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Perception of fatness

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Abstract
The study's objective was to find out whether there is a relationship between bodily fatness traits described with anthropometric measurements and the assessment of the physical attractiveness of people with different degree of fat deposition. Furthermore, an attempt was made to answer the question whether we perceive the physique of another man as a whole or if we pay more attention to certain parts of the body and whether there is a stereotype of desirable fat deposition.

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Introduction

Our perception of another human being always involves two types of information. First type encompasses the information about these properties of a perceived object or person which could be designated "objective" properties. These information are also called "descriptive" or "depicting" and they represent the traits of a perceived person, regardless of the emotional attitude of the perceiving person. The descriptions of definite physical traits and the data on human behaviour and general properties referring to behaviour are information of this type. Thus, for instance, a bit of information saying: "intelligent" contains a descriptive component, since one can identify a class of behaviour types which should be manifested by so described human being. The other type of information received in the process of perception of a human being are information pertaining to "value" [LEWICKA, TRZEBIŃSKI 1985], called also "affective" or "emotional" information. The term "value" should be understood also as an assessment being a derivative of emotionally pleasant or unpleasant experiences with the object (perceived person) or resulting from a confrontation of descriptive properties of the appraised person with the definition features of the ideal state. Affective (emotional) information are based on descriptive information which make it possible to ascertain the fact of the occurrence of a specific trait in a given object. One of the characteristics of the perceived people is their physical attractiveness. The characteristic has a significant influence on the shaping of social relationships and is widely used as a classification criterion. The manner in which a given person is treated and appraised depends to a high degree on the evaluation of his/ her attractiveness.

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Definition of attractiveness

In the anthropological practice the notion of physical attractiveness is treated as a morphological trait [STRZAŁKO, KASZYCKA 1990, 1992]. It is regarded as a complex feature exhibiting continuous variability. Variants of this variability form a scale called the scale of attractiveness (for instance, a five degree scale: not quite attractive, quite attractive, moderately attractive, very attractive and exceptionally attractive proposed by ARGYLE [1991]).

Physical attractiveness is the most important feature discovered in a beloved person [WOJCISZKE 1993] and in spite of the fact that, similarly to the stature or the colour of hair, it is treated as a morphological trait it is not an objective characteristic. Depending on the circumstances the same person may be regarded as a very attractive one or only common. Experiments on the evaluation of attractiveness indicate that, for instance, physiological stimulation induced by physical effort may lead to a more favourable evaluation of the attractiveness of a potential partner. This is conditional on the shift of attention from the actual source of physiological stimulation to the potential partner [WOJCISZKE 1993]. Studies conducted in this field [STRZAŁKO, KASZYCKA 1990, 1992] have shown that physical attractiveness is related to the values of morphological traits most common in the population; girls in a group rated attractive showed the values of traits within the middle range of their distribution. The final conclusion drawn from the studies of face attractiveness is as follows: the persons whose appearance shows possibly the greatest conformity with the species standard are considered to be the most attractive partners [STRZAŁKO, KASZYCKA 1990, STRZAŁKO, KASZYCKA, KUJAWA 1996, KUJAWA 1997]. Human physical traits are translated into the language of psychological properties. In psychological literature the phenomenon is known as "metaphoric generalisation" [SKARŻYŃSKA 1981]. Metaphoric generalisation denotes a tendency to look for relationships between physical and mental traits. Persons denoted as pretty, attractive or alluring are perceived as sexually warmer, more responsible, sensitive and kind. Beautiful people are tended to be considered good as well [ARONSON, WILSON, AKERT 1997, ARGYLE 1991, KUJAWA 1997]. The outward aspect affects people's mutual expectations to a considerable extent. It seems we like good looking people more than the ugly ones whom we tend to ascribe negative attributes, such as aggressiveness. We know from research conducted by psychologists that attractive men and women have more successful private and professional lives, they find better jobs, receive better marks, they are considered more effective socially, better adjusted, more balanced [LEWICKA, TRZEBIŃSKI 1985, ARONSON, WILSON, AKERT 1997]. In conflict situations we tend to blame a person regarded as unattractive. People rated attractive are sometimes privileged, since any doubts which arise are solved to their benefit and they are treated more leniently [ARONSON, WILSON, AKERT 1997].

Fatness

A great majority of studies on physical attractiveness involved the study of features of the face, a smaller number of them dealt with the physique. It is interesting to what degree stoutness affects

the assessment of attractiveness. The analysis of the results of research conducted in the recent years in the villages in Kashubia region in Poland pertaining to the impact of fatness of the body on the selection of a partner seems to confirm the existence of certain preferences with regard to this trait. The stereotype according to which plump physique was favoured was refuted in that study. It turned out that both women and men showed preference for slim partners [PTASZYŃSKA 1996].

Undoubtedly, the stereotypes or standards of physical attractiveness with regard to fatness have undergone numerous changes over the centuries. This has been well illustrated by the trends in the pictorial art and sculpture. Beauty standards have changed depending on the culture or even within the same culture in various stages of its history. For a long time now psychologists have tried to determine the features a person should possess to be considered attractive. It turns out that in the past apart from good health, and bodily cleanliness also "plumpness" was perceived as one of important attributes of beauty [LEWICKA, TRZEBIŃSKI 1985].

Cultural differentiation of beauty criteria is vast. What is more, various beauty standards encompass mutually exclusive traits. On the one hand, people valued plump and ample proportions, on the other hand slim and slender bodies were praised. Charles Darwin in his work *On the origin of species...* quotes the following standard of beauty prevailing among North American Indians: "Ask an Indian from the North what a beauty is and he will tell you she has got a wide, flat face, small eyes, protruding cheekbones, three or four lines across each cheek, low forehead, big, wide chin, awkward hooked nose, brown and red skin and breasts hanging down to her waist" (cited after WOJCISZKE [1993]).

It seems that beauty stereotypes refer to a higher degree to women than to men. However, this is a debatable statement, since psychologists point out to the fact that in the cultures where woman and man have equal rights in the choice of partner the care for external appearance is of equal importance for both sexes.

Problems with the effects of obesity have accompanied man since the earliest times and for a long time have been a topic of interest. The attitude towards obesity has often been ambivalent. On the one hand it has been seen as a symbol of wealth and prosperity, on the other hand as a result of gluttony. Also nowadays there is a certain duality in the treatment of obesity. It is usually perceived negatively in adults, while in children it is taken for a sign of good health.

The earliest findings from the excavations of Upper Palaeolithic, dated back to the period between 25,000 to 10,000 years B.C. indicate that obesity could have been a desirable feature. Figurines of strongly adipose women (*Venus*) were probably sexual and maternity symbols as well as an embodiment of the beauty ideal of that time.

In the old cultures such as the ancient Egypt or Rome excessively ample proportions were undesirable, at least in higher social strata [TATOŃ 1985]. Sometimes the excess of adipose tissue was treated as a social problem. Hippocrates was the first physician ever to promote the opinion that obesity can shorten the span of human life and is a reason of infertility in some women.

To answer the question about the contemporary ideal of a beautiful physique it is enough to turn to the mass media promoting the image of a sylphid on a previously unknown scale. A contemporary "beauty" is a woman 180 cm tall whose weight only slightly exceeds 50 kg. No wonder then that women have to suffer a great deal of self-denial following extremely strict diets in order to attain the ideal. The weight-losing craze spreads over numerous countries. It is possible that the grounds for anorexia may be associated with the craving to be slim. The disease affects mostly teenage girls and young women of twenty odd years of age [ZIMBARDO, RUCH 1994].

Psychologists indicate that in some cases obesity may be advantageous both somatically and psychologically – it may sometimes protect from osteoporosis and help give an impression of a generous and jovial person. It also helps attract attention of other people [BASDERANT, LA BARZIC, GUY-GRAND 1996].

This paper deals with the topic of the perception of fatness in man.

Adipose tissue

Adipose tissue (textus adiposus) is a variety of connective tissue. It is made up mainly of cells, its intercellular substance being very scarce. In the course of the ontogenetic development the tissue occurs in two forms: as yellow fat and brown fat. The process of the multiplication of fat cells is called proliferation. What is characteristic of adipose tissue is the fact that the specific number of its cells which developed at the moment of the tissue formation does not increase in the course of ontogenesis. The differences in the degree of fatness in particular individuals result from differences in the saturation of cells with fat.

Adipose tissue cells occur in the form of complexes forming pyramid- shaped lobules. Particular lobules are separated with the well vascularized tela conjunctiva [TATOŃ 1985]. Adipose tissue plays an important role in the maintenance of the homeostasis in the organism. Its main task is to store fat, provide thermal insulation and protection against mechanical injuries for the organs located under the skin. Some adipose cells act as heat generators. Functions of adipose tissue depend to a certain degree on the sex and age of an individual. Different areas of the tissue can react to hormonal factors in a different way. And thus, estrogens stimulate the growth of cells in the area of the abdomen and hips and can result in gynoidal obesity (adipose tissue accumulates in the lower part of the body). Androgens have the opposite effect. They cause the growth of fat cells in the upper part of the body, that is in shoulder belt and the thorax. In this way they are responsible for androidal obesity [TATOŃ 1985].

Obesity may increase the risk of incidence of cardiovascular system disease or diabetes. Research on obesity indicates that androidal obesity is more frequent among diabetics than the obesity of gynoidal type. Accumulation of adipose tissue in the area of abdominal cavity is, regardless of the body weight, a metabolic risk factor and a factor of vascular complications [BASDERANT, LE BARZIC, GUY-GRAND 1996].

Study objectives

The objective of this study was to find out whether any relationships exist between the traits of the fatness, described with anthropometric measurements and the assessment of the physical

attractiveness of persons with a different degree of fatness. Furthermore, it aimed at providing answers to the following questions:

1. Do we perceive the human physique as a whole or do we pay special attention to certain parts of the body when observing another person?

2. Is there a stereotype of desirable stoutness resulting from the current fashion?

Materials and methods

The material used in this study was collected in two stages. In 1992 the employees of the Institute of Anthropology of Adam Mickiewicz University in Poznań took measurements and carried out a survey among 78 school girls from the Grammar School in Kleczewo, the Konin province. The remaining proportion of the data were collected in 1996 in two secondary schools in Poznań: the Grammar School No. 4 and the Grammar School No. 12. The measurements were taken from the total number of 139 girls. Based on the assumption that women pay particular attention to their appearance the study involved the examination of girls between 15 and 17 years of age.

The first set of data contained the measurements taken with the use of standard anthropometric equipment. The weight and stature of the body as well as the arm, thigh, waist and hips circumferences were measured. The measurements were taken according to the widely used Martin's method [MARTIN 1928].

Another element of the study was the measurement of the thickness of ten skinfolds. The measurements of subcutaneous fat deposits were taken with callipers method, with the use of the Harpender fold gauge with 10g/ mm^2 contact surface load, with 0,1 mm accuracy. The measurements were taken at the left side of the body in the following places:

1. on the cheek – horizontal fold at the level of auricular tuberculum;

2. on the chin – longitudinal fold below the edge of the chin;

3. on the thorax – anterior dermal fold above the greater pectoral muscle, just below the axilla;

4. on the thorax – lateral dermal fold in the axilla line at the level of the tenth rib;

5. on the scapula – fold running askew to the side and down from the bottom of the angle of the scapula;

6. on the arm – longitudinal fold above the triceps muscle of arm, in the middle of the distance between the acromion and olecranon;

7. on the abdomen – transverse fold, slightly down and to the side of the navel;

8. above the iliac ala – dermal fold in the side line of the body above the upper edge of iliac crest;

9. above the knee – longitudinal fold above the knee just above the knee cap;

10. on the shank – longitudinal fold on the posterior of the calf, slightly above the popliteal fossa.

The choice of the folds was based on the proposal of Pařizkova et al. [CHRZANOWSKA 1993].

The other set of data was obtained from a survey on the assessment of the overall physical attractiveness of the physique as well as the assessment of the fatness of the body (plumpness) and its selected parts, namely hips, thighs and arms. The scale of marks provided in the questionnaire reflected the scale of

school marks. This was a six-point scale ranging from 1 to 6, with the accuracy up to 0.5 of a mark. The girls were told they could assign a higher mark if in their opinion a trait was an attractive one. Each girl was appraised many times by her peers who acted as judges. A total number of 135 questionnaires was obtained. They were subsequently used to assess the relationship between fatness traits and the assessment of attractiveness.

The preliminary evaluation of the material involved the basic parameters of distributions for each of the measured traits: arithmetic mean (m), standard deviation (sd) as well as skewness (a) and kurtosis (k) coefficients. In the statistical tests conducted the significance coefficient was adopted at the value of 0.05.

On the basis of direct measurements of the thickness of skinfolds the total for 10 folds and fold totals for the face, extremities, entire trunk and its lower and upper part were calculated. The data on the shape and proportions of the body were represented numerically with a set of indices. Their type and number was determined by the requirements of the study. Thus, the following indices were calculated in the present work: waist circumference/ hip circumference ratio, circumferentially deposited fat/ centrally deposited fat ratio (total of extremity folds/ total of trunk folds ratio) [CHRZANOWSKA 1993]; Rohrer's index calculated according to the following formula:

$$RI = \frac{RM \cdot 10^5}{W^3}$$

where:
RM – actual body weight [kg]
W – stature [cm]

The values of this index up to 1.24 were classified into category "slim", from 1.25 to 1.36 – into category "average", and values exceeding 1.36 – category "stout".

The values of the measurements of skinfolds showed skew distribution. That is why they were transformed logarithmically (based on natural logarithm).

For the assessment of relationships between the stoutness (characterised with the traits described above) and the assessment of attractiveness of persons with a given degree of stoutness Pearson's r-correlation coefficients were used.

Due to the skewness of correlations of certain variables (which may affect the r value) the assessment of relationships between the traits was repeated with the use Spearman's correlation ranks.

Statistical significance of the dependency between the value of the trait under study and its assessment was tested also with χ^2 test for a two-fold 2x3 table. Next, the index

$$\varphi = \sqrt{\frac{\chi^2}{n}}$$

approximating the strength of correlation was calculated,

The assessment of the statistical significance involved the use of a two-fold 2x3 table, since the assessments of the physique attractiveness were classified into two categories – high assessments (medium and high marks) and low assessments. The traits being morphological measurements were split into three

Table 1. Parameters of morphological traits distributions within the group under study

trait	*m*	*sd*	*k*	*a*
stature [mm]	1636.9	634.2	- 0.53	- 0.04
body weight [kg]	58.0	8.93*	2.51**	1.3
arm circumference [mm]	246.7	30.5	0.57	0.9**
thigh circumference	532.1	47.6	0.54	0.41
hips circumference	927.3	63.4	2.51*	0.51**
Rohrer's index	1.31	0.2	4.12*	0.37
thigh circumference/ hips circumference ratio	71.6	4.24	1.37*	0.89**

*, ** – significantly different from zero (for p = 0.05 and p = 0.01 accordingly)

categories. The middle category encompassed the values from $[m - 0.5\ sd]$ to $[m + 0.5\ sd]$.

With regard to the assessments concerning the trait "stoutness degree" the material was divided into two groups: the positive one (slim persons) and the negative one (stout). To establish the significance of differences between mean values in these two categories Student's *t*-test was used.

The appraisal of the conformity of the assessments of judges was carried out with the use of the repeatability method based on taking multiple measurements of the same trait in the same individuals. Multiple measurements of a given feature may be taken by the repetition in time or in space [BUDNIK 1989, FALCONER 1974, HENNEBERG & HENNEBERG 1980, KOWALIK 1984]. The assessment of the repeatability coefficient enables to isolate from the overall phenotypic variance a trait (V_p), its source components (including the case of the "error" variance – differentiation of particular judges' assessments). The value of the repeatability coefficient falls within the 0 to 1 range. The closer the value obtained approaches one the greater the conformity of assessments. In the present study each of the girls was subjected to multiple assessments by a group of 135 judges. Particular girls were appraised by groups of judges of varying size. That is why, a mean number of repetitions for each girl was calculated according to the following formula:

$$\bar{n} = \frac{1}{k-1}\left(\sum_{i=1}^{k} Ni - \frac{\sum_{i=1}^{k} Ni^2}{\sum_{i=1}^{k} Ni}\right)$$

where:
Ni – number of measurements (repetitions – i for a given individual)
k – total number of subjects

For the calculation of the repeatability index for the estimations of judges' conformity the following repeatability formula was applied:

$$R = \frac{\bar{n} V_{p(n)}}{(\bar{n} - 1) Vp} - \frac{1}{\bar{n} - 1}$$

where:
n – mean number of repetition
$V_{p(n)}$ – phenotypic variance in a given individual, calculated on the basis of the average marks received by each girl
V_p – overall phenotypic variance of a trait – in a given assessment by the judges

To distinguish repeatability from Pearson's *r*-correlation repeatability was denoted with the symbol *R*.

Table 2. Parameters of skinfolds distributions within the group under study

	direct parameters				logarithm values			
trait	*m*	*sd*	*k*	*a*	*m*	*sd*	*k*	*a*
cheek fold	10.47	2.42	0.16	- 0.43	2.32	0.26	1.85*	- 1.25**
chin fold	8.86	3.07	- 1.17*	0.28	2.12	0.36	- 1.05*	- 0.16
above pectoral muscle	9.2	3.4	- 1.21*	0.13	2.14	0.4	- 1.06*	- 0.33
at X rib level	10.65	4.41	5.36*	1.57**	2.29	0.4	- 0.09	- 0.02
below scapula	11.23	4.82	6.67*	2.07**	2.34	0.38	0.9	0.17
on arm	11.1	3.62	4.34*	1.36**	2.36	0.32	1,07*	- 0.21
on abdomen	12.37	5.28	2.29*	1.12**	2.42	0.43	0.12	- 0.34
above iliac ala	10.7	4.52	4.29*	1.36**	2.39	0.41	- 0.39	- 0.03
above knee	10.35	3.92	6.08*	1.55**	3.97	0.09	0.26	0.11
on shank	10.15	3.41	0.45	0.41	2.26	0.36	- 0.41	- 0.44
10 folds total	102.89	31.3	4.86*	1.29**	4.59	0.3	2.47*	- 0.53**
total for trunk	53.13	19.33	6.14*	1.81**	3.91	0.33	1.23*	0.11
total for extremities	30.85	9.89	3.82*	1.01**	3.37	0.34	2.1*	- 0.77**
total for face	18.98	4.75	- 0.55	- 1.32	2.88	0.34	5.66*	- 1.8**
total for shoulder belt	30.35	11.11	5.34*	1.61**	3.35	0.35	1.07*	- 0.09
total for pelvic belt	22.78	9.25	4.32*	1.54**	3.05	0.38	0.31	0.05
extremities fat/ trunk fat ratio	60.42	14.63	0.32	0.63**				

* significantly different from zero (p = 0.05; ** p = 0.01)

Table 3. Parameters of distributions of marks assigned by the judges (1–6 scale of marks)

	physical attrac-tiveness	stoutness of the body	thigh stoutness	arm stoutness	hips stoutness
m	4,38	4,43	4,34	4,47	4,36
sd	0,59	0,59	0,59	0,47	0,57
k	0,2	1,3	1,61	0,92	1,26
a	0,43	- 0,8	0,91	- 0,72	- 0,72

Results

Tables 1 and 2 represent the compilation of the values of measurements of the location, dispersion, skewness and kurtosis for the stature and body weight, circumferences, skinfolds, totals of these folds and for the indices.

One of the objectives of the present study was to find out whether there are any relationships between the traits of fatness in the body, described by means of anthropometric measurements and with indices and the assessment of the degree of stoutness in a person. For this purpose Pearson's *r*-correlations were calculated. The results are represented in Tables 4, 5, 6 and 7.

Table 4. Correlations between stoutness of the body and selected measurements

trait	assessment of stoutness	
	Spearman's rank correla-tions	Pearson's *r*-correlations
assessment of physical attractiveness	0.8124*	0,8580*
body weight	- 0.419*	- 0,5956*
RI	- 0.5637*	- 0,4740*
extremities / trunk fatness ratio	0.0657	0.0936
10 skinfolds total	- 0.19*	- 0.2574*
total skinfolds for trunk	- 0.2121*	- 0.3072*
total skinfolds for extremities	- 0.1768*	- 0.2186*
total skinfolds for shoulder belt	- 0.2537*	- 0.3223*
total skinfolds for pelvic belt	- 0.1473	- 0.2286*

* statistically significant

Table 5. Correlations between the assessment of hip stoutness and selected measurements

trait	assessment of hip stoutness	
	Spearman's rank correla-tions	Pearson's *r*-correlations
skinfold above iliac ala	- 0.5274*	- 0.3072*
skinfold on abdomen	- 0.1938*	-0.1572
total skinfolds for iliac belt	- 0.215*	- 0.2466*
hip circumference	- 0.4721*	0.5785*
waist circumference/ hip circum-ference ratio	- 0.176*	- 0.2875*

* statistically significant

Table 6. Correlations between the assessment of thigh stoutness and selected measurements

trait	assessment of thigh stoutness	
	Spearman's rank correlations	Pearson's *r*-correlations
skinfold above knee	- 0.2417*	- 0.5461*
thigh circumference	- 0.4756*	- 0.5701*

* statistically significant

Table 7. Correlations between the assessment of arm stoutness and selected measurements

trait	assessment of arm stoutness	
	Spearman's rank correlations	Pearson's *r*-correlations
skinfold on arm	- 0.1773*	- 0.2418*
arm circumference	- 0.2268*	- 0.3664*

* statistically significant

Table 8. Test on the independence of two traits – χ^2

Traits	χ^2 value
assessment of stoutness of the body – skinfolds total	16.21*
assessment of stoutness of the body – Rohrer's index	39.12*
assessment of stoutness of the body – body weight	21.72*
assessment of hip stoutness – total folds for iliac belt	11.03*
assessment of hip stoutness – hips circumference	16.21*
assessment of hip stoutness – waist circumference/ hip circumference ratio	0.15
assessment of arm stoutness – fold on arm	2.35
assessment of arm stoutness – arm circumference	3.74*
assessment of hips stoutness – fold above knee	6.3*
assessment of thigh stoutness – thigh circumference	20.29*

* significant values

As it has already been mentioned, distributions of the studied traits sometimes showed a great degree of skewness. Not always was it eliminated by subjecting the data to the logarithmic transformation. The skewness of distributions could have affected the values of Pearson's *r*-correlation coefficients. For this reason also another method enabling to study dependencies between traits was used. The method was Spearman's rank correlation. It is worth emphasising that the values obtained with this method are lower than the values obtained with Pearson's *r*-correlation method.

In order to confirm or refute the obtained correlation values the non-parametric $\chi 2$ test was used. Table 8 contains a set of selected traits and the test results.

The population of girls under study was split into two groups based on the received marks referring to the "degree of fatness". The division was based on the value of the median for the assessment of this trait. The group of girls who received the marks higher than the median value was rated slim, while the girls with the marks below the median – stout. The arithmetical mean and standard deviation were calculated for each of the groups for the following traits: Rohrer's index, body weight and the total of skinfolds. The significance of the differences between the mean values of the both groups was checked with Student's t-test. Comparing of t^0 value with $t_{\alpha = 0.05}$ made it possible to reject zero hypothesis (H_0) assuming the insignificance of the differences between the mean values.

In accordance with the expectations, the first group was composed of the girls with lower values of the studied traits. On average their body weight was lower, they had a lower total of adipose folds and lower value of Rohrer's index.

The conformity of the judges regarding the marks they assigned appraising the degree of fatness was measured with the repeatability coefficient *R*. Since each girl was apprised by a different number of judges, a mean number of repetitions $\overline{n} = 16.74$ was calculated. Thus, each girl was appraised on average by approximately 17 judges. The repeatability coefficient calculated for the group under study was 0.36. Hence, it was assumed that in approximately 36% of cases common marks were a result of identical aesthetic judgement of the judges.

Discussion

The preliminary assessment of the studied group and the confrontation of the results characteristic for it with the available comparative material [CHRZANOWSKA 1992] showed that the studied subjects' bodies showed slightly higher degree of fatness than other Polish girls of this age. The comparison involved the totals of 10 skinfolds characterising general subcutaneous fatness in the body. From the population studied by Chrzanowska three age groups corresponding to the age of the girls examined in the present study were selected. On the basis of the data referring to these groups median and weighted deviation of the dermal folds total were calculated. The differences between the mean values checked with Student's t-test turned out to be statistically significant. However, the differences could have resulted from the diversity of material composed of urban and rural girls.

In the study three indices were calculated. These were: Rohrer's index, the waist circumference to hip circumference ratio and the extremity fat to trunk fat ratio. Selection of these indices resulted from the intention to capture the body proportions and to find out whether the studied girls pay attention to the shape of particular parts of the body when appraising the physique and its components. The results obtained indicate that while appraising the obesity one does not pay much attention to the way fat is distributed in the body (no statistically significant correlations were found between the assessment of the general fatness and the limb fat to trunk fatness ratio). On the other hand, the circumferences ratio shows slight but still statistically significant correlation with the assessment of the size of the hips. The result obtained was surprising inasmuch as it seemed that the girls would rather pay attention to the feminine body proportions which can be reflected by the above mentioned ratio. However, it turned out that in the studied group of girls this particular trait exerted no great influence on the assessment of the physique. It was Rohrer's index that proved to be the most representative one. This value shows the rela-

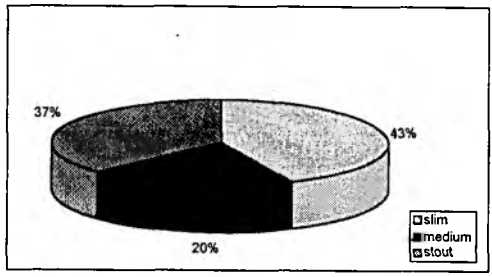

Fig. 1. Distribution of Rohrer's index

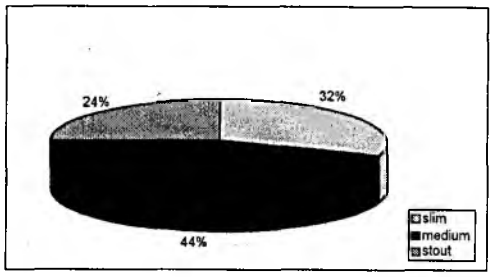

Fig. 2. Distribution of the waist / hip circumference ratio

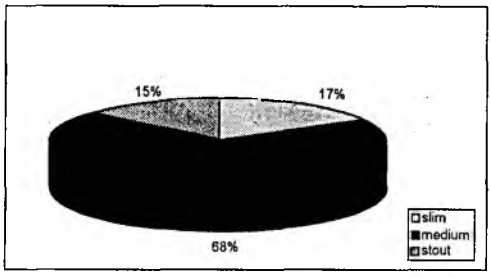

Fig. 3. Distribution of the extremities / trunk fatness ratio

tion between the weight of the body and the stature and enables to capture their mutual proportion relatively accurately. In the studied group of girls the category of slim girls prevailed (though only slightly). Most of the subjects who received high marks for the degree of fatness in the physique fell in this category. This result seems to be significant, since the principal question posed in this study referred to the influence of the degree of fatness on the assessment of the attractiveness of an individual. It seems the answer to this question is positive. In the group of girls under study the quantity of the adipose tissue proved to be of significance for the assessment of the physique. The fact that the girls were going through the age at which they carefully watch their appearance may be a likely explanation to this result. It is possible that mature women would demonstrate a different attitude towards the adiposity problem. However, to ascertain that one should conduct research in various age groups gathering people of various education level and economic status.

The population of girls under study was split into two groups. The fatness degree of one of the groups was appraised in a positive way (slim girls), while the other group was given negative marks (stout girls). The differences between the mean values (calculated for the assessment of the degree of fatness in the body, Rohrer's index, the total of 10 skinfolds and the body weight) describing each group were compared with the use of Student's t-test and proved to be statistically significant. This means that the group rated positively with regard to stoutness was composed of the girls with lower index values, lower body weight and lower total of 10 skinfolds but receiving higher marks for the physique attractiveness. This result confirmed a conviction that the group of attractive girls would consist of those girls whose traits had values below the mean value.

In order to determine the relationships between the fatness traits and the assessment of attractiveness also correlation coefficients were calculated. The values of Spearman's rank correlation coefficients were slightly lower than the values of Pearson's r-correlation. However, the same direction of dependencies was maintained. This means that if the value of Pearson's r-correlation was high enough, significant and negative, then the rank coefficient – though lower – still turned out to be statistically significant and negative. The values of χ^2 test corroborated the fact that the biological trait of fatness (expressed as the size of the circumferences of the body and the thickness of folds) is perceived and, what is more, is important for the assessment of the physique (the test values are statistically significant).

The overall attractiveness is unquestionably a complex of numerous features, including mental and physical traits. From the point of view of the human biology the latter (physical traits) seem to be more interesting. The biological feature taken into consideration in the present study was the degree of fatness of the body.

The studied girls were asked to mutually rate their physiques and the degree of fatness, stoutness of the arms, hips and thighs in order to mutually appraise their attractiveness. Apart from the question whether slim, medium size or even stout girls would be regarded as attractive also the question of which part of the body was perceived in the most critical way

was taken into account. One could expect that the physique would be perceived as a whole, but there was also an alternative hypothesis. According to this theory there are certain parts of the body to which particular attention is paid. The analysis of the results obtained allowed to formulate the conclusion to the effect that certain parts of the body are appraised in a decisively more critical way than other parts.

In the present study the judges appraising the physique had at their disposal a six-point evaluation scale (ranging from 1 to 6, however marks from 1 to 5 could be raised by 0.5 of a mark). As expected, the extreme marks within the evaluation scale were assigned rarely. On the whole, however, the studied girls rated their mutual attractiveness fairly high, since the mean mark in all categories was almost 4.5.

A question arises: what could be the reason for such high marks? Especially in view of the fact that the research on the assessment of the beauty of the face revealed the opposite phenomenon [STRZAŁKO, KASZYCKA 1990].

It is possible that the discrepancy stems from the differences in the rating systems. Furthermore, it is likely that more severe evaluation criteria are applied to the face. It may be that usually we are more satisfied with our body proportions than with the features of our faces. The research on the attractiveness of the face indicate that "commonplace faces" are considered the most attractive ones [STRZAŁKO, KASZYCKA 1990]. This means that in the face the mean variants of the features are liked most. The situation is slightly different in the case of the assessment of the physique. Here, the girls showing lower than average values were considered the most attractive.

In the studied population girls within a single school form reciprocally appraised their attractiveness. It is likely that mutual sympathy between some girls could affect the assigned marks. In order to at least partially eliminate this potential influence, the girls were asked to list in the questionnaire the pupils in the form they were friends with. The data were subsequently used to compare the marks assigned to a given girl by her girlfriends with the mean value of marks assigned to her by other girls. It turned out that the element of mutual liking had no effect on the overall mark. The values received from friends did not deviate from the values received from other girls.

The evaluation of the conformity of the judges in their perception of the degree of the body stoutness with regard to its attractiveness was measured with the use of the repeatability method. The method has been applied mostly in the studies on the variability in plants and animals, and within the recent 20 years also in the research on humans [FALCONER 1974, HENNEBERG & HENNEBERG 1980, BUDNIK 1989, KOWALIK 1989]. The value of $R = 0.36$ obtained in the present study denotes the total participation of the variance resulting from phenotypic differentiation of the girls' physiques in the overall phenotypic variance of a trait, which in this study were the assessments of attractiveness. Thus, a relatively large proportion of the variance results from the diversity of judges' views on what is attractive. On the basis of the value of R coefficient ($R = 0.36$) we may form a general conclusion that 36% of the judges were concordant grading the attractiveness of other girls. Slightly lower result was obtained by

STRZAŁKO, KASZYCKA [1990] in the study pertaining to the attractiveness of the face. It seems the differences in the degree of conformity of the assessments of attractiveness assigned by judges in both studies arise from two sources. First of all, different methods were used for researching the conformity of assessments issued by the judges (reliability coefficient used in Strzałko & Kaszycka's work versus repeatability coefficient used in the present work). It is also possible that fashion is a factor responsible for a higher conformity of the assessments of the physique than of the face.

Conclusions

1. The degree of fatness of the body undoubtedly affects the assessment of the physical attractiveness. Slim persons are perceived more attractive than moderately adipose and stout persons.

2. Legs and hips are the parts of the body attracting most attention. High values of skinfolds in these parts of the body are perceived as unattractive and entail low assessment value.

3. It seems that the judges' conformity in grading the attractiveness of the physique (with regard to the degree of fatness) stems mainly from cultural trends. It is most likely that fashion is the factor which can "impose" the ideal of the contemporary woman's appearance.

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Streszczenie

Spostrzegając drugiego człowieka, odbieramy dwa rodzaje informacji: afektywną (będącej wynikiem kontaktów z obiektem) oraz deskryptywną (opisującą cechy przynależne osobie spostrzeganej niezależnie od tego jaki jest stosunek osoby spostrzegającej).

Atrakcyjność fizyczna jest cechą, którą spostrzegamy opisując drugiego człowieka, mającą wpływ na kształtowanie relacji społecznych. W antropologii atrakcyjność fizyczną traktuje się jak cechę morfologiczną, nie jest to jednak cecha obiektywna. Ocena atrakcyjności nadawana jest każdemu indywidualnie i jest to ocena zmienna.

W związku z tym, iż większość badań nad atrakcyjnością dotyczyła twarzy w niniejszej pracy podjęto próbę odpowiedzi na pytanie w jaki sposób otłuszczenie wpływa na atrakcyjność fizyczną sylwetki.

W pracy pokazano związek pomiędzy cechami otłuszczenia a spostrzeganiem atrakcyjności sylwetki. Badaniami objęto 135 dziewcząt w wieku od 15 do 17 lat. Badanym zmierzono masę ciała, wysokość ciała, obwody: ramienia, uda, pasa, bioder oraz grubości 10 fałdów skórno-tłuszczowych. Z bezpośrednich pomiarów wyliczono sumę dla 10 fałdów oraz sumy fałdów dla poszczególnych części ciała. Kształt i proporcje ciała przedstawiono za pomocą wskaźników.

W dalszej kolejności poproszono sędziów o dokonanie oceny atrakcyjności fizycznej sylwetki oraz tęgości ciała i wybranych jego części. Oceny mieściły się w przedziale od 1 do 6, przy czym oceny od 1 do 5 mogły zostać podwyższone o 0,5 stopnia.

Najważniejsze wnioski jakie wypływają z pracy można streścić następująco:

1. Otłuszczenie ma niewątpliwie wpływ na ocenę atrakcyjności sylwetki. Osoby szczupłe są uważane za atrakcyjniejsze.

2. Obserwując drugiego człowieka zwracamy przede wszystkim uwagę na nogi i biodra, zbyt duże otłuszczenie tej partii ciała jest spostrzegane jako nieatrakcyjne.

3. Zgodność ocen sędziów świadczy o tym, iż istnieje pewien stereotyp pożądanego otłuszczenia, dyktowany wpływami kulturowymi.