adolescents from the USA than from Lithuania and Croatia are aware of their excess body mass. In the USA, where the prevalence of overweight and obesity is much higher than in the two other countries, overweight and obese adolescents more frequently took steps to reduce excess body mass [29]. This may be explained by the fact that due to the epidemic of overweight and obesity in the USA, there are more educational campaigns aimed at promoting a healthy lifestyle and preventing obesity than in societies in which the obesity problem is not so severe.

A relatively small number of studies analyse the relationship between socio-economic status and weight perception [19, 21, 30, 32, 33]. In the developed countries, a high socio-economic status is correlated with a lower BMI, and women of high socio-economic status overestimate their body weight by the WHO standards more often than women of low status [30]. According to research conducted among New Zealanders, low socio-economic status is associated with weight underestimation [23]. Among American high school students, fewer girls from high-income families than their peers from low-income households rated their weight incorrectly. Overall, girls tended to overestimate their weight; only among black and Hispanic female students and those from low-income families, a tendency to underestimate body mass was observed [20].

In contrast, Johnson et al. concluded that socio-economic status is correlated neither with the BMI value nor with the



self-perception of body weight [34]. The presented study had similar results. Significant differences in weight perception accuracy depended only on the mother's education. Many studies point to a relationship between mother's education, BMI and daughter's perception of her own figure. It was found that mothers are mistaken in assessing their daughters' weight less frequently than their daughters themselves. If the assessment is erroneous, mothers tend to underestimate their daughters' weight, and in the case of overweight, often classify their daughters as having normal body weight [35, 36]. Child's weight perception by parents did not depend on their education level. It was also found that women with higher education are less satisfied with their own weight, although their BMI, on average, was lower than in women with a lower level of education [11, 31, 32].

The presented work also involved asking the women if they would like to change their weight or figure. Many surveyed women, despite assessing their body weight as correct, were dissatisfied with their figure and thought they had too much fatty tissue on their, abdomen, hips or thighs. The highest percentage of subjects expressed the preference to reduce thigh, waist or hip circumference; a significant percentage of women would like to have a lower weight. The desire to change weight was related to perception. Women who were aware of being underweight more frequently stated that they would like their weight to be higher than underweight women who consider their weight as normal. Similar relationships are visible for women with normal BMI and overweight women. The presented study did not address the question whether the women who would like to lose weight actually took any steps, such as diet or increased physical activity. Studies by other authors revealed that weight overestimation is related to unjustified slimming, which frequently involved the use of drastic methods, such as crash diets, inducing vomiting, or the use of slimming pills [3, 6, 13].

Summing up, the results of the presented study demonstrate that women express dissatisfaction with their body shape more frequently than their body mass. Even if they classify their weight as correct by the WHO standards, they still think they have too much fatty tissue on their abdomen, hips and thighs. High percentages of underweight women who claim to have normal body mass and normal weight women who consider themselves overweight, suggests that many women identify normal weight not with the BMI range of 18.5 – 25 kg/m<sup>2</sup>, but with a value approximating underweight or the lower limit of the standard range.

## CONCLUSIONS

1. Almost 30% of the surveyed students incorrectly assessed their body weight. Overestimation was more prevalent than underestimation (24.2% vs. 3.9%).
2. Underweight women tended to incorrectly assess their body weight more often than normal weight women or overweight women (43.2% vs. 75.4% vs. 77.2%).
3. Students from families of high socio-economic status slightly more often estimated their weight status correctly than students with average and low status, but the difference was statistically significant only in the case of factor "mother's education".
4. The desire to weigh less was associated with body weight status and body weight perception.

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