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IS SOCIAL SUPPORT DURING PHYSICAL EDUCATION LESSONS ASSOCIATED WITH BODY MASS INDEX STATUS, GENDER AND AGE?

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ABSTRACT

There are findings suggesting that social support could impact the physical activity (PA) levels of adolescents, depending on age and biological gender. Simultaneously, some studies report the relationship between social support and Body Mass Index (BMI) status. Because of the limited information available regarding the influence of social support regarding students of different ages, BMI status and gender, this study examined the associations between two social support sources (classmates and physical education [PE] teachers) and BMI status among the youth in Poznan, Poland. Body mass and height of 284 adolescents (girls=136; boys=148) aged 10-17.5 years were measured. BMI was used to classify participants as underweight, normal weight and overweight. Classmate and Teacher Support Scales were used to determine the level of social support. Descriptive statistics, a three-way ANOVA, and Tuckey's HSD post hoc test were applied. Findings indicated a statistically significant two-way interaction effect of age and BMI status on classmate support ($p<0.002$) and also on PE teacher support ($p<0.03$). The results provide a better understanding of age-related and BMI status-related changes in social support received by students during PE lessons and might provide a basis for the future teaching context of PE students.

Keywords: Body Mass Index; Classmate support; Teacher support; Gender; Age; Youth.

INTRODUCTION

The prevalence of overweight and obesity in adolescents is rising globally (Kedzior *et al*., 2017; Kolahdooz *et al*., 2017). In 2004, Janssen *et al*. (2004) pointed out that the adolescent obesity epidemic is a global issue. The authors' review of surveys from 34 countries showed that Malta and the United States were the countries with the highest prevalence of overweight (Janssen *et al.*, 2004). A high prevalence of overweight and obesity was also reported in countries located in south-western Europe (Janssen *et al.*, 2004). Brug *et al*. (2012) noticed that 44.4% of boys in Greece and 13.5% of girls in Belgian Flanders were overweight. However, Smetanina *et al.* (2015), in a cross-sectional study that included 3,990 seven to 17 year-old school children, found Lithuania to be the country with the lowest prevalence of overweight and obesity across the European countries. Ahluwalia *et al.* (2015), in their latest paper, reported that, among

11-, 13- and 15-year-olds in 25 countries from 2002 to 2010, a consistent increase in overweight was observed in boys and girls in 10 out of 25 countries, namely: Croatia, Czech Republic, Estonia, Greece, Latvia, Macedonia, Poland, Russia, Slovenia and Ukraine. In Poland, 11-, 13-, and 15-year-old girls showed a marked increase in overweight between 2002 and 2010 from 10.27 % to 20.71 % (Ahluwalia *et al.*, 2015).

Haines and Neumark-Sztainer (2009) reported that overweight adolescents experienced being treated differently than their average weight peers. Moreover, Puhl and Latner (2007) suggested that overweight and obese children and adolescents also experience weight-related stigma from parents and teachers. For example, Greenleaf and Weiller (2005) found that PE teachers have lower expectations about the physical, cognition and social skills of overweight pupils. Another study shows that there is a need for training Physical Education (PE) teachers and students in strategies aimed at reducing the case of victimisation of overweight and obese students (Martínez-López *et al.*, 2017). Sampedro *et al*. (2012), observed that students, studying to become PE teachers have more negative attitudes toward obesity than students of other fields. Therefore, it is suggested that PE teachers need to be sensitive to the obesity issue and carefully consider how physical activities are organised. Stigmatisation often leads to social exclusion by peers as a result of viewing overweight or obese people as undesirable or different (Puhl *et al*., 2008). Consequently, this may lead to depression (Richardson *et al.*, 2003; Ringham *et al.*, 2009) and improper eating habits, such as dieting, fasting, binging, and using laxatives and diuretics (Eisenberg *et al.*, 2005; Neumark-Sztainer *et al.*, 2006; Thompson *et al*., 2006). It is important to teach overweight and obese adolescents that weight control, as well as regular physical activity (PA) and reducing sedentary time, play a critical role in weight reduction.

According to the social-ecological model (Bauer *et al.*, 2003), health-related behaviours of individuals are determined by many agents, which are related to intrapersonal, interpersonal, institutional and community factors, as well as public policy. In the social-ecological model, the importance of the social and physical environment is emphasised. For example, family lifestyle and support, peers, institutions, such as schools, and teachers have a significant influence on the behaviour of children and adolescents concerning PA (Salvy *et al*., 2012). Results of previous studies confirm that schools can be effective environments for health and PA promotion in adolescents. Physical Education (PE) is an important predictor of PA during leisure time (Barr-Anderson *et al*., 2007). Unfortunately, literature reports that overweight and obese adolescents in school settings are often teased during PA and PE lessons (Fox & Edmunds, 2000; Trout & Graber, 2009). As a result of negative experiences, children start to avoid PE and after school PA, thereby increasing their sedentary time (Zabinski *et al*., 2003; Hayden-Wade *et al*., 2005).

Perceived social support is used in studies as an indicator of the quality of social support (Wills & Shinar, 2000) and represents the individual's perceptions of the extent to which people from their environment are available to provide social support (Demaray & Malecki, 2002). Wills and Shinar (2000) indicated several dimensions of support, like emotional support, instrumental support, informational support, companionship support and validation support. The literature indicates further that peer and teacher support are positively related to the PA of adolescents (Zhang, *et al.*, 2012; Bronikowski *et al*., 2015a). However, after adjusting for body weight, the results are different. Researchers noticed that peer support has the greatest impact on PA among normal weight children and adolescents (Mikolajczyk & Richter, 2008;

Kantanista *et al.*, 2013). The study of Kantanista *et al.* (2013) revealed a positive relation between a higher level of classmate support and a higher level of PA in underweight and normal weight adolescent girls and boys. However, the authors did not report a significant relation in overweight girls; while overweight boys who received support from classmates were more physically active in comparison to peers with low levels of peer support (Kantanista *et al*., 2013).

High levels of teacher support positively influenced the PA of girls and boys of normal weight and underweight boys, but teacher support did not influence PA in overweight students (Kantanista *et al*., 2013). A recent study of Bronikowski *et al*. (2015a) confirmed the positive effect of classmate and teacher support on PA among adolescents. In the cited study, there was no interaction between body weight or peer support, but only between gender and teacher support (Bronikowski *et al.,* 2015a). Girls who received low support from teachers in PE presented a low level of PA, regardless of weight status. Boys who reported a medium or high level of teacher support and normal body weight indicated a high level of PA. The authors did not note the interaction between gender, body weight and classmate support in PE (Bronikowski *et al*., 2015a). Nonetheless, a small number of studies examined the association of teacher and classmate support and adolescents' PA regarding body weight and gender. The association is complex and still not well understood, especially when considering students of different ages.

PURPOSE OF RESEARCH

The current study explores the associations between two sources of social support (classmate support and PE teacher support) and BMI status (underweight, normal weight and overweight status) according to gender and age (11-year-old primary school students, 15-year-old junior school students, and 17-year-old secondary school students) among youth residing in the city of Poznan, Poland.

METHODOLOGY

Participants and study design

The sample consisted of 91 secondary school students (mean age=17.3±0.27 years), 103 junior school students (mean age=15.3±0.25 years), and 90 primary school students (mean age=11.5±0.73 years). Participants were recruited from the same grade level of randomly selected standard urban schools drawn from the pool of all public schools in the city of Poznan. The sample unit was a school class also randomly selected for each level in the schools. Data for this study was obtained from the "Active not only online" Project supported by a Study Grant from the Akademickie Centrum Kreatywności (Academic Center of Creativity, no. MNiSW/2014/DIR/612/ACK) by the Polish Ministry of Science and Higher Education. Detailed information of this study design has been described elsewhere (Bronikowski *et al*., 2016). Questionnaires were completed in whole-class groups during one regular school lesson and took approximately 20 minutes to complete. Anthropometric measures were taken during PE classes. Written consent from all participants and parents of minors were also obtained.

Table 1. **PARTICIPANTS: AGE, ANTHROPOMETRIC MEASURES (M±SD) AND BMI CATEGORIES FOR GENDER DIFFERENCES**

Variables	**17-year-olds** Total (N=91)	Girls (n=42)	Boys (n=49)	p-Value	Cohen's ds
Age (years)	17.3±0.27	17.3±0.24	17.1±0.28	0.02	0.50
Height (cm)	174.4±9.80	166.2±6.10	181.4±6.30	0.00	2.45
Body mass (kg)	65.1±11.2	57.5±7.93	71.9±11.07	0.00	1.50
BMI (kg/m^2)	21.2±2.67	20.6±2.31	21.7±2.87	0.04	0.44
BMI categories					
Underweight	10 (11.0%)	7 (16.7%)	3 (6.1%)	NS	
Normal weight	74 (81.3%)	34 (80.9%)	40 (81.6%)		–
Overweight	7 (7.7%)	1 (2.4%)	6 (12.3%)		
Variables	**15-year-olds** Total (N=103)	Girls (n=44)	Boys (n=59)	p-Value	Cohen's ds
Age (years)	15.3±0.25	15.3±0.25	15.3±0.25	NS	0.08
Height (cm)	169.5±7.79	164.0±5.17	173.6±6.84	0.00	1.58
Body mass (kg)	58.5±9.27	56.6±7.14	59.9±10.42	NS	0.36
BMI (kg/m^2)	20.3±2.63	21.1±2.55	19.8±2.57	0.01	0.51
BMI categories					
Underweight	11 (10.7%)	1 (2.3%)	10 (16.9%)	NS	
Normal weight	80 (77.7%)	38 (86.4%)	42 (71.2%)		–
Overweight	12 (11.7%)	5 (11.3%)	7 (11.9%)		
Variables	**11-year-olds** Total (N=90)	Girls (n=50)	Boys (n=40)	p-Value	Cohen's ds
Age (years)	11.5±0.73	11.4±0.77	11.5±0.67	NS	0.11
Height (cm)	149.8±8.06	150.0±8.45	149.6±7.66	NS	0.06
Body mass (kg)	43.3±11.24	43.6±11.59	43.0±10.92	NS	0.06
BMI (kg/m^2)	19.1±3.47	19.2±3.55	19.0±3.40	NS	0.03
BMI categories					
Underweight	9 (10.0%)	5 (10.0%)	4 (10.0%)	NS	
Normal weight	62 (68.9%)	34 (68.0%)	28 (70.0%)		–
Overweight	19 (21.1%)	11 (22.0%)	8 (20.0%)		

BMI=Body Mass Index NS=not significant M=Mean SD=Standard Deviation

Ethical considerations

The Local Bioethics Committee of the Karol Marcinkowski University of Medical Sciences in Poznan (Decision number: 126/15) granted ethical approval for the study.

Anthropometric measurements

Body mass and height data was collected by trained personnel with the use of anthropometric instruments. Body height was measured to the nearest 0.5 centimeters (cm) using a stadiometer and body weight was measured to the nearest 0.1 kilogram (kg) on an electronic scale (Tanita

Corporation, Japan), with the participant wearing minimal clothing and their body mass indexes (BMI), which is a ratio of weight-to-height for an individual, were calculated. A high BMI can be an indicator of high body fatness (Spiegel & Foulk, 2006). For children and adolescents, BMI is age- and gender-specific and it is often referred to as BMI-for-age, because children's bodies are changing as they grow and mature (Spiegel & Foulk, 2006). Subsequently, participants were classified as underweight, normal weight and overweight according to the age- and gender-specific cut-off points for children and adolescents according to Cole *et al*. (2007). The final number of participants, stratified by gender and the frequency levels of being underweight, of normal weight and overweight, is presented in Table 1 (previous page).

Peer and teacher support measures

In the case of external support, two scales containing five questions each were used to assess classmate and teacher support during PE lessons. These scales were based on the Classmate and Teacher Support Scale (Torsheim *et al*., 2000). Torsheim *et al*. (2000) identified that the Classmate and Teacher Support Scale is well suited for use in large social surveys and can be used despite potential language and cultural differences (test-retest correlations r=0.69). The Original Classmate and Teacher Support Scale concerned teaching of all school subjects. Therefore, to use it in the PE environment, it needed to be adjusted by using two items from the original Teacher Support Scale and three items from the Classmate Support Scale. Three extra items to assess teacher support during PE and two extra items to assess classmate support during PE were designed additionally and adjusted to meet the PE environment, by a panel of four experts (one in psychology, one in physical activity and two in physical education). The internal consistency of the scales was established using Cronbach's Alpha test. For the teacher support scale the alpha value was α=0.89, and for the classmate support it was α=0.80.

Statements on the Classmate Support Scale were as follows: (1) other students accept me as I am; (2) most of the students in my class are kind and helpful; (3) I am often picked to play on various teams; (4) I get positive feedback from my peers when I play; and (5) the students in my class enjoy being together. The items on the teacher support scale were: (1) our teacher treats us fairly; (2) when I need extra help, I can get it; (3) I get positive feedback from my teacher when I play; (4) our teacher makes sure we all treat one another fairly; and (5) the teacher lets us express our opinions. The statements 1 and 2 (concerning teacher and classmate support) came from the original questionnaires (Torsheim *et al*., 2000) and the other three were developed by the research team. Participants reported their concordance with each statement on a 5-point Likert scale (range between I strongly agree=1 to I strongly disagree=5). The total score could be 25 points on each of the scales.

Moreover, the support from teachers and classmates were categorised with the use of the scores of individuals, normalised to a sten scale (Cattell, 1965). Individuals with 1-4 sten scores were classified as receiving a low level of support, while those with 5-6 scores as having a medium level of support, and individuals with 7-10 sten scores as receiving a high level of support. To minimise human and instrument errors, all measurements were taken by the same group of trained research staff, using the same sets of measurements.

Statistical analysis

Descriptive characteristics (mean, standard deviations and frequencies) were calculated for anthropometric measures and for classmate and teacher support separately for age (17- year-old secondary school students, 15-year-old junior school students, 11-year-old primary school students) and for girls and boys. Comparisons with regard to gender and BMI status were calculated using an Independent *t*-test and χ^2-test. To compare the support received from classmates for the different age groups and different BMI status (underweight, normal weight, overweight) in groups of girls and boys, a three-way (age, gender, BMI status) ANOVA was applied. The same model was used to compare support received by students from PE teachers. To conduct detailed multiple comparisons, Tuckey's HSD post hoc test was employed. Statistical significance was set at $p \leq 0.05$. All statistical analyses were conducted using Statistica version 10.0.

RESULTS

In the group of 17-year-old students, significant differences were found between girls and boys, both in classmate ($p<0.01$) and PE teacher ($p<0.01$) support. Boys received higher classmate and PE teacher support than girls. No significant differences were found in support received from classmates and PE teachers between girls and boys from the lower levels of education (Table 2).

Table 2. **DESCRIPTIVE STATISTICS OF SUPPORT FROM CLASSMATE AND TEACHERS IN PE: GENDER DIFFERENCES**

	17-year-olds		
Factors	Girls (n=42) M±SD	Boys (n=49) M±SD	p-Value
Classmate support	20.0±4.46	22.2±3.61	<0.01
Teacher support	16.4±4.05	23.9±2.31	<0.01
	15-year-olds		
Factors	Girls (n=44) M±SD	Boys (n=59) M±SD	p-Value
Classmate support	20.5±5.51	20.8±4.17	NS
Teacher support	21.7±3.39	21.8±3.01	NS
	11-year-olds		
Factors	Girls (n=50) M±SD	Boys (n=40) M±SD	p-Value
Classmate support	20.0±3.01	18.9±3.79	NS
Teacher support	20.7±2.99	20.4±3.76	NS

NS=Not significant M=Mean SD=Standard Deviation
p-Values were derived from the Independent *t*-test for numerical variables

In this study, the interaction effect of age, gender, and BMI status on classmate support was analysed also (Table 3). Using classmate support as the dependent measure, a three-way ANOVA (age*gender*BMI status) revealed no significant role of the three-way interaction effect of age, gender and BMI status on classmate support (F=0.50, df=2; p=0.102). However, the results indicated a significant two-way interaction effect of age and BMI status on classmate support ($F_{4, 266}$=4.440, df=4; p<0.002) (Figure 1).

Table 3. **THREE-WAY ANOVA (AGE*GENDER*BMI STATUS) ON CLASSMATE SUPPORT**

Source	F	p-Value	Eta-squared
Age	2.30	0.10	0.02
Gender	1.57	0.21	0.01
BMI status	1.57	0.21	0.01
Age*Gender	1.53	0.22	0.01
Age*BMI status	4.44	<0.01	0.06
Gender*BMI status	0.51	0.60	0.01
Age*Gender*BMI status	0.50	0.73	0.01

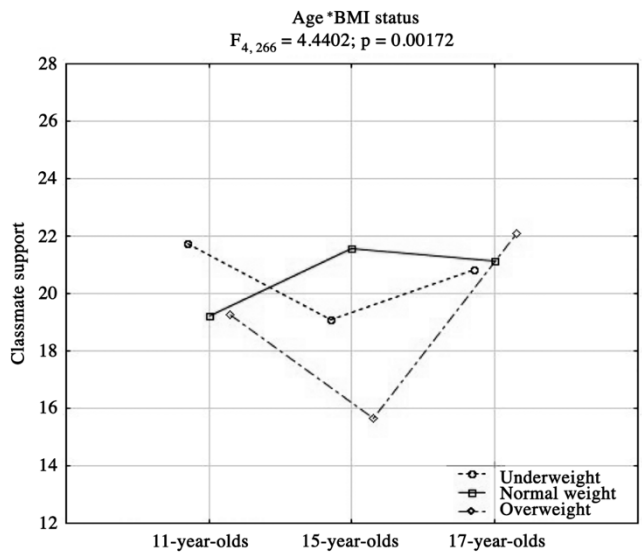

Figure 1. **TWO-WAY ANOVA (AGE*BMI STATUS) INTERACTION EFFECT ON CLASSMATE SUPPORT**

In general, the overweight 15-year-old students received the lowest classmate support. Those students received lower classmate support than students at the same age with normal BMI status ($p<0.001$) and 17-year-old students with normal BMI status ($p<0.001$), and also lower classmate support than the 17-year-old overweight secondary students ($p<0.01$) and the underweight 11-year-old students ($p<0.03$). The same group of 15-year-old students, but with the normal BMI status, received higher classmate support than 11-year-old students with normal BMI status ($p<0.02$). No statistical significance of the two-way interaction effect of age and gender on classmate support was observed ($F=1.531$, $df=2$; $p=0.218$). Also, no statistically significant main effect of age ($F=2.302$, $df=2$; $p=0.102$), BMI status ($F=1.575$, $df=2$; $p=0.209$) and gender ($F=1.5763$, $df=1$; $p=0.211$) on classmate support was obtained. The interaction of age, gender and BMI status on teacher support was also analysed (Table 4).

Table 4. **STATISTICS OF THREE-WAY ANOVA (AGE*GENDER*BMI STATUS) OF PE TEACHER SUPPORT**

Source	F	p-Value	Eta-squared
Age	1.64	0.19	0.01
Gender	20.74	<0.01	0.07
BMI status	0.18	0.83	0.01
Age*Gender	13.36	<0.01	0.09
Age*BMI status	2.61	<0.03	0.04
Gender*BMI status	0.85	0.43	0.01
Age*Gender*BMI status	0.46	0.76	0.01

Using teacher support as the dependent measure, a three-way ANOVA (age, gender, BMI status) also revealed no significant effect of the three-way interaction effect of age, gender and BMI status on PE teacher support ($F=0.464$, $df=4$; $p=0.762$). A statistically significant effect of age and BMI status on PE teacher support ($F_{4, 266}=2.61$, $df=4$; $p<0.03$) was found, as shown in Figure 2. Post-hoc analyses using Tuckey's HSD indicated that the underweight 17-year-old students received lower PE teacher support than the 11-year-old students who are underweight ($p<0.01$), 15-year-old students with normal BMI status ($p<0.001$) and the overweight 17-year-old students ($p<0.01$). In turn, 15-year-old students with normal BMI status received higher PE teacher support than 11-year-old students with normal BMI status ($p<0.02$).

Furthermore, the two-way interaction effect of age and gender on PE teacher support approached significance ($F_{2, 266}=13.36$, $df=2$; $p<0.0001$) (Figure 3). Seventeen-year-old boys from secondary school received higher PE teacher support than 11-year-old boys ($p<0.001$) and girls ($p<0.001$), and also than 15-year-old boys ($p<0.007$) and girls ($p<0.01$). Seventeen-year-old girls received the lowest support from PE teachers when compared to 11-year-old boys ($p<0.001$) and girls ($p<0.001$), 15-year-old boys ($p<0.001$) and girls ($p<0.001$) and boys ($p<0.001$) at age 17. Additionally, the main effect of gender on support received by students from the PE teacher was significant ($F_{1, 266}=20.74$, $df=1$; $p<0.001$). Overall, boys received higher support from PE teachers than girls ($p<0.01$). No statistically significant main effect of age on PE teachers' support ($F=1.644$, $df=2$; $p=0.195$), or of BMI status ($F=0.186$, $df=2$;

p=0.830) was found. Furthermore, no statistical significance of the two-way interaction effect of gender and BMI status on PE teacher support was observed (F=0.853, df=2; p=0.427).

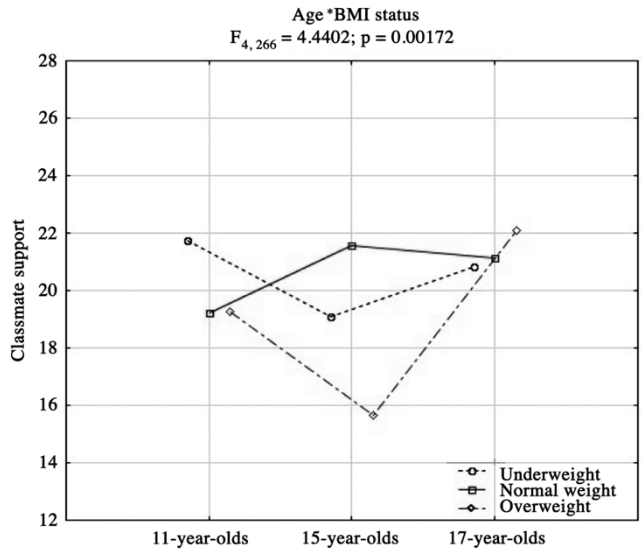

Figure 2. **TWO-WAY ANOVA (AGE*BMI STATUS): INTERACTION EFFECT ON PE TEACHER SUPPORT**

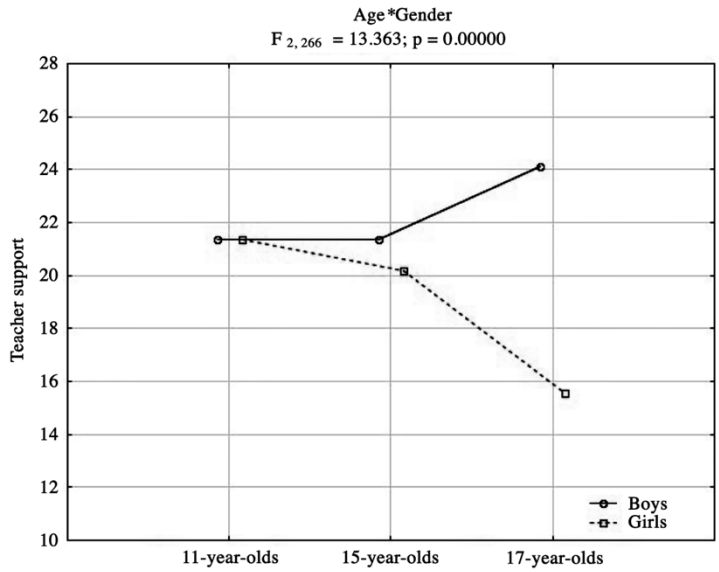

Figure 3. **TWO-WAY ANOVA (AGE*GENDER) INTERACTION EFFECT ON PE TEACHER SUPPORT**

DISCUSSION

This study investigated the current associations between two sources of social support with BMI status depending on the gender and age of students. In general, the frequency of the social support received by students from their classmates and PE teachers was affected by their age, gender and also BMI status. Though all the variables are important, they affect teacher and classmate support differently and to varying degrees. They do not, therefore, work as a whole, but separately. Girls receive lower classmate support than boys at age 17. This is the time when classmates may become more important social partners in the lives of adolescents than before (Brown & Larson, 2009. In the context of engagement in PA, support from friends was found to be the most important social environmental factor in young adolescents (Zhang *et al.*, 2012). On the other hand, overweight/obese adolescents are less likely to choose participation in PA with friends versus normal weight teenagers (Corder *et al*., 2013). In the study of Bronikowski *et al*. (2015b), an interaction effect of classmate support and gender and age on moderate-to-vigorous physical activity (MVPA) was found. Among 13-year-old girls, those who received higher classmate support had significantly higher MVPA. The findings of Springer *et al*. (2006) showed significant correlations between friend support and MVPA, as well as friend encouragement with vigorous physical activity (VPA), which may suggest that friends play a more important role in influencing PA levels of adolescent girls than family.

In the current study, the 15-year-old students are the most critical about the body mass of their overweight peers. The perception of peer support by overweight boys and girls are the lowest at this age. Similar to these results, some researchers have indicated that overweight adolescents may be more socially isolated (Strauss & Pollack, 2003) or that overweight children report lower levels of social support for PA (Zabinski *et al*., 2003). However, another study showed no differences in the social support received from peers and family examined by BMI classification (Springer *et al*., 2006).

There is strong evidence concerning the coexistence of different types of discrimination and overweight/obesity problems. Almenara and Ježek (2015) found that, compared with non-overweight adolescents, overweight Czech adolescents were more likely to report appearance-teasing by male classmates, siblings and fathers. In accordance with this finding, the meta-analysis performed by Van Geel *et al*. (2014) indicated that both overweight and obese youths experience significantly more bullying than normal weight youths.

Fontana *et al*. (2013) showed a strong anti-fat bias among PE teachers, using a test which relied on a timed assessment measuring automatic attitudes toward obese individuals through word categorisations, namely: good-bad, lazy-motivated, etc. In a more controlled situation, when how teachers perceive students who are obese during class was measured, the results indicated that teachers have a pro-fat bias toward obese students (Fontana *et al*., 2013).

Hagger *et al*. (2005) indicated that the average level of autonomy support among Polish students was far lower than those in other studied samples. One of the explanations provided was that the PE teachers in the Polish school tended not to adopt autonomy supportive behaviours, or that the school had a particularly controlling style of teaching (Hagger *et al.*, 2005). In this context, it is important to analyse the supportive climate of teachers and classmates during PE classes.

As Cox and Ullrich-French (2010) suggested, the relationship between teacher and classmate support might be different and important in the context of PA. Profile differences suggest that positive relationships with teachers and peers are associated with optimal PE experiences. Positive peer relationships, even when teacher support is relatively low, may afford some advantages within this setting. Torsheim *et al.* (2012) reported that teacher support showed a stronger association with school satisfaction than classmate support, which might indicate that teacher support has general functions that overlap with other factors of the psychosocial environment.

In the present study, the analysis of the three-way interaction effect of age, gender and BMI status on PE teacher support was undertaken, as no studies that investigate the interactive influence of age, gender and BMI on PE teacher support jointly, could be found. The findings showed that there was no significant effect of these variables and, therefore, suggest that there is a need for a separate, detailed, and multidirectional analysis.

The above assumption supports results obtained in the study which shows that the effect of gender on support received by students from the PE teacher was significant. Boys received higher support from PE teachers than girls. Similar findings were noted by Bronikowski *et al.* (2015b) in a group of 1,228 adolescents from Kosovo. However, this is not in line with results found by Lim and Wang (2009), which revealed that there was no difference between the support of male and female students from their PE teachers. However, differently than in previous studies, Lim and Wang (2009) investigated autonomy support. Most available research results, indicate that girls received less teacher support than boys (Springer *et al*., 2006; Hill *et al*., 2012). The reason for this finding might be related to lower levels of participation in PA and PE lessons among girls in comparison to boys (Slater & Tiggemann, 2011). Some studies indicated that girls report appearance-teasing more often than boys (Puhl & Latner, 2007; Almenara & Ježek, 2015). This may be one of the reasons why girls avoid PE lessons. According to Puhl *et al*. (2013), the support of friends and peers is the most preferred source of support for adolescents. However, these authors underlined that teacher support ranked third in importance (Puhl *et al.*, 2013). Future investigations are needed to assess if adolescent females either do not need teacher support, or they do not receive enough support from their PE teachers.

Concerning the interaction effect of age and gender on PE teacher support in this study, 17-year-old boys from secondary school received the highest PE teacher support and 17-year-old girls received the lowest support. Similarly, in the study of Zhang *et al*. (2012), PE teacher support was related to age and gender. These authors noticed that 13-year-old primary school boys and girls received higher PE teacher support, whereas in secondary school, a higher level of PE teacher support was noticed in boys only (Zhang *et al.*, 2012). The assumption could be made that the different treatment of boys and girls by teachers might be related to the fact that girls maturated earlier than boys and are no longer treated as children (Zhang *et al.*, 2012). Therefore, early maturation in girls potentially causes peer support to become more important than teacher support (Zhang *et al*., 2012). Consequently, PE teachers need to be prepared to provide appropriate support depending on the age and gender of students.

The findings from the present study also indicated that age and BMI status were important for PE teacher support, as well as respective genders. According to Kantanista *et al.* (2013), high levels of teacher support was associated with higher MVPA among underweight and average weight girls and boys. Interestingly, in the study of Bronikowski *et al.* (2015a), the level of MVPA among Kosovar youth in overweight, girls and boys were not affected by the level of teacher and classmate support in PE. In that particular study (Bronikowski *et al*., 2015a), the highest level of MVPA was found in boys with normal weight, who were receiving high or medium levels of support from the teachers, whereas the lowest level was recorded in girls with a low level of support, regardless of body weight status. Nevertheless, Oblacińska and Jodkowska (2007) claim that obese girls avoid PE lessons twice as much as their peers with average weight status. Therefore, as indicated by Stelzer (2005), PE teachers may play a crucial role in reducing overweight and obesity among young people by developing a positive mind-set.

LIMITATION AND RECOMMENDATIONS

The findings of the current study should be interpreted cautiously because of some design limitations. A small sample of students was involved and the sample is not necessarily representative of Poland as a whole. Also, data on classmate and teacher support was based on declarations by adolescents and may be subject to some bias. Nevertheless, in this study the interaction between age, gender, BMI status of the students and the support provided by PE teachers and peers was analysed. There are no other studies that investigated these variables together. There is a need to analyse this dependency separately, in detail and in a multidirectional manner. Despite the limitation of the research design, the findings from the present study have important implications for PE teachers in their practice. One of the implications is that interventions aimed at increasing the support given to adolescents can benefit from including both teachers and peers. During the PE training, teachers should learn more about how to give sufficient social support to learners in the PE classes. Leisure-time activities organised by schools may also be suitable places for interventions directed toward building supportive and accepting relationships with teachers and classmates that may create a friendlier educational environment in schools. The findings of the current study may also be of interest to medical professionals, politicians and policy makers.

CONCLUSION

The findings of this study indicate the importance of social support in the context of PE and contribute to providing a reliable basis for future teaching contexts of PE students. There was a statistically significant two-way interaction effect of age and BMI status on classmate support, as well as PE teacher support. PE teachers need to regulate the quality and amount of support given to students, depending on the age and gender of the students, independently of their BMI status. Future research could take into consideration the gender of the PE teachers, as it is possible that the gender of the PE teacher may influence the support the PE teacher gives to the student.

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