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Alternative Methods of Nutritional Status Assessment in Adolescents

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A B S T R A C T

The main objective of this cross-sectional study was to determine the validity of the silhouette rating scale and reported values of height and weight in assessing weight status in a group of adolescents. 245 adolescents, students of the Belgrade elementary school, aged 11–14 (12.33±0.50), were involved. Weight status was assessed by anthropometry, self-reported height and weight and by figure rating scale. From the results obtained significant differences emerged as a function of weight status. The majority of normal weight adolescents were accurate in reporting their body size. The percentage of under-reporters was significantly higher in the overweight/obese group than in the normal weight group ($\chi2=9.741$, $p=0.003$). The correlation between BMI, both measured and self-reported, and perceived body size was positive and highly significant ($p<0.001$). Self-reported weight and height appears acceptable for estimating weight status in normal weight adolescents, but not in those who are overweight or obese. This study also demonstrated that adolescents can estimate with some accuracy their body size using figure ratings scales.

Key words: *nutritional status, body mass index, self reported body weight and height, figure rating scale*

Introduction

Nutritional status disorders are an obvious sign of poor eating patterns in modern societies. The most common of these is obesity which is taking on epidemic proportions[1]. Others like anorexia and bulimia nervosa are consistently increasing in incidence, especially among adolescents of urban background[2].

The assessment of weight status by anthropometry in epidemiological studies in order to identify vulnerable individuals is not always feasible. Alternative methods include self-reported weights and heights and the body silhouette method. In surveys of self-reported heights and weights a systematic bias has been found towards reporting fewer kilograms and more centimeters than confirmed by actual measurements[2–5] with the clear tendency for a »flat slope syndrome«[6], i.e. under-reporting high values and over-reporting low ones. While underestimation of body mass index (BMI) tends to be reported in general population samples, an inverse trend is observed in subjects with eating disorders[7]. The discrepancy between measured and reported BMI is negatively related to age and positively related to BMI, the younger and the heavier responders are, the greater the disparity in reporting is[8,9].

The Silhouette Figure Rating Scale was first used by Stunkard, Sørenson and Schulsinger[10] to determine the weight status of parents of adopted children. The method is widely applied by researchers and a number of different figure rating scales (FRS) have been developed[11–17], having different reliability and validity levels[18], some of them being age and gender specific[11, 12]. Numerous studies have used FRS to estimate ideal body size, or body dissatisfaction by computing discrepancy scores between current and ideal body figures[12–16]. In addition, FRS have been used as an alternative to measurement of obesity in adults[8,19], with a significant improvement in accuracy when a combination of adjusted self-reports and silhouettes was applied[20,21].

BMI is now universally used for categorizing weight status in adults[22]. In children, a variety of definitions has been applied, making international comparisons on rates of obesity in children very difficult. However, Cole et al.[23] have published a standard definition for childhood overweight and obesity based on an international survey of six large nationally representative growth studies, providing age and sex-specific cut-off points for overweight and obesity.

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The main aim of the present study was to determine the validity of the silhouette rating scale and reported values of body height and body weight in a group of adolescents from an urban background, and the differences in body image assessment in adolescents with normal weight status and overweight/obese. It was predicted that girls would be more accurate in estimating body size but more dissatisfied with their bodies than boys, and that these gender differences would transcend weight status contexts.

Materials and Methods

Subjects

The study included 245 adolescents aged 11–14 (12.33 ± 0.50), 114 boys aged 12.39±0.53, and 131 girls aged 12.28 ± 0.47, all of them being 6th grade students from four central Belgrade communities.

Measurements

Data such as date of birth, gender, self reported body weight (rWt) and self reported height (rHt) were obtained by structured questionnaires.

All participants had weight measured (mWt)) using a standard balance – beam scale, and height (mHt) using a standard height bar. BMI was calculated when body weight (kg) was divided by the square of height (m) both as self-reported (rBMI) and measured (mBMI) values. According to Cole's international age/gender specific criterion BMI[23], they were designated as normal weight category (below cut off point for overweight) or overweight category (above overweight cut off point), which actually merge overweight and obese adolescents, as it was quite small numbers in the obese categories. The adolescents were given an age and gender specific FRS. The scale consisted of 7 silhouettes (2 to 8 from the original scale)[18]. Every participant was asked to choose a number from two sets of silhouettes, one representing his/her actual body image, (»the figure that looks most like you«), the other representing his/her desired looks (»the figure that you would most like to be«). The difference (delta) was calculated by subtracting the »actual« from the »ideal« number. A positive result signified a desire for larger body size, and a negative result – desire for a smaller body size. Zero represented body satisfaction. Although these scales are gender specific, they are conventionally used to contrast the sexes since it is assumed that the scales are comparable with intervals between figures with similar values.

Data analysis

Data were analyzed using SPSS package version 9. Analyses of variance were performed both by employing univariate and multivariate ANOVA (MANOVA) procedures. Paired-samples t-test was used for the existing differences. Correlations were conducting using Pearson's r.

Results

An average 75% of subjects had a normal nutritional status. The others belonged to the »problematic weight« category, either overweight or obese. Within our sample, a greater percentage of boys (26.3%) than girls (21.4%) belonged to this category (Table 1).

To test differences in measured and self reported anthropometric variables, a MANOVA procedure was applied to the sample with independent variables weight status and gender (Table 2). Differences in reported and measured values were tested using the Student's paired-samples t-test for each subgroup of the tested population: normal weight boys, normal weight girls, overweight/obese boys and overweight/obese girls.

Normal weight boys reported a slightly higher body weight compared with the measured one (46.40 kg vs. 45.52 kg, p=0.037). All the other subgroups of the tested population reported lower values. This difference is trivial in normal weight status girls (46.30 kg vs. 46.50 kg,

TABLE 1
GENERAL CHARACTERISTICS OF THE SAMPLE

Gender	N	%	Weight status (WS)	Parameters	X	SD	Min	Max
Male	114	46.5	Total	Age (year)	12.39	0.53	11	14
(M)	84		Normal weight (NW)		12.43	0.50	12	13
	30		Overweight (OW)		12.30	0.60	11	14
Female	131	53.5	Total		12.28	0.47	11	13
(F)	103		Normal weight (NW)		12.28	0.47	11	13
	28		Overweight (OW)		12.29	0.46	12	13
Male	114		Total	Body Mass Index BMI (kg/m^2)	19.63	2.99	14.19	27.85
(M)	84	73.7	Normal weight (NW)		18.21	1.71	14.19	21.15
	30	26.3	Overweight (OW)		23.62	2.02	21.17	27.85
Female	131		Total		19.51	3.11	14.18	29.87
(F)	103	78.6	Normal weight (NW)		18.30	2.04	14.18	21.92
	28	21.4	Overweight (OW)		23.98	2.10	21.72	29.87

TABLE 2
MEAN AND STANDARD DEVIATION OF ANTHROPOMETRIC PARAMETERS WITH A SUMMARY OF MANOVA EFFECTS

GROUP			NW		OW		MANOVA F/p		
Anthropometric parameters	Method	Gender	X	SD	X	SD	WS	gender	WS x gender
Body weight (kg)	Measured	M	45.52	6.90	60.23	9.80	188.49	1.43	0.005
		F	46.50	7.16	61.43	6.24	0.000	ns	ns
	Reported	M	46.40	7.12	57.08	9.29	113.84	0.49	0.149
		F	46.30	6.77	58.21	7.25	0.000	ns	ns
Body height (m)	Measured	M	1.58	0.08	1.59	0.09	1.56	1.41	0.179
		F	1.59	0.07	1.60	0.05	ns	ns	ns
	Reported	M	1.59	0.08	1.61	0.09	2.91	1.17	0.282
		F	1.60	0.07	1.61	0.05	ns	ns	ns
BMI	Measured	M	18.21	1.71	23.62	2.02	362.18	0.74	0.150
		F	18.30	2.04	23.98	2.10	0.000	ns	ns
	Reported	M	18.34	1.82	21.98	2.59	155.45	0.07	1.139
		F	17.98	1.91	22.40	3.36	0.000	ns	ns
BMI discrepancy		M	0.95	7.70	–6.85	8.42	34.21	0.94	1.062
(% BMIm)		F	–1.49	6.14	–6.81	8.42	0.000	ns	ns

M – male, F – female, NW – normal weight, OW – overweight, WS – weight status

p=0.350), but among the problem weight boys and girls it exceeded 3 kg (on average) (57.08 kg vs. 60.23 kg, p<0.001 for boys and 58.21 kg vs. 61.43 kg, p<0.001 for girls). Testing revealed the significant main effect of weight status ($F_{(1,217)}$=113.844, p<0.001), but no significant main effect of gender nor an interaction between these two factors.

BMI values calculated from measured height and weight differed among the groups of normal weight boys and boys with a weight problem (18.21 vs. 23.62), and girls (18.30 vs. 23.98). But, there were no differences between boys and girls regarding any of the measured nutritional status elements, such as measured body weight ($F_{(1,217)}$=1.432, p=0.233), measured height, (F(1,217)= 1.413, p=0.236), and BMI ($F_{(1,217)}$=0.737, p=0.391).

Height values showed less obvious differences – subjects of all subgroups reported height greater than the measured one: a 1 – 2 cm difference. There was no significant main effect of tested parameters nor an interaction between them ($F_{(1,217)}$=1.171, p=0.280 – gender, $F_{(1,217)}$= 2.913, p=0.089 – weight status, $F_{(4,217)}$=0.282, p=0.596 – gender and weight status).

BMI, calculated from reported values of body height and weight, did not differ from the BMI, calculated from objective values in normal weight boys (t=0.812, p= 0.419), but became apparent in normal weight girls who believed themselves thinner then they objectively were (t=–2.923, p=0.004), and even more in adolescents of both sexes with weight problems (boys, t=–4.267, p< 0.001, girls, t=–4.085, p<0.001). This could be attributed entirely to weight status ($F_{(1, 217)}$=44.057, p<0.001), as there was no significant effect of gender nor an interaction between the factors. The same pattern could be applied to other parameters like BMI discrepancy calculated from the difference between measured and reported BMI and expressed as a percentage of BMI measured. The difference in reported BMI is very significant both in boys and girls with weight problem, being on average – almost seven percent less then BMI measured (6.85 and 6.81). Table 3 shows data on the silhouette rating scales.

When comparing perceived body size across the two weight and gender categories, a significant difference was found within weight groups for the figure rating scale of actual size both between normal weight girls and boys which ($F_{(1,217)}$=96.703, p<0.001). But, girls, although objectively of the same BMI as boys, selected a thinner silhouette to represent their current body size. This applies both to the normal weight status girls (2.93 vs. 3.87) and the girls with weight problems (4.57 vs. 4.93), confirmed by a main effect of gender ($F_{(1,217)}$=19.963, p< 0.001). A main effect of gender was also found for the ideal silhouette ($F_{(1,217)}$=70.737, p<0.001), and for the discrepancy value ($F_{(1,217)}$=6.509, p=0.011). A main effect of weight status was found for the ideal silhouette ($F_{(1,217)}$=5.940, p=0.016) and the discrepancy value ($F_{(1,217)}$=55.392, p<0.001). Interaction of these factors does not show significant effects on any of the three observed parameters. There was a clear tendency for convergence in ideal body size between same sex adolescents with different weight status (Figure 1), suggesting consensus for the figure which represents the most ideal.

Each of the two weight status subgroups within each gender selected the same figure as ideal. Both normal and overweight/obese girls reported ideal body size below the central figure on the scale (2.75 and 3.25). Whilst overweight boys also wanted to decrease their size nor-

TABLE 3
SILHOUETTE VALUES AND MANOVA EFFECTS

Parameter	Gender	NW			OW			MANOVA F/p		
		X	SD	N	X	SD	N	WS	Gender	WSxGender
Actual	M	3.87	0.77	82	4.93	1.07	29	96.703	19.963	3.774
silhouette	F	2.93	0.97	100	4.57	1.03	28	0.000	0.000	ns
	Total	3.35	1.00	182	4.75	1.06	57			
Ideal	M	3.95	0.56	82	4.00	0.80	29	5.940	70.737	3.657
silhouette	F	2.75	0.87	100	3.25	0.75	28	0.016	0.000	ns
	Total	3.29	0.96	182	3.63	0.86	57			
Δ value	M	–0.04	0.87	82	–0.90	0.72	29	55.675	6.509	0.530
	F	–0.25	0.86	100	–1.32	0.98	28	0.000	0.011	ns
	Total	–0.15	0.87	182	–1.11	0.88	57			

M – male, F – female, NW – normal weight, OW – overweight

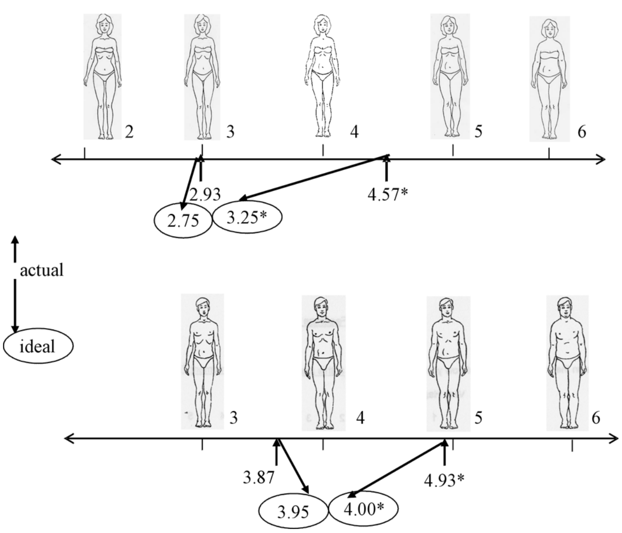

Fig. 1. Actual and ideal figures in normal weigh (NW) and overweight/obese (OW) adolescents.*

mal weight boys wanted to increase their body size, so their ideal figures converged around 4 (3.95 and 4.00).

To determine the association among tested anthropometric parameters and silhouettes, Pearson's product moment correlations were applied (Table 4).

Ratings for actual figure were found to correlate significantly with both measured and reported BMI ($p<0.01$). According to Pearson's coefficients, the correlation was linear showing that adolescents were accurate at estimating their body size using the FRS.

Measured body weight was also positively correlated with all anthropometric parameters, and negatively correlated with the difference in BMI values reported and measured. The higher the BMI, the greater the difference in percent of objective BMI, thus the higher the children's body weight, the lower the reliability of self reported values. Body weight, both reported and measured, as well as BMI, showed a highly significant negative correlation ($p<0.01$) with the discrepancy value. This parameter is considered to be a valid measurement of body dissatisfaction. In the present study, it is obvious that

TABLE 4
MEAN (X) STANDARD DEVIATION (SD) AND PEARSON'S CORRELATION FOR THE TESTED FACTORS

	2.	3.	4.	5.	6.	7.	8.	9.	10.	X	SD
1. rBW	0.927***	0.589***	0.619***	0.846***	0.788***	–0.066	0.604***	0.198**	–0.482***	49.02	8.70
2. mBW		0.585***	0.613***	0.759***	0.882***	–0.437***	0.607***	0.153**	–0.541***	49.56	9.65
3. rBH			0.912***	0.074	0.194**	–0.144*	0.096	0.023	–0.084	1.60	0.08
4. mBH				0.173 **	0.176**	–0.145**	0.144*	0.039	–0.135*	1.59	0.07
5. rBMI					0.848***	0.009	0.685***	0.219**	–0.555***	19.10	2.78
6. mBMI						–0.454***	0.676***	0.159**	–0.609***	19.57	3.05
7. rBW-mBW							–0.161*	0.067	0.279***	–0.54	3.64
8. Actual								0.588***	–0.600***	3.68	1.17
9. Ideal									0.199**	3.37	0.94
10. Δ value										–0.38	0.96

rBW – reported body weight, mBW – measured body weight, rBH – reported body height, mBH – measured body height, rBMI – reported body mass index, mBMI – measured body mass index, * – p>0.05, ** – 0.01>p<0.05, *** – p<0.01

TABLE 5
ADOLESCENTS DIVIDED BY BMI ACCURACY AND χ^2 ACCORDING TO WEIGHT STATUS AND GENDER

Weight status	Gender	N	Percentage and number (N) of adolescents according to reported BMI accuracy			χ^2 9.741*	p 0.003
			Under reporter	Over reporter	Accurate		
NW	M	84	16.7 (14)	28.6 (24)	54.8 (46)		
	F	103	20.4 (21)	10.7 (11)	68.9 (71)		
OW	M	30	50.0 (15)	6.7 (2)	43.3 (13)		
	F	28	50.0 (14)	3.6 (1)	46.4 (13)	0.299**	0.861

M – male, F – female, NW – normal weight, OW – overweight, * – χ^2 according to weight status, **– χ^2 according to gender

body size dissatisfaction was higher in overweight/obese adolescents compared to normal weight adolescents, followed by significant positive correlation with BMI discrepancy ($p<0.01$). Dissatisfaction with their body size was also reflected by the fact that half of overweight/obese adolescents were in the group of under-reporters (Table 5).

This means that body size assessed by BMI derived from weight and height which were self-reported was more then 5% smaller than the one assessed by objectively measured weight and height. This percentage of under-reporters is significantly higher than in the normal weight group ($\chi^2=9.741$, $p=0.003$). In contrast, the majority of normal weight adolescents were accurate in reporting their body size. There were no significant differences between boys and girls.

Discussion

This study is an initial phase of a longitudinal investigation aimed at exploring factors associated with eating disorders in adolescents from Dundee and Belgrade. The results presented here involved just adolescents from the Belgrade cohort, because self-reporting and measurements of weight and height were performed in parallel for them. Detailed methodology for this study has been published previously[24]. Drawing on findings from other research it was predicted that girls would be more accurate in estimating body size but more dissatisfied with their bodies than boys, and that these gender differences would transcend weight status contexts.

Self reported body size indicated that it was accurate in more then half of normal weight boys and almost 70% of girls. In contrast, half of overweight/obese adolescents were underestimating their body size. From this study it is certainly evident that there is a strong negative correlation between adolescent BMI and their degree of underreporting. In addition, heavier adolescents wish to decrease in size and lighter boys wish to increase slightly.

The self reported body weight and height method in children and adolescents and the influence of factors which cause these values to differ have so far been discussed by many others[25, 26]. Reported BMI values of twelve-year old girls have been analyzed in one such study. Average value of 17.88±1.88 kg/m^2 was found, which is in concordance with our results (131 girls aged 12.3±0.5) of rBMI of 18.93±2.92 kg/m^2, being somewhat higher and more variable value[15]. Previous findings suggest that adolescents, having a desire to grow up as soon as possible, report their anthropometric values higher than they objectively are[27]. Usually, men see themselves as more muscular, while women have a tendency for a leaner figure because of the influence of the cosmetic, fashion or cultural ideal[20]. A normative increase of pubertal girls' body fat tissue leads to increased concern about their appearance[18].

In our study, the majority of the observed subjects – 75% – belonged to the normal weight status category, determined by criteria of the most recent international standard, and majority of them, as expected, accurately reported their weight and height.

Madrigal et al. (2000) in a cross-sectional study of 15,232 adults from 15 countries of the EU combined anthropometric measures and silhouette rating scales[9]. Overall, men showed a higher tendency to underestimate their body mass index than women. Adult males self-assessed their BMI as lower in 65.2% of cases – as did 32.2% females. Younger men and women reported significantly more frequent lower values regarding their age: 15–34 year olds 71.4% and 33.4% vs. 35–54 year olds 68.3% and 31.7%. The greatest discrepancy appeared in subjects from the Mediterranean countries: 68.7% men and 39.7% women, which best reflects the present sample.

This study also demonstrates that adolescents can estimate with some accuracy their body size using figure ratings scales, girls being more accurate then boys which is consistent with previous evidence from a European cohort[9,28]. Body dissatisfaction was extremely common both in girls and boys[12,29]. This is interesting given that previous research indicated that when dissatisfied, boys tend to want to increase in size. But, the magnitude of body size dissatisfaction and estimated body size discrepancy was much higher for problem weight adolescents. This suggests that though prevalent among adolescents, body dissatisfaction is more common and significantly higher in heavier adolescents. Given this observation, it is crucial in detecting overweight and obesity that actual measurements are conducted whereas self-reported weights and heights appear to be adequate for those studies which are not focused on detecting prevalence of overweight and obesity.

REFERENCES

1. IASO INTERNATIONAL OBESITY TASK FORCE, Childhood obesity report, Available from: . — 2. BATTLE EK, BROWNEL KD, Addict Behav, 21 (1996) 755. — 3. PIRIE P, JACOBS D, JEFFREY R, HANNAN P, J Am Diet Assoc, 78 (1981) 601. — 4. PALTA M, PRINEAS RJ, BERMAN R, HANNAN P, Am J Epidemiol, 115 (1982) 223. — 5. ROWLAND ML, Am J Clin Nutr, 52 (1990) 1125. — 6. KUSKOWSKA-WOLK A, BOSTROM G, ROSSNER S, Diabetes Res Clin Pract, 10 (1990) S 155. — 7. SCIACCA JP, MELBY CL, HYNER GC, BROWN AC, FEMEA PL, J Community Health, 16 (1991) 159. — 8. ZIEBLAND S, THOROGOOD M, FULLER A, MUIR J, J Epidemiol Community Health, 50 (1996) 105. — 9. MADRIGAL H, SANCHEZ-VILLEGAS A, MARTINEZ-GONZALEZ MA, KEARNEY J, GIBNEY MJ, IRALA J, MARTINEZ JA, Public Health, 114 (2000) 468. — 10. STUNKARD AJ, SORENSEN T, SCHULSINGER F, Res Publ Assoc Res Nerv Ment Dis, 60 (1983) 115. — 11. STUNKARD A, Percept Mot Skills 90 (3 Pt 1) (2000) 930. — 12. TIGGEMANN M, WILSON-BARRETT E, Int J Eat Disord, 23 (1998) 83. — 13. COLLINS ME, Int J Eat Dis, 10 (1991) 199. — 14. THOMPSON SH, CORWIN SJ, SARGENT RG, Int J Eat Disord, 21(1997) 279. — 15. RAND CS, WRIGHT BA, Int J Eat Disord, 28 (2000) 90. — 16. MARKOVIC J, VOTAVA-RAIC A, NIKOLIC S, Coll Antropol, 22 (1998) 221. — 17. EPSTEIN LH, MCCURLEY J, MURDOCK RC JR, Addict Behav, 16 (1991) 369. — 18. THOMPSON MA, GRAY JJ, J Pers Assess, 64 (1995) 258. — 19. THOMPSON JK, Assessment of body image. In: ALLISON DB (Ed), Handbook of Assessment Methods for Eating Behaviors and Weight-Related Problems (Sage, Thousand Oaks, 1995). — 20. MUELLER WH, JOOS SK, SCHULL WJ, Int J Obes, 9 (1985) 193. — 21. JORGA J, ĐORĐEVIĆ I, MARINKOVIĆ J, BACKOVIĆ D, Ann Nutr Metabol, 45 Suppl (2001) 487. — 22. WORLD HEALTH ORGANIZATION, Obesity: Preventing and Managing the Global Epidemic (WHO Technical Report Series 894, Geneva, 2000). — 23. COLE TJ, BELLIZZI CM, FLEGAL MK, DIETZ WH, BMJ, 320 (2000) 1. — 24. BARANOWKSI, M JORGA J, DJORDJEVIC I, MARINKOVIC J, HETHERINGTON MM, Eur Eat Disorders Rev, 11 (2003) 478. — 25. RODIN J, Ann Inter Med, 119 (1993) 643. — 26. ATTIE I, BROOKS-GUNN J, Dev Psychol, 25 (1989) 70. — 27. BAYLEY L, BASTIANI-ARCHIBALD A, GRABER J, BROOKS-GUNN J, Int J Eat Disord, 28 (2000) 155. — 28. SANCHEZ-VILLEGAS A, MADRIGAL H, MARTINEZ-GONZALEZ MA, KEARNEY J, GIBNEY MJ, DE IRALA J, MARTINEZ JA, J Hum Nutr Diet, 14 (2001) 93. — 29. COHANE HG, POPE GH, Int J Eat Disord, 29 (2001) 373.

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ALTERNATIVNE METODE MJERENJA NUTRICIJSKOG STATUSA KOD ADOLESCENATA

SAŽETAK

Cilj ovog istraživanja bio je otkriti valjanost ljestvice za rangiranje debljine na temelju prikazanih obrisa (»figure rating scale« FRS) u usporedbi sa izmjerenim vrijednostima visine i težine kod grupe adolescenata.U istraživanja je bilo uključeno 245 adolescenata, učenika beogradske osnovne škole u dobi između 11 i 14 (12,33±0,50) godina. Nutricijski status dobiven je antropometrijskim mjerenjima i temeljem prikazanih obrisa tijela. Rezultati su pokazali značajne razlike u procjenjivanju nutricijskom statusu ovim metodama.Većina adolescenata normalne težine odgovarala je njihovu rangiranju temeljem prikazanih obrisa tijela. Postotak ispitanika bio je značajno veći u grupi pretilih nego u grupi ispitanika normalne težine (χ^2 = 9,741, p<0,003). Povezanost indeksa tjelesne mase i procjene temeljem ljestvice za rangiranje debljine na temelju prikazanih obrisa tijela bila je pozitivna i izrazito značajna (p<0,001). Ljestvica za rangiranje debljine na temelju prikazanih obrisa tijela pokazala se prikladnom za adolescenate normalne težine, ali ne i za pretile. Ova su istraživanja također pokazala da adolescenti mogu sa priličnom točnošću odrediti svoju veličinu tijela koristeći se ljestvicom ta rangiranje debljine na temelju prikazanih obrisa.