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Social position in a peer group of school-aged boys and selected biological parameters

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ABSTRACT: The period of adolescence includes biological, psychological and social maturation. All these processes complement and affect each other. The ultimate goal is the transition from childhood to adulthood which enables individuals to become socialized beings, who are psychologically mature and able to pass on their genetic inheritance. In the process of reaching full maturity, adolescents are exposed to both positive and negative stimuli the socio-cultural environment. In the process of socialization, the influence of peers, and the maturing into social roles is important. At the same time, adolescents mature biologically. A holistic understanding of the sequence of changes that occur during adolescence foregrounds the significance of biology in informing emotions and cognition. Research conducted on adolescents from Wrocław, Poland, showed the impact that physical development plays on social development within a school peer group. Adolescents with a slower pace of maturity, lower BMI, and lower body height achieved the lowest social status in the group's hierarchy. These adolescents also became victims of peer rejection. The role of scapegoat assigned to them highlighted and completed the symptomatic rejection process, which highlighted negative social group behaviours. In contrast, their peers from the same classes, with higher biological parameters, became leaders in the school's social groups. Furthermore, sociometric 'stars', leaders and gray eminences, compared to scapegoats, achieved maturity faster, and had greater body height and higher BMI among all age groups.

KEY WORDS: body height, BMI, stage of maturation, social position, peer group

Introduction

One of the most important stages in human ontogenesis is adolescence. It is also one of the most interesting periods, (Jankowiak 2017) in which young individuals undergo various biological, psychological and social changes. Each of these complementary and inter-dependent bio-psycho-social components inform the evolution of an adolescent human. Understanding the nature of such interdependencies necessitates an inquiry into human ontogenic processes leading into adulthood (Sisk and Zehr 2005).

Biologically speaking, the period of adolescence leads to full sexual maturity enabling one to reproduce (Wolański

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2018). However, considering it from a holistic perspective, adolescence ends when sexual and psychological elements are merged rendering a young individual to integrate their sexual desires with emotional bonding (Beisert 2006). A specifically human feature of the adolescence period is the rapid acceleration of the growth rate of morphological structures, especially long bones (Wolański 2017). The most important hormonal factor for growth spurts during puberty is the presence of sex steroids: testosterone and estradiol (Rogol 2002). Normal sexual maturation primarily results from the mature activity of the Hypothalamus-Pituitary-Gonadal (HPG) axis (Bordini 2011). In adolescent males the hormone gonadotropin is produced and released by the hypothalamus which stimulates the cells in the testes to produce testosterone. Under the influence of the HPG axis, testicular integrity is maintained and sperm production begins. Testicular tubules are formed through which the spermatozoa migrate via the vas deferens to the seminal vesicles next to the prostate gland where they mix with seminal fluids, which is necessary in the transportation of sperm during coitus (Chyra-Jach et al. 2020). Moreover, sexual maturity during puberty is concomitant with psychological changes that reinforce gender identity. In addition to androgynous people, we can distinguish people who are sexually defined or undefined and people with a cross-sectional arrangement of sex-related psychological features (Bem 2000). Thus, the process of sexual maturity is crucial in the construction and maintenance of gender and sexual identity which assist in defining one's social being.

However, changes during puberty in the context of sexual behavior only allow us to distinguish two components: the need for emotional bonding and sexual desire (Izdebski 2001).

In psychological terms, adolescence is considered to be a very important stage due to the complex dynamics of this processes that are taking place (Bardziejewska 2015). During childhood and adolescence, one's relationships with peers take on different forms, and become significant due to the high psychological investment an individual assigns to them (Kołodziejczyk 2011). Status assessment in a peer group is usually conducted using sociometric techniques. Based on sociometric methodology, three main groups in children can be precisely identified. This idea was developed by Newcomba (1993) by adding those categories of affected and average children. However, sociometric analysis usually classifies three groups: popular children, rejected children and ignored children (Kupersmidt and Coie 1990).

Peer acceptance or lack of it, known as peer rejection, has a significant impact on an adolescent's mental well-being. The varying degree of acceptance or rejection an adolescent encounters affects later psychological adjustment (Schaffer 2005).

The marginalized sociometric status of a rejected child, also referred to as a scapegoat, results from several classifications of group statuses proposed by others, i.e. by Pilkiewicz, Coie, Dodge. Sociometric Acceptance Scale, Sympathy Scale and Antipathy Scale are based on the Moreno classification (Musialska 2011).

Being defined as a scapegoat is associated with rejection, as well as group aggression. The process of rejection fosters stigmatisation which is long lasting (Olweus 2007).

The aim of this study is to demonstrate the influence of the status of boys during adolescence in their school peer group on selected biological characteristics.

Material and methods

The study group consisted of 296 high school students comprising three age groups: 116 boys who were 14 years, 92 boys who were 15 years and 88 boys who were 16 years. All students attended schools in Wrocław, Poland. All schools usually had public gymnasiums that were free of charge and were open to both sexes. The research was conducted over three years from 2016 to 2019. All data were collected by the one of the authors: TK.

All boys were subjected to anthropometric measurements. Body height was measured according to a standard procedure (Martin and Saller 1956), using a stadiometer manufactured by the Swiss company GMP (Gneupal Praezisions Mechanik) with an accuracy of 1 mm. Weight measurement was carried out using a medical scale with an accuracy of 100 g. The BMI value is the quotient of body mass in kilograms and squared body height in meters (kg/m^2).

The stage of maturation of the subjects was determined on the basis of the stage of development of secondary sexual characteristics such as pubic, abdominal, axillary, thoracic and facial hair. The self-assessment method of the respondents was used in accordance with the recommendations [Cameron 2008]. The boys rated the stage of development of a given trait based on a five scores scale by marking the answer between 'not present' to ' fully present', where the determination of occurrence indicated the full development of the examined feature in the subjects. The verification of the correctness of assessments was made during anthropometric tests in all hair types, excluding pubic hair. The answers given by the respondents were verified during physical education lessons. During the anthropometric measurements boys wore sportswear. Next, all measurements of maturation stage were included in the Principal Component Analysis (PCA). The PCA produced only one component, which explained 43.8% of variation and the eigen value accounted for 2.19. The loadings of particular secondary sex characteristics varied from 0.58 for armpit hair development, to 0.72 for abdominal and pubic hair development. The scores of first component were regressed on age and expressed as standardized residual variance. This allowed to remove of age differences and were used in further calculation as a general, synthetic measure of stage of maturation.

Sociometric research

In order to determine the social relationships between students forming a peer group within a school class, the classic Moreno sociometric method was used (Pilkiewicz 1973; Jarosz 2007; Musialska 2011; Misiuk 2015). The Moreno technique involves respondents giving positive or negative answers in a questionnaire. Students independently, without consulting the answers with anybody, answered the questionnaire's questions, giving their own opinions on their classmates in the answer column (Lobocki 2006), being either positive or negative. Utilizing this method, the following types were distinguished in each class: a leader, gray eminence, scapegoat and an invisible person. The school classes were integrated, and daily had approximately six or eight hours of common activities.

Statistical analysis

Since adolescence is a period of dynamic changes in somatic features, all anthropometric measurements were standardized according to age, using the mean and standard deviation for the appropriate chronological age group. Logistic regression was applied in order to assess the effects of position in a class on biological trails. Differences in a means for somatic features between two groups were assessed by the t-test for independent samples, where there were more than two groups by one-way analysis of variance. Post hoc comparison was done by means of HSD Tukey Test. Additionally, All calculations were done using Statistica 31.1.

Results

Descriptive statistics of height, BMI and maturational stage are presented in Table 1. The lowest values of average body height and BMI depicted students who were rejected and occupied position of scapegoat, whereas the tallest students were class leaders. Students at the position of grey eminence had the highest value of BMI. The scrutinizing the maturational stage, depending on the social position of a student in his peer group, gave us another perspective which is extremely important for further interpretation. The most advanced maturational stage (0.409) is characteristic for gray eminences, while the lowest one with a negative index (−0.526) is characteristic for rejected and excluded students, referred to as scapegoats. The results were untenuous. In the entire research group, it is the excluded students who not only demonstrated slower biological maturation, but also differed from the rest of the male students.

Boys who had been assigned to either grey eminence or scapegoat categories had a significantly affected maturational stage among class mates (Table 2). In

Table 1. Average values of the studied biological characteristics depending on the social position of students in a classes

	Leader N = 29		Grey eminence N = 31		Scapegoat N = 22		Invisible person N = 21	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Body height (kg)	173.330	8.26	170.360	10.28	167.351	7.88	172.980	8.59
BMI (kg/m^2)	21.290	2.37	21.720	4.09	20.170	3.54	22.020	5.77
Maturation stage	0.185	1.09	0.409	0.98	−0.526	0.53	0.001	1.02

Table 2. Results of logistic regression where dependent variables was the position in a class (yes/no), and independent variables were biological features standardized on age

	SDS maturation stage		SDS height		SDS BMI	
	χ^2 Wald's	p	χ^2 Wald's	p	χ^2 Wald's	p
Leader	0.20	ns	3.60	=0.058	0.05	ns
Grey eminence	7.09	<0.01	0.63	ns	0.13	ns
Scapegoat	3.97	<0.05	0.55	ns	0.72	ns
Invisible	1.28	ns	2.42	ns	0.32	ns

SDS – standard deviation scores.

contrast, students who were ranked as class leaders or invisible persons were not significantly differed in the three biological trials from the rest of the peers in classes.

The relationships between biological characteristics and social status in the school class are presented in Figures 1–3.

Figure 1 showed that the class leaders were the tallest students in the classes, whereas scapegoats were the shortest, and significantly differed from other students within the classes. The leaders also were the tallest, and the scapegoats were the shortest in comparison to class students who occupied other social positions ($F = 2.94$; $p<0.05$). Similarly, two analyses of BMI showed no significant differences, neither in comparison with other class students, nor in comparison with students who had occupied other social positions in the classes (Fig. 2). Analysis results regarding maturational stage provided an interesting pattern. Students in gray eminence category were the most advanced, while students in the scapegoat category had the most delayed maturational stage in comparison with other class students (Fig. 3). In comparison with students occupied other social positions within classes, the scapegoats showed significant differences in the maturational stage along with the leaders and gray eminences.

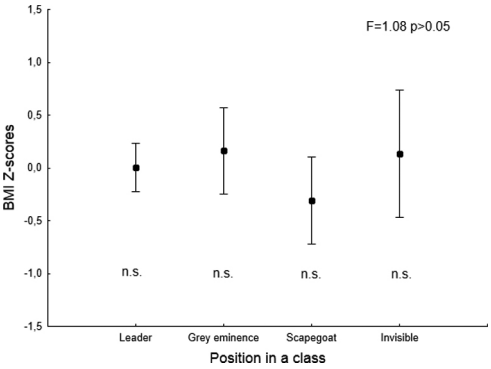

Fig. 2. Means and 95% CI of BMI Z-scores of students according to their position in a class. Differences in BMI between 4 positions in a class were tested by one-way anova. Differences in BMI between particular position and other students were tested by t-tests

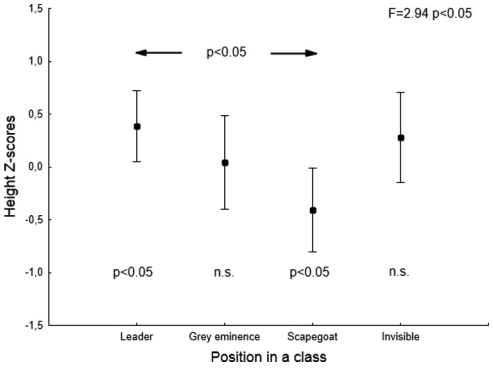

Fig. 1. Means and 95% CI of height Z-scores of students according to their position in a class. Differences in height between 4 positions in a class were tested by one-way anova. Differences in height between particular position and other students were tested by t-tests

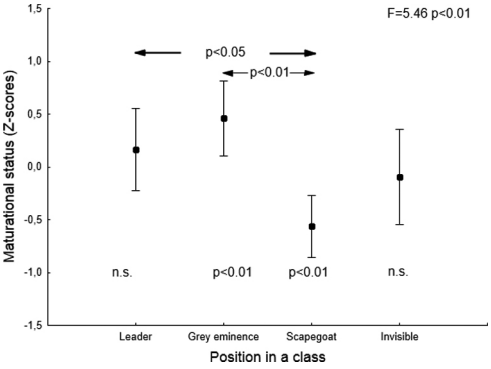

Fig. 3. Means and 95% CI of maturational stage Z-scores (MS) of students according to their position in a class. Differences in MS between 4 positions in a class were tested by one-way anova. Differences in MS between particular position and other students were tested by t-tests

Discussion

This study showed that in terms of body height, BMI and the maturational stage, scapegoats, were on average, the most disadvantaged. In contrast, class peers defined as sociometric stars, i.e. leaders and gray eminences, had the highest scores. Results from our analysis challenges the theory proposed by Dambach (2003), which states that exclusion is not determined by an individual's physical characteristics, but rather by group structure. According to Dambach, anyone can become a scapegoat (i.e. a person rejected by a peer group). Dambach's theory was not evident in our findings nor to Bernes' study (2007). In both studies ed physical differences between children were treated as determinants of rejection within a peer group. These results have also been confirmed by Woolfolk (2008), who depicts physical differences between peers as being significant factors of rejection in a peer group. In addition, Urban (2015) emphasizes the significance of physical, alongside with ethnic, racial and linguistic differences as being crucially important for building social relationships in young people.

Similarly, Musialska (2011), like Muszyńska (2015) also highlight the influence of biological factors on social status, especially among rejected persons. The author lists fifteen main factors that determine rejection, among which physical development is regarded as one of the key determinants of rejection. Students rejected due to lower body height, lower mean BMI value and slower maturation, were at the same time physically weaker than their peers. Olweus (2007) points to this relationship, noting that people rejected because of their physicality are also much weaker than the rest of the group. Apart from biological factors that may influence peer group rejection of individuals , psychoneurological deficits are also included (Biel 2011), as well as developmental microdefects in early childhood (Borzucka-Sitkiewicz 2013).

In our research, we have specifically pointed to biological factors that, along with social factors, determine the formation of social status. Studies have shown that the rate of biological maturation is the key biological factor that has the greatest impact on social status. Peers that show slower maturation, with lower body height, lower BMI and less developed tertiary sexual characteristics have the lowest status in a peer group. We would argue that those individuals who demonstrate the fastest rate of maturation in the social context invariably attain the rank of group leaders (i.e. high social status) which is exemplified by their social dominance over other students. students. Certainly, due to the high social status of gray eminences affecting the rest of the group, it can be suggested that they had a significant impact on other students, creating their positive and negative attitudes, maintaining social differences in the group. This is confirmed by studies by (Hold-Cavell 1992; Grammer 1982; Vaughn 1981; Henrich 2001).

Another interesting finding, is that from a psychological perspective rejected people also consider themselves to be less attractive (Deptuła 2013), which only deepens their state of alienation within the peer group. In effect, very often rejected individuals changed their frustration into aggression behaviour. As a result, a rejected child, wanting to gain the attention, realizes the need for recognition (Kaleta 2010) by often choosing

controversial means for this purpose, such as aggression, both auto aggression or aggression directed at others. Aggressive actions performed by a rejected person may be similarly met with an aggressive response by group members. This is confirmed by Schaffer (2010) which notes how group rejection of an individual may be the result of inappropriate or aggressive behaviors by the latter.

Importantly, the experience of peer group rejection during childhood and adolescence has been consistently shown to have a deleterious impact on self-esteem, social status and psychological well-being throughout adult life (Vitaro 1988). Children who experience chronic rejection over several years, not only manifest an inferiority complex but also remain in a state of social withdrawal that continues into adulthood (Hymel et al. 2002).

In conclusion, it is important to pay special attention to biological factors modeling social relations among adolescent youth. It should be recognized that, apart from the considerable influence of social factors, biological factors play a significant role during adolescence in shaping social attitudes and forming social status within peer groups. The slower pace of maturation and lower body height of rejected adolescents, compared to their peers, influences social development that may resemble to suffering from certain illness, which seriously affected young people's maturation. Thus retardation in biological development significantly affects not only self-esteem of rejected person, but also reception by the peer group (Pluta 2019).

Due to the anonymous nature of the surveys, it was impossible to examine the surveyed students in subsequent years in order to verify the question concerning the degree of influence of biological factors.

An important limitation of the research was the relatively small sample size, resulting from the inability to involve the students' legal guardians to participate in the research. At the same time, the reliability of the tests, especially the sociometric test, was determined by the attendance and consent of all students from a given class. Another limitation was the method of determining tertiary sexual characteristics based on self-assessment of adolescents.

In the future, research could be conducted in examining whether biological factors (i.e. once the right values of body height, weight, BMI index, and sexual maturity have been reached) will still have a significant impact in building social relationships. Consequently, this has also been a limitation of our study.

The Authors' contribution

The study was designed and conceived by TK and SK. Field work was carried out by TK. Analysis and interpretation were conducted by SK. The manuscript was written by TK.

Conflict of interest

The authors declare that there is no conflict of interest.

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