Original Research

Socio-economic status and physical activity among adolescents: The mediating role of self-esteem

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SUMMARY

Objectives: Physical activity is an essential part of a healthy lifestyle in adolescence. Previous studies have shown physical activity to be associated with socio-economic status and self-esteem; the latter association may mediate the former, but evidence on this is lacking. The aim of this study was to explore the associations of socio-economic status and the self-esteem of adolescents with physical activity, and their joint effects.

Methods: A sample of 3694 elementary-school students from Slovakia (mean age 14.3 years, 49% boys) completed the Rosenberg Self-esteem Scale and answered questions about the frequency of their physical activity and their parents' educational level.

Results: Adolescents with higher socio-economic status were significantly more likely to report physical activity on ≥ 5 days/week and to report higher self-esteem. In logistic regression, the association between socio-economic status and physical activity decreased after including self-esteem, suggesting that at least a part of this association is mediated by self-esteem.

Conclusions: To conclude, youths from lower socio-economic groups have already been identified as a target group, for intervention. These findings suggest that it is important for promotion programmes to focus not only on the enhancement of their physical activity, but also on their self-esteem as a possible mediator.

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Introduction

Regular physical activity leads to physical health benefits such as reduced risk of coronary heart disease, diabetes and obesity. Previous research has also suggested possible mental health benefits of engagement in regular physical activity, such as reduced risk of depression or anxiety.[1] Healthy lifestyle patterns that include regular physical activity can be traced back to childhood and adolescence. These stages of development are crucial for adopting healthy lifestyles that have consequences for current and future physical and mental health.[2] Despite the well-known health benefits of

regular exercise, recent international studies[3–5] have shown a lack of sufficient physical activity among adolescents, indicating a potentially serious public health problem.[2] It is therefore important to identify possible determinants for the specific target groups.

Social inequalities have been found in the physical activity of adolescents, with adolescents with low-educated or low-income parents being less physically active.[3,6–8] There are several possible explanations, two of which are: parents with a higher education level may help their children to develop more positive attitudes towards health and health-related behaviours, and a high family income may support the engagement in certain sports with high costs.

Moreover, intrapersonal factors may contribute to social inequalities in physical activity, and influence the connection between the socio-economic status of youths and their engagement in physical activity. Several studies[9–11] have shown that adolescents from higher socio-economic groups report higher self-esteem. In turn, self-esteem representing a person's overall feeling of self-worth[12] has well-known consequences for current physical and mental health, and health-related behaviours. Higher self-esteem is not only seen as a basic feature of mental health, but also as a protective factor that contributes to better physical health and health-related behaviours through its role as a buffer against the impact of negative influences.[13] Moreover, self-esteem has been repeatedly associated with health-related behaviours, e.g. physical activity, in past studies[14–18] which implies an existing connection between physical activity and higher self-esteem.

Although associations between self-esteem and socio-economic status or self-esteem and physical activity were explored in the abovementioned studies, there is a lack of evidence on the role of self-esteem in the relationship between socio-economic status and physical activity among adolescents, as most of the studies in this field focused on adults. Another limitation of the previous studies is that most of them were cross-sectional.

Based on the explored association between socio-economic status, self-esteem and physical activity, it was hypothesized that self-esteem as an intrapersonal factor may not only mediate but may also moderate the relationship between the socio-economic status of adolescents and their physical activity. This hypothesis is in line with the theoretical approach proposed by Wilkinson,[19] who stressed the importance of the psychosocial interpretation of the socio-economic situation. Wilkinson proposed that psychosocial factors (e.g. self-esteem) may have an important role as mediators on the effect of socio-economic inequalities on health. The present hypothesis is also consistent with the Dahlgren and Whitehead model[20] emphasizing interactions between different areas of influence on health (individual lifestyle factors; social and community factors; living and working conditions; and economic, cultural and environmental conditions).

Therefore, the aim of this study was to explore the associations of socio-economic status and self-esteem with physical activity, and the possible influence (mediation or moderation) of self-esteem on the association between socio-economic status and physical activity by assessing their joint effects.

Methods

Sample and procedure

The study sample consisted of 3725 adolescents in the eighth and ninth grades at elementary schools in the major cities of Bratislava (600,000 inhabitants, Western Slovakia), Zilina (156,000 inhabitants, Northern Slovakia) and Kosice (240,000 inhabitants, Eastern Slovakia), as well as other smaller cities (10,000–40,000 inhabitants) in the eastern region of Slovakia. The school and classes in each region were selected at random from a database of schools from the Slovak Institute of School Information and Prognosis (81 schools in total, two classes per school, an average of 23 students per class). The directors of the selected schools were asked to participate, and following their agreement, parents were given the opportunity to opt out before data were collected. The response rate at the school level was 70%; schools that refused to participate were replaced by other schools from the database. The sample was comprised of 49% boys, with a mean age of 14.3 years [standard deviation (SD) 0.65, range 11–17 years]. Students <13 and >16 years of age were excluded to make the sample more homogeneous and to avoid age extremes that could influence the findings. After this exclusion, the study sample consisted of 3694 students (mean age 14.3 years, SD 0.62), with 24.6% coming from Bratislava, 21.3% from Zilina, 32.1% from Kosice and 22% from other cities in the eastern region of Slovakia.

Trained researchers and research assistants collected data between October and December 2006. The set of questionnaires was administered during two regular 45-min lessons over a 90-min time period on a voluntary and anonymous basis in the absence of the teachers. The overall response rate was 93.5%. Non-response was due to illness or another type of school absence. All questionnaires used in this study underwent back-translation from English to Slovak to ensure that the versions used in this study measured the same constructs as the original versions. The local ethics committee approved the study.

Measures

Physical activity was assessed using a single question used and validated in Health Behaviour in School-aged Children (HBSC) surveys[3–5]: 'Over a typical or usual week, on how many days were you physically active for a total of at least 60 min/day?' with answers: (1) 0 days; (2) 1 day; (3) 2 days; (4) 3 days; (5) 4 days; (6) 5 days; (7) 6 days; and (8) 7 days. The responses to this question were dichotomized for logistic regression into two categories, with the cut-off point at 5 days of physical activity per week, further denoted as sufficient vs insufficient physical activity.

Socio-economic status was assessed by parents' education level, defined as the highest level of education obtained by each of the respondent's parents. Education level of both parents was combined into one indicator and was classified as: high (university education), middle (secondary school education completed with school leaving examinations) or low (apprenticeship or primary school education only). The

Table 1 – Descriptive statistics of the study variables in the whole study sample (n = 3694) and separately by socioeconomic status and by gender.						
	Whole sample (n = 3694)	1 Low SES (n = 345)	2 Middle SES (n = 1626)	3 High SES (n = 1441)	p	Post hoc analysis
Gender: n (%)						
Boys	1765 (49.0)	131 (38.6)	753 (47.6)	765 (54.5)		
Girls	1929 (51.0)	208 (61.4)	829 (52.4)	638 (45.5)		
Physical activity: n (%)						
5 or more days per week	1074 (30.5)	74 (22.6)	455 (29.3)	474 (34.3)	p < .001	1–2, 1–3, 2–3
RSES[a]: Mean (SD; range)	28.07 (4.45; 11–40)	26.58 (4.17; 13–39)	27.92 (4.49; 11–40)	28.69 (4.30; 11–40)	p < .001	1–2, 1–3, 2–3
	Whole sample (n = 3694)	Boys (n = 1671)	Girls (n = 1743)		p	
Education of parents: n (%)					p < .001	
Low	345 (10.1)	131 (7.9)	208 (12.4)			
Middle	1626 (47.7)	753 (45.7)	829 (49.5)			
High	1441 (42.2)	765 (46.4)	638 (38.1)			
Physical activity: n (%)						
5 or more days per week	1074 (30.5)	666 (39.9)	388 (22.0)		p < .001	
RSES[a]: Mean (SD; range)	28.07 (4.45; 11–40)	28.9 (4.14; 11–40)	27.16 (4.56; 11–40)		p < .001	
SD, standard deviation; RSES, Rosenberg Self-esteem Scale.						
a Higher scores indicate higher self-esteem.						

characteristic of the parent with the higher level of education was used for classification.

Self-esteem was assessed using the Rosenberg Self-esteem Scale (RSES).[12] The 10 items of the RSES assess a person's overall evaluation of his/her worthiness as a human being.[21] Responses range on a four-point scale from 1 (strongly disagree) to 4 (strongly agree). A global self-esteem factor can then be calculated, with the sum score ranging from 10 to 40. A higher score indicates higher self-esteem. Cronbach's alpha for global self-esteem was 0.76.

Statistical analysis

Standard descriptive analyses for the whole study sample as well as for different socio-economic groups and genders were performed in the first step. In the next step, hierarchical logistic regression was performed to analyse the association between socio-economic status, physical activity and self-esteem of adolescents. Running the analysis separately for boys and girls did not change the strengths of associations; it only influenced the significance levels due to smaller sample sizes per gender, and therefore gender was added as a control variable together with age. Three models adjusted for age and gender were constructed. Model 1 explored the association between socio-economic status and physical activity, with socio-economic status as an independent variable. Self-esteem was added in Model 2 in order to assess whether this would lead to a decrease in the odds ratios (OR) for socio-economic status on physical activity. If present, this could be indicative of a mediating effect of self-esteem on the association between socio-economic status and physical activity. In Model 3, the interaction between socio-economic status and self-esteem was added in order to assess the moderating effect of self-esteem on the association between socio-economic status and physical activity. All analyses were performed using Statistical Package for the Social Sciences Version 16 (SPSS Inc., Chicago, IL, USA).

Results

Table 1 shows the descriptive statistics of all the study variables for the whole study sample, and separately for three socio-economic groups (low, middle and high socio-economic status), as well as for boys and girls separately. Significant socio-economic differences were found between the variables. Adolescents with higher socio-economic status were significantly more likely to report physical activity on ≥5 days/week, and were significantly more likely to report higher self-esteem. Significant gender differences were found between all studied variables. Boys were more likely to have higher socio-economic status, report physical activity on ≥5 days/week and report higher self-esteem compared with girls.

Table 2 presents OR and 95% confidence intervals (CI) from the hierarchical logistic regression adjusted for age and gender. Model 1 assessed the association between socio-economic status and sufficient physical activity, and results show that high socio-economic status significantly increased the probability of sufficient physical activity (OR 1.58, 95% CI 1.16–2.15; P < 0.001). Model 2 assessed the joint effects of socio-economic status and self-esteem in order to explore the possible mediating influence of self-esteem on the association between socio-economic status and physical activity. After self-esteem was added to the analysis, the association between high socio-economic status and sufficient physical activity weakened, showing a decrease in OR and significance (OR 1.45, 95% CI 1.07–1.98; P < 0.05), and higher self-esteem was found to significantly increase the probability of sufficient physical activity (OR 1.05, 95% CI 1.03–1.07; P < 0.001), suggesting that at least part of the association between socio-economic status and self-esteem is mediated by self-esteem. In Model 3, interactions between socio-economic status and self-esteem were added in order to assess the possible moderating influence of self-esteem on the association between socio-economic status and physical activity. These

Table 2 – Associations of socio-economic status and self-esteem with sufficient physical activity (≥5 days/week): odds ratios (OR) and 95% confidence intervals (CI) for sufficient physical activity from hierarchical logistic regression.

		Model 1	Model 2	Model 3
		OR (95% CI) adjusted for age and gender	OR (95% CI) adjusted for age and gender	OR (95% CI) adjusted for age and gender
Age		0.85 (0.75–0.97)*	0.86 (0.75–0.98)*	0.86 (0.75–0.98)*
Gender	Girls	1.00**	1.00**	1.00**
	Boys	2.40 (2.05–2.82)	2.25 (1.90–2.66)	2.25 (1.90–2.66)
Socio-economic status	Low	1.00**	1.00*	1.00*
	Middle	1.30 (0.96–1.75)	1.22 (0.90–1.67)	1.18 (0.86–1.61)
	High	1.58 (1.16–2.15)	1.45 (1.07–1.98)	1.40 (1.02–1.92)
RSES			1.05 (1.03–1.07)**	1.11 (1.03–1.20)**
Low socio-economic status*RSES				1.00
Middle socio-economic status*RSES				0.94 (0.87–1.01)
High socio-economic status *RSES				0.94 (0.87–1.02)

RSES, Rosenberg Self-esteem Scale.
**P-value for the overall contribution of this variable to the model <0.001.
*P-value for the overall contribution of this variable to the model <0.05.

interactions were not statistically significant, suggesting that self-esteem does not play a moderating role on the association between socio-economic status and physical activity. Age and gender were significantly associated with sufficient physical activity in all three models.

Discussion

This study explored the associations of socio-economic status and self-esteem with physical activity among adolescents, and the potential influence of self-esteem on the association between socio-economic status and the physical activity of adolescents. The results show that youths with high socio-economic status engage in regular physical activity more often than their peers with middle or low socio-economic status, and also report higher self-esteem. The association between socio-economic status and physical activity decreases if the results are adjusted for self-esteem, suggesting that at least a part of this association is mediated by self-esteem.

Socio-economic inequalities in the physical activity of adolescents have been found in previous research,[6–8,22] and the present findings confirm their existence. The higher education of parents may help students to develop positive attitudes towards health and health-related behaviours. Family income, on the other hand, may support the engagement in certain sports with high costs. In general, it can be assumed that youths from lower socio-economic groups are more vulnerable regarding low physical activity, and are thus an important target group in the promotion of physical activity.

Additionally, this study provides information about the mediating role of self-esteem on the relationship between socio-economic status and physical activity. A higher socio-economic status was found to be associated with higher self-esteem.[9–11] Previous research has also revealed a connection between self-esteem and physical activity.[15,18] Based on this connection, feelings of self-worth seem to play an important role in the connection between socio-economic status and physical activity in adolescence. The lower socio-

economic status of adolescents might be reflected in their negative perception of self. Consequently, from a public health perspective, low self-esteem may be associated with harmful health-related behaviour patterns and lower engagement in physical activity. This seems to be in line with Wilkinson's[19] theoretical approach that those with worse socio-economic status might feel marginalized and their self-esteem suffers as a consequence, leading to a more harmful health-related lifestyle.

Interventions focused on the strengthening of self-esteem might lessen the negative association between low socio-economic status and insufficient physical activity. Parental, school and community involvement enhances these actions and provides the necessary background.[23] Finally, self-esteem interventions need to take possible differences between participants (e.g. age, gender, ethnicity or type of problems) into account.[24]

This study had several important strengths, the most important being the large sample size and the high response rate. It also had limitations. First, only subjective self-reports were used for the measurement of physical activity. However, previous studies support the validity of self-reports.[25] The question on physical activity used in the present study was adapted from the Health Behaviour in School-aged Children (HBSC) survey. Its validity with the cut-off point as used in this study has been tested previously in order to provide necessary information about its reliability and validity levels. Studies concluded that the measure provides reliable estimates of adolescents' physical activity behaviour and correlates significantly with an objective measure of physical activity.[26,27] A main limitation of the present study was its cross-sectional design, which made it impossible to formulate conclusive statements about causality in the findings. The findings therefore need to be confirmed in studies with a longitudinal design which build their hypotheses on the present findings, suggesting at least one of the possible ways to explore and interpret variables associated with physical activity among youths. Further studies should also investigate the different age groups. As age increases during adolescence, physical activity decreases.[3–5] The latest 2005/2006 HBSC

study in Slovakia[3] found no significant differences among boys, but a significant difference was found between 11- and 15-year-old girls, with an evident decrease in physical activity between those ages; this was a common trend in most European countries at the time. Another limitation of the present study is the rather low ORs, especially in the case of self-esteem. However, it should be noted that an adolescent at the highest quartile of self-esteem (value: A) is, based on the OR in Model 2, 1.05^x times more likely to be physically active than an adolescent at the lowest quartile (value: B), with $x =$ difference between the two values (A–B).

Physical activity is one of the possible ways of enhancing physical health during adolescence, and the development of healthy patterns in adolescence is likely to continue into adulthood.[2] The present findings, which are in line with a recent national report from the Slovak Republic[28] as well as the international HBSC study,[3] suggest an existing association between socio-economic status and engagement in physical activity during adolescence. Youths from lower socio-economic groups should therefore be considered as one of the possible target groups regarding physical activity. Based on these results, it may be helpful for promotion programmes not only to consider the direct enhancement of adolescents' physical activity, but also to focus on other existing factors that may influence the existing connection. Enhancement of self-esteem among youths, which may be considered as a possible mediator between socio-economic status and physical activity among adolescents, is one example. How-ever, it is important to keep in mind that physical activity, as part of the health behaviour pattern, is influenced by other psychosocial (motives for physical activity, engagement in physical activity by their peers and parents) and environmental (opportunities and barriers for physical activity in physical environment) factors.

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Ethical approval

Ethics Committee of the Faculty of Science at PJ Safarik University in Kosice.

Competing interests

None declared.

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