

Gender Differences in Body Composition, Physical Activity, Eating Behavior and Body Image among Normal Weight Adolescents – An Evolutionary Approach

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ABSTRACT

Body composition but also physical activity patterns underlie gender typical differences throughout human life. In the present study the body composition of 354 girls and 280 boys ageing between 11 and 18 years originating from Eastern Austria were analyzed using bioelectrical impedance method. Normal weight according to body mass index categories was a strict inclusion criterion. Information regarding physical activity during school and leisure time, daily nutritional habits, subjective body satisfaction and weight control practices were collected by means of a structured and standardized questionnaire. Results of the analyses reveal that – as to be expected – adolescent boys and girls differed significantly in body composition, but also in physical activity patterns. Even normal weight girls exhibited a significantly higher amount of absolute and relative fat mass, whereas normal weight boys showed a significantly higher amount of fat free body mass. Furthermore male adolescents were significantly more physically active than their female counterparts. According to the results of multiple regression analyses physical activity patterns had beside sex an independent influence on body composition parameters during adolescence. In contrast, girls and boys showed only minor differences in nutritional habits and weight control practices. Nutritional habits, body satisfaction and weight control practices were not significantly related to body composition parameters. The observed gender differences in body composition as well as in physical activity patterns are interpreted in an evolutionary sense.

Key words: childhood, adolescence, body composition, sports, eating behavior

Introduction

Somatic and behavioral gender differences or sexual dimorphism have important implications of the study of human evolution and the development of differences in sexual roles among societies. It is well known, that among humans adult males are on the average taller than adult females, although average male height to average female height show some variation¹. Male and female adults differ not only in stature height, but also in body composition. It is well documented that adult males surpass females in fat free or lean body mass, while females exhibit a quantitative higher amount in absolute and relative fat mass^{2–3}. From an evolutionary point of view, these sex differences in stature and lean body mass seem to be the result of sexual selection caused by male-male competition for mates⁴. The higher amount of fat tissue among

human females may be interpreted as a result of sex typical different energetic demands of successful reproduction⁵. Since energetic requirements for successful reproduction and increased body size for successful male-male competition are not need before sexual maturation, some authors plead for a development of these characteristics of secondary sexual dimorphism not before puberty or adolescence^{2,6}. In contrast, others studies yielded significant differences in body composition even between female and male prepubertal children^{7–11}. But what are the proximate causes for these gender differences in body composition? From an endocrinological point of view the gender typical body composition, characterized by a higher amount of fat tissue among human females and a higher amount of fat free body mass among human

males are caused by sex typical levels of sexual steroids. The significantly higher concentrations of androgens, first of all testosterone, seem to induce the increased development of lean body mass or muscle mass among males. In contrast, the rising concentrations of estrogens are discussed to be responsible for the increase of fat mass observable among human females. However, there are also behavioral differences in prepubertal and post-pubertal girls and boys which might effect body composition: Gender differences in eating behavior but also in physical activity have been the subject of research since the 1970s¹². It is well documented that girls tend to show restricted eating behavior more frequently than their male counterparts, and physical activity is a domain of male achievement¹³. These gender typical behavioral differences may also influence body composition development during childhood and adolescence, however they also might have evolutionary roots. In the present study gender differences in physical activity, nutritional habits and body image are analyzed and interpreted from an evolutionary point of view.

Material and Methods

Subjects

Data collection took place between April and June 2004 in five public schools in Oberschützen, Oberwart and Pinkafeld located in the central part of Burgenland, the most eastern County of Austria. This exceptionally rural area is located between Styria and the International border to Hungary. 354 girls and 280 boys ageing between 11 and 18 years ($x = 14.6 \pm 2.3$) were enrolled in the present study. All subjects were classified as normal weight according to the definition described in the following section. Normal weight probands represented 71.6% of the whole sample ($n = 886$). Underweight ($n = 12$, 12.6%) overweight ($n = 89$, 10.0%) and obese ($n = 51$; 5.8%) adolescents were excluded from the analyses. Since it is not possible to collect any personal data regarding family income from schoolchildren in Austria, we decided to use the educational level of the parents as an indicator of socio-economic status. All parents had finished a minimum of 9 years educational training at schools in Austria, and the great majority (89.9%) had experienced a minimum of 4 years professional training. 24.9% of the parents stay at school until 18 years and reached a high school degree. 5.3% reached University degree too. Only 4.3% of the parents were unemployed at the time of investigation and only 3.8% were fulltime farmers. Therefore we conclude that the great majority of probands belonged to the so called social middle class of rural areas in Austria.

Pubertal status

In order to distinguish between prepubertal and post-pubertal adolescents, age at menarche, the age at voice breaking and facial hair growth were determined for each subject.

Anthropometrics and body composition analyses

Stature was measured with a Martin anthropometer to the nearest millimeter according to the technique described by Knussmann¹⁴. Weight was recorded with a scale precise to ± 100 g. The probands wore only underwear. Weight status was determined using the body mass index (BMI) kg/m^2 . BMI is increasingly used for the diagnosis of underweight, overweight and obesity during childhood and adolescence¹⁵. In the present study the percentiles of the body mass index published by Kromeyer-Hauschild et al¹⁶ for Central Europe were used. According to Kromeyer-Hauschild et al¹⁶ and the recommendations of the European Childhood obesity group¹⁵ we used Percentile 10 to percentile 90 to define normal weight.

Body composition

Body composition was determined using a TBF 310 Body composition analyzer (Tanita Corp.) according to bioelectrical impedance method (BIA). In this BIA system two foot-pad electrodes are incorporated into a precise electronic scale. Impedance of the lower limbs and body weight are measured simultaneously, while the proband is standing on the scale. The electrodes are in contact with soles and heels of both feet. Bioelectrical impedance was measured with 4 terminals and uses a standard of 50kHz – 0.8mA sine wave constant current. The voltage drop was compared with the heel electrodes. The computer software in the machine then used the measured resistance, the programmed probands gender, group (child, adult, athlete) and stature height and the measured weight to calculate the body density based on previously derived equations obtained from regression with under water weighing. This was then applied automatically to the standard densiometric formula according to Brozek to calculate the fat percentage. The following parameters were determined: Absolute lean body mass in kg (LBM), absolute fat mass in kg (FM) and total fat percentage (fat%). The coefficient of variation for within day impedance measurement was 0.9% and between days coefficient of variations was 2.1%^{20,21}. Nunez et al.¹⁷ described the leg to leg pressure contact electrode BIA system as comparable to conventional arm to leg electrode BIA. Furthermore this technique of body composition analysis offers the advantage of increased speed and easy transportation. In the present study this method was especially useful because data collection took place in schools and the probands had only to step on the scale.

Eating behavior, body image and physical activity

All probands were interviewed concerning their nutritional habits, body image and weight controlling practices based on the eating behavior and body image questionnaire developed by Buddeberg-Fischer¹⁸ for adolescents in Switzerland. Additionally data regarding physical activity patterns were collected in a structured interview.

Statistical analyses

Statistical analyses were carried out by means of SPSS program version 11.0. Since the Kolmogoroff Smirnov test indicates that no normal distribution could be assumed for many variables, non parametric tests were applied. After computing descriptive statistics (means, Medians, Standard deviations, relative frequencies), the statistical significance of group differences was tested by means of Mann-Whitney u-tests and Chi-square analyses.

Results

For further analyses the sample was divided into two subsamples. Subsample one contained 324 girls and boys ageing between 11 and 14 years. Sub sample 2 contained 310 female and male adolescents aging between 15 and 18 years.

Gender differences in anthropometrics and body composition

The physical characteristics of both subgroups are shown in Table 1. Regarding the younger age group (11 to 14 years) boys were not significantly different from girls with respect to weight, stature and body mass index. By contrast, this was not true of the older age group (15 to 18 years. Among this subgroup male probands were significantly taller and heavier than their female counterparts. As expected, absolute and relative fat mass were significantly higher in girls and fat free body mass (lean body mass and total body water) was significantly higher in boys. This was true of both age groups.

Gender differences in body image

Summarized in Table 2 are the associations between gender and body image. A significantly higher amount of female probands described their own body as unattractive and non-athletic. This was true of the younger age group ($\chi^2 = 50.2$ $p < 0.0001$), as well as of the older age group ($\chi^2 = 46.2$; $p < 0.0001$). Regarding the subjective rating of the own weight status, a higher amount of female probands rated their own body as too thick. A significant difference between the two sexes however, was found for the older age group only ($\chi^2 = 33.5$; $p < 0.0001$).

Gender differences in physical activity

As to be seen in Table 3, boys were significantly more physically active than girls. Significantly more male probands were active members of a sports club and participated in more physical trainings lessons at school in comparison to female probands. This was true of the younger ($\chi^2 = 38.4$, $p < 0.0001$) as well as of the older age group ($\chi^2 = 131.7$, $p < 0.001$). Furthermore male probands reported that they participate more frequently in physical training lessons during their leisure time. This was also true of the younger ($\chi^2 = 40.3$, $p < 0.001$) as well as the older age group ($\chi^2 = 50.8$; $p < 0.001$). In Figure 1 and 2 sex differences in preferred sportive activities are presented. As to be seen in Table 3, physical activity decreased with increasing age in girls, but not in boys.

Gender differences in eating behavior

Figure 3 describes gender differences in the frequency of thinking about adequate nutrition.

TABLE 1
GENDER DIFFERENCES IN ANTHROPOMETRIC PARAMETERS AND IN BODY COMPOSITION ACCORDING TO AGE GROUP (MANN-WHITNEY TEST)

	Female	Male	
	X (SD)	X (SD)	Significance
Age group 1 (11–14 years)			
Stature (cm)	154.6 (7.9)	154.5 (9.8)	n.s.
Body weight (kg)	45.7 (7.5)	45.6 (8.9)	n.s.
BMI (kg/cm ²)	19.03 (2.09)	18.91 (1.94)	n.s.
Fat mass (kg)	10.1 (3.9)	6.7 (2.9)	P<0.001
Fat percent (%)	14.5 (4.9)	21.4 (6.1)	P<0.001
Lean body mass (kg)	35.7 (4.8)	38.8 (7.3)	P<0.001
Body water (kg)	26.1 (3.5)	28.4 (5.4)	P<0.001
Age group 2 (15–18 years)			
Stature (cm)	163.5 (5.4)	175.1 (9.3)	P<0.001
Body weight (kg)	55.6 (6.5)	65.2 (10.1)	P<0.001
BMI (kg/cm ²)	20.78 (1.85)	21.17 (1.75)	n.s.
Fat mass (kg)	13.5 (4.1)	7.7 (2.9)	P<0.001
Fat percent (%)	23.9 (5.1)	11.6 (3.4)	P<0.001
Lean body mass (kg)	42.1 (3.5)	57.6 (8.4)	P<0.001
Body water (kg)	30.8 (2.7)	42.1 (6.1)	P<0.001

TABLE 2
GENDER DIFFERENCES IN BODY IMAGE (CHI-SQUARE ANALYSES)

	Age group 1 (11–14 years)			Age group 2 (15–18 years)		
	Female	Male	p-value	Female	Male	p-value
Subjective rating of weight status						
Too thick	29.5%	19.7%	n.s.	39.9%	13.5%	<0.001
Too thin	2.3%	3.7%		0.9%	11.2%	
Appropriate	68.2%	76.6%		59.2%	75.3%	
Subjective rating of body shape						
Attractive	49.6%	45.5%	<0.001	45.1%	55.7%	<0.001
Athletic	10.4%	42.0%		7.8%	31.8%	
Unathletic	15.2%	6.8%		19.4%	8.0%	
Unattractive	24.8%	5.7%		27.7%	4.5%	

TABLE 3
GENDER DIFFERENCES IN PHYSICAL TRAINING AT SCHOOL AND DURING LEISURE TIME (CHI-SQUARE-ANALYSES)

	Age group 1 (11–14 years)			Age group 2 (15–18 years)		
	Female	Male	p-value	Female	Male	p-value
Member of a sports club						
Yes	14.4%	63.2%	<0.001	21.3%	62.9%	<0.001
No	85.6%	36.8%		78.7%	36.0%	
Physical trainings lessons (school) Obligatory and facultative ones						
Less than 5	85.8%	59.2%	<0.001	92.9%	48.3%	<0.001
5–8	14.2%	29.3%		7.1%	47.2%	
More than 8	0.0%	11.5%		0.0%	4.4%	
Physical training during leisure time (minimum of one hour)						
Never	3.8%	0.0%	<0.001	16.7%	3.4%	<0.001
1 per week	21.8%	7.9%		43.9%	5.6%	
2–3 per week	47.4%	33.2%		28.1%	32.6%	
4–6 per week	10.5%	27.9%		5.0%	18.0%	
Daily	16.5%	31.1%		6.3%	40.4%	

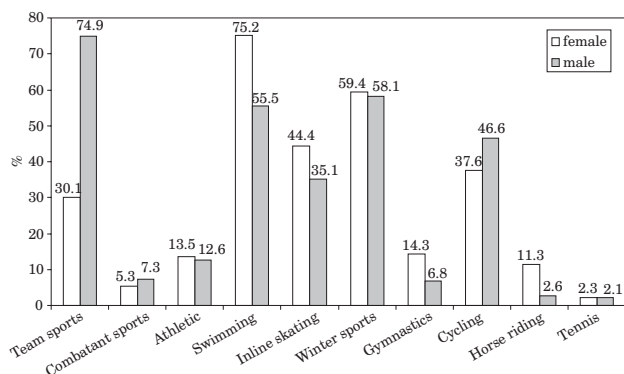


Fig. 1. Preferred sports among 11 to 14 years old adolescents.

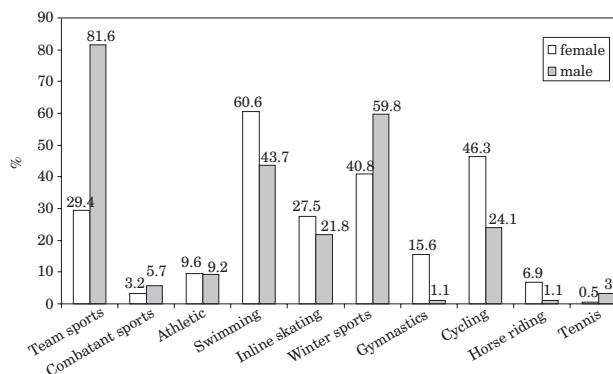


Fig. 2. Preferred sports among 15 to 18 years old adolescents.

Girls reported a significantly higher frequency of thinking concerning adequate nutrition than boys ($\chi^2 = 14.0$ $p < 0.01$). This was especially true of the older age

group ($\chi^2 = 35.5$; $p < 0.001$). No statistically significant gender differences were found regarding the subjective rating of nutritional quality (see Figure 4). Daily nutri-

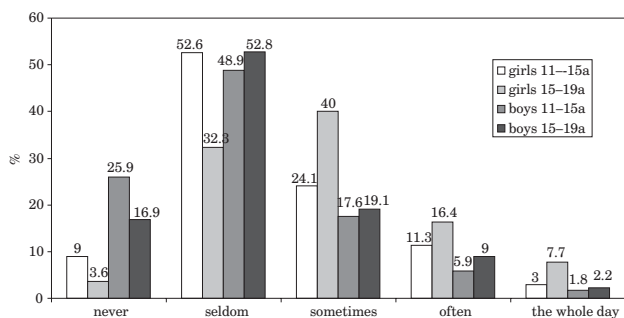


Fig. 3. Gender differences in the frequency of thinking about adequate nutrition each day.

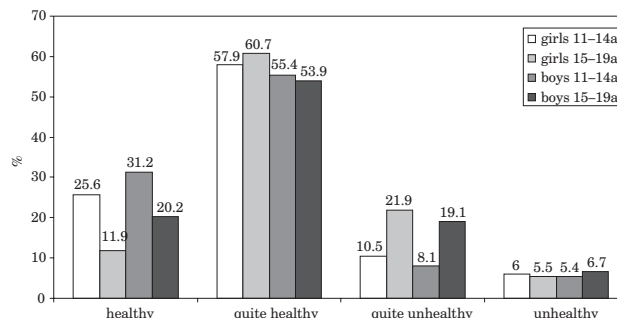


Fig. 4. Subjective rating of personal nutritional quality.

TABLE 4
GENDER DIFFERENCES IN DAILY NUTRITIONAL HABITS (CHI-SQUARE ANALYSES)

	Age group 1 (11–14 years)			Age group 2 (15–18 years)		
	Female	Male	p-value	Female	Male	p-value
Breakfast						
Nothing	32.3%	23.8%	n.s.	32.6%	25.8%	n.s.
Little	45.9%	41.3%		41.2%	33.7%	
Moderate	20.3%	31.7%		21.7%	32.6%	
Much	1.5%	3.2%		4.5%	7.9%	
Lunch						
Nothing	0.8%	0.5%	<0.02	0.5%	1.1%	<0.001
Little	6.9%	6.8%		13.1%	4.5%	
Moderate	75.6%	61.1%		62.9%	48.9%	
Much	16.8%	31.6%		23.5%	45.5%	
Dinner						
Nothing	5.3%	4.2%	n.s.	5.0%	3.4%	<0.005
Little	48.9%	38.4%		31.2%	18.2%	
Moderate	38.2%	48.9%		50.7%	50.0%	
Much	7.6%	8.4%		13.1%	28.4%	
Snacks between meals						
Nothing	19.7%	16.9%	n.s.	30.3%	19.5%	<0.002
Little	43.9%	45.0%		44.5%	32.2%	
Moderate	30.3%	32.3%		19.7%	36.8%	
Much	6.1%	5.8%		5.5%	11.5%	

tional habits are presented in Table 4. Statistically significant differences in eating behavior were found for the older age group only. Boys reported in general more frequent to eat much at breakfast, lunch, dinner and snacks between meals. Statistically significant differences were found for eating habits at lunch ($\chi^2 = 17.1$ $p < 0.001$), dinner ($\chi^2 = 12.7$; $p < 0.01$) and snacks between meals ($\chi^2 = 13.4$; $p < 0.01$) only. Extraordinary higher was the percentage of girls and boys of both age groups, who reported to eat nothing at breakfast. Nearly a third of the girls and 25 of boys of both age groups never had breakfast in the morning.

Gender differences in weight control practices

Table 5 shows the percentage of probands reporting weight control behavior by gender. The percentage of children and adolescents who were attempting weight loss and used weight loss methods was significantly higher among female probands. This was true of the younger ($\chi^2 = 13.4$; $p < 0.004$) as well as of the older age group ($\chi^2 = 16.6$; $p < 0.001$). No gender differences were observable regarding the frequency of stepping on scale and binge eating attacks.

TABLE 5
GENDER DIFFERENCES IN WEIGHT CONTROL PATTERNS (CHI-SQUARE-ANALYSES)

	Age group 1 (11–14 years)			Age group 2 (15–18 years)		
	Female	Male	p-value	Female	Male	p-value
Number of slimming cures during the last 12 months						
None	59.1%	78.5%		65.2%	89.8%	
1	30.3%	17.4%		19.0%	9.1%	
1 to 5	9.8%	4.2%	<0.001	10.4%	1.1%	<0.001
Restricted eating during the whole years						
	0.8%	0.0%		5.4%	0.0%	
Step on a scale						
Daily	10.5%	12.1%		15.8%	10.1%	
Once a week	38.3%	36.8%		28.5%	32.6%	
Once a months	35.3%	37.4%	n.s.	32.6%	40.4%	n.s.
Never	15.8%	13.7%		23.1%	16.9%	
Binge eating attacks						
Never	77.4%	66.1%		37.0%	41.6%	
Once a month	9.1%	16.4%		33.3%	23.6%	
Once a week	3.0%	8.5%	n.s.	17.4%	16.9%	n.s.
Several times a week	3.8%	5.8%		8.7%	13.5%	
Daily	3.0%	3.2%		3.7%	4.5%	

Determinants of body composition

As expected, body composition parameters, absolute and relative fat mass and lean body mass differed between males and females in the present sample. Body composition was statistically significantly influenced by physical activity patterns, this was true of both genders. Table 6 demonstrates that absolute and relative fat mass were negatively associated with an increasing physical activity in school and during leisure time. In contrast lean body mass was positively associated with an increasing physical activity.

Discussion

Today physical activity and nutritional habits during childhood and adolescence are focused from a public health view predominantly. It is well known, that inactivity is an important and modifiable determinant of overweight among children and adolescents, while physical activity has been associated with a wide range of beneficial health outcomes in children as well as in adults, such as those related to metabolic and cardiovascular diseases and selected cancers¹⁹. Physical activity and food habits during childhood and adolescence may also have a positive impact on growth, body composition development and psychologic well being. The association patterns between physical activity and body composition, in particular body fat mass has been explored in longitudinal as well as cross sectional studies, however with inconsistent results. Several studies plead for a significant negative association between physical activity and body fat mass^{20–23},

while others reported only a weak relationship between physical activity and body composition parameters^{24–26}. Body composition during adolescence, however is not only influenced by physical activity and sportive behavior, it is also associated with ethnicity, socio-economic parameters, parental body composition and sex¹⁹. It is well documented that the amount of body fat and lean body mass differ significantly between boys and girls¹¹. As mentioned in the introduction section, these differences are explained by proximate and ultimate factors. In the present study – as to be expected – gender typical differences in body composition were found for younger as well as older adolescents. Although only normal weight adolescents were enrolled in the present study, girls exhibited a significantly higher amount of absolute and relative body fat, while their male counterparts showed significantly higher values of lean body mass. These findings are in accordance to those of numerous previous studies^{8–11}. From a physiological point of view these differences are explained by the sex typical differences of the endocrinological and metabolic situation during adolescence. However, there is also relationship between behavioral factors and body composition independent of gender. Body composition parameters were significantly influenced by gender, but by physical activity patterns too, while nutritional habits had no impact on body composition. Body fat mass was independently of gender negatively associated with physical activity. Lean body mass in contrast, was positively with physical activity. These results indicate that physical activity independent of gender typical physiological parameters influence body composition. Comparing physical activity between male

TABLE 6
DETERMINANTS OF BODY COMPOSITION, REGRESSION ANALYSES

Variable	Female		Male	
	Coefficient	95% Confidence interval	Coefficient	95% Confidence interval
Absolute fat mass				
Physical activity during leisure time	-0.49 p<0.05	-0.04 – -0.03	-0.21 p<0.05	-0.96 – 0.15
Physical trainings lessons at school	-0.77 p<0.01	-1.16 – -0.37	-1.85 p<0.01	-0.22 – 0.06
Relative fat mass (fat%)				
Physical activity during leisure time	-0.51 p<0.05	-1.14 – 0.11	-0.53 p<0.05	- 1.06 – 0.01
Physical trainings lessons at school	-0.81 p<0.01	-1.36 – -0.26	-4.11 p<0.01	- 5.64 – 0.16
Lean body mass				
Physical activity during leisure time	0.68 p<0.01	-0.18 – 1.19	0.82 p<0.05	-0.49 – 2.15
Physical trainings lessons at school	1.21 p<0.01	-0.70 – 3.13	3.73 p<0.01	2.39 – 9.84

and female probands it turned out, that there was a significant gender gap in physical activity and participation of sportive activities. It could be shown, that significant more boys were active members of sports clubs and participated in significantly more physically trainings lessons at school and showed a significantly higher physical activity during leisure time. This was true of both age groups. The finding that girls were physically less active was surprising because significantly more girls reported to be unsatisfied with their body shape. Additionally girls and boys differed not significantly in eating behavior and weight control practice. We can summarize among normal weight adolescents girls exhibit a higher amount of fat tissue and are less satisfied with their bodies than their male counterparts, however girls showed no coping strategies to improve their body images. They neither showed special weight control practices and nutritional habits nor increased physical activity. In contrast significant more boys were satisfied with their bodies and boys exhibited a significantly increased physical activity in comparison with the girls. These behavioral and somatic differences between female and male adolescents may be interpreted in an evolutionary sense. Physical activity and sports traditionally have been domains of male achievement. As to be found in the present study, up to now girls take part more seldom in sports than do boys^{12,27}. Sports behavior is strongly associated with masculinity such as competitiveness, assertiveness and athleticism²⁸. Furthermore boys and girls have different patterns of sports participation, it is well documented that boys are more likely than girls to play team sports, while girls' participation is concentrated in individual sports. This was also true of the probands of the present sample. Especially at adolescence the gender gap widens²⁹. Female adolescents become increasingly physically inactive. This was also found for the girls of the present sample. The probands of the present study had independent of gender the same possibilities to be physically active at school and during leisure time. Nevertheless girls were less active. From an evolutionary point of view adolescence is a very young phase of human life history³⁰. During adolescence secondary sexual development progresses and skel-

etal growth spurts takes place. Adolescence stage may have evolved to provide the time to practice complex social skills required for reproductive success and effective parenting. Therefore from an evolutionary point of view adolescence may be interpreted as a phase of reproductive maturation³⁰. However, in humans, uniquely both genders differ regarding reproductive maturity. Girls appear to be maturing sexually significantly earlier than their male counterparts. They develop secondary sexual characteristics and experience peak height velocity even before experiencing menarche. However, most girls experience one to three years of anovulatory menstrual cycles after menarche³⁰. In contrast phenotypical maturation in boys is delayed, while they become fertile well before they assume the size and physical characteristics of an adult man. These sex typical differences of adolescence may explain gender differences in physical activity during adolescence. Adolescent boys increase competitive behavior³¹, and in this way physical activity to increase later reproductive success. In contrast, girls try to achieve reproductive maturity. Female reproductive span is not only limited, female reproduction is also extremely vulnerable to energetic imbalance^{32–34}. Energetic stress and a negative energy balance have adverse effects on ovarian function -even among normal weight females^{33–35}. Furthermore quantitative variations in ovarian function have been reported in association with mild levels of exercise⁵. As mentioned above adolescence is a special vulnerable phase of female reproductive capability. Therefore from an evolutionary point of view gender differences in physical activity patterns and body composition during adolescence may be interpreted as adaptations to gender differences in reproductive function during this phase of life. Therefore the fear of gaining weight and the negative interpretation of body fat found among adolescent girls seems to be confusing in an evolutionary sense, because stable weight and a sufficient amount of body fat may be interpreted as indicators of energy balance and so as signs of fertility. During the last few decades female gender identification and gender role have changed. Motherhood and the ability to reproduce are no longer determinants of a satisfied female life. In contrast, to cor-

respond to the culture typical ideal of female body shape gained in importance for life satisfaction of adolescent girls. While for most time of our evolution and history body fat and a stabile body weight have been desired fea-

tures of adolescent girls, in recent times this evolutionary heritage turns into a psychologic burden of many girls during adolescence.

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SPOLNE RAZLIKE U TJELESNOM SASTAVU, FIZIČKOJ AKTIVNOSTI, PREHRAMBENIM NAVIKAMA I PERCEPCIJI TIJELA KOD ADOLESCENATA NORMALNE TEŽINE – EVOLUCIJSKI PRISTUP

SAŽETAK

Tjelesni sastav, ali i obrazac fizičke aktivnosti, pokazuje tipične razlike među spolovima tijekom čitavog života ljudi. U ovom istraživanju analiziran je tjelesni sastav 354 djevojke i 280 mladića u starosti između 11 i 18 godina porijeklom iz istočne Austrije, pomoću metode bioelektrične impedancije. Normalna težina prema indeksu tjelesne mase bio je ključan čimbenik za uključivanje u istraživanje. Informacije o fizičkoj aktivnosti tijekom školskog i slobodnog vremena, dnevne prehrabene navike, subjektivno zadovoljstvo tijelom i kontrola tjelesne težine sakupljene su pomoću strukturiranog i standardiziranog upitnika. Rezultati analize pokazali su, kao što je i očekivano, da se adolescentice i adolescenti značajno razlikuju u tjelesnom sastavu, ali i u obrascima fizičke aktivnosti. Čak i djevojke normalne tjelesne težine, imale su značajno veću količinu apsolutne i relativne tjelesne masti, dok su dječaci normalne tjelesne težine pokazivali značajno viši udio nemasne tjelesne mase. Nadalje, adolescenti su bili značajno fizički aktivniji od njihovih godišnjakinja. Prema rezultatima multiple regresije, obrasci fizičke aktivnosti imali su, uz spol, neovisan utjecaj na parametre tjelesnog sastava tijekom adolescencije. Nasuprot tome, djevojke i mladići pokazali su minimalne razlike u prehrabnenim navikama i kontroli tjelesne težine. Prehrabnene navike, zadovoljstvo tijelom, i kontroliranje tjelesne težine nisu značajno povezani s parametrima tjelesnog sastava. Opažene spolne razlike u tjelesnom sastavu, kao i u obrascima fizičke aktivnosti, interpretirane su u evolucijskom smislu.