

Social capital and physical activity among Croatian high school students: a school type-based cross-sectional study

Društveni kapital i tjelesna aktivnost učenika srednjoškolske dobi u Hrvatskoj: transverzalno istraživanje populacije učenika srednjih škola

Hrvoje Ajman, Dario Novak, Marjeta Mišigoj-Duraković*

Summary

Background: Recent scientific research indicates that school social capital is mostly associated with students' health predictors. A higher level of physical activity was detected in boys attending comprehensive school or high school, while those in vocational schools were less active. The aim of this study was to evaluate the link between social capital and the level of physical activity among vocational and public high school students and to determine gender differences.

Methods: The participants were high school students from the city of Zagreb, Croatia (N=3,427). The dependent variable was the level of physical activity, assessed through the abbreviated version of the International Physical Activity Questionnaire. Independent variables were social capital indicators and the school type. The questionnaires were distributed during PE classes and were filled out by the students. Data analysis involved the descriptive statistic parameters for the physical activity variable and the frequency response for the social capital variables. Statistically significant differences were tested using the Mann-Whitney U test and the link between social capital and physical activity were assessed using a series of logistic regressions.

Results: Results indicate a significant difference in the physical activity level between students attending public and vocational high schools (5410.20 ± 6279.14 vs 6480.80 ± 7586.09 MET-min/week). The logistic regression analysis determined a significant association between the physical activity level and informal social control ($p=0.01$), student interpersonal trust ($p=0.04$), and student collaboration in school ($p=0.03$) for students attending public high schools.

Conclusions: The present study indicates that higher levels of social capital are associated with higher physical activity in boys attending public high schools. High informal social control is associated with higher physical activity in girls attending public high schools.

Key words: social capital, physical activity level, high school students, school type

Sažetak

Uvod: Veza između društvene okoline i pojedinca značajno utječe na zdravlje i zdravstvene navike mladih. Rezultati posljednjih znanstvenih istraživanja ukazuju na to da je društveni kapital značajno povezan s prediktorima zdravlja. Viša razina tjelesne aktivnosti utvrđena je kod dječaka koji pohađaju opće obrazovne škole ili gimnazije, dok su oni koji pohađaju strukovne škole manje tjelesno aktivni. Iz svega navedenog formiran je cilj ovoga istraživanja, a to je utvrditi povezanost između varijabli društvenog kapitala i tjelesne aktivnosti učenika gimnazija i strukovnih srednjih škola, te ispitati postoje li razlike s obzirom na spol ispitanika.

Metode: Uzorak ispitanika formiran je iz populacije učenika završnih razreda srednjih škola iz grada Zagreba, Republika Hrvatska (N=3427). Zavisna varijabla u istraživanju bila je razina tjelesne aktivnosti, izračunata pomoću kratke verzije Međunarodnog upitnika tjelesne aktivnosti (IPAQ-SF), dok su nezavisne varijable bile prediktori društvenog kapitala (društveni kapital obitelji, susjedstva i vrsta škole.) Ispitanici su

* **Josip Juraj Strossmayer University in Osijek, Faculty of Education, Department of kinesiology** (Assistant Hrvoje Ajman, ph.D.); **University of Zagreb, Faculty of Kinesiology, Zagreb, Department of General and Applied Kinesiology** (Senior Assistant Dario Novak, ph.D.), **Department of Kinesiological Anthropology and Methodology** (Prof. Marjeta Mišigoj-Duraković, Ph.D.)

Adresa za dopisivanje / Correspondence address: Hrvoje Ajman, Cara Hadrijana 10, 31000 Osijek, Croatia; E-mail address: hajman@foozos.hr

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popunili upitnike tijekom sata tjelesne i zdravstvene kulture. Obradom podataka utvrđeni su deskriptivni parametri za varijablu tjelesne aktivnosti, a frekvencije odgovora izračunate su za varijable društvenog kapitala. Statistička značajnost razlika utvrđena je Mann-Whitney U testom. Serijom logističkih regresijskih analiza utvrđena je povezanost između društvenog kapitala i tjelesne aktivnosti.

Rezultati: Statistički značajne razlike utvrđene su za razinu tjelesne aktivnosti između učenika gimnazija i strukovnih škola ($5410,20 \pm 6279,14$ vs $6480,80 \pm 7586,09$ MET-min/tjedno). Logističkom regresijskom analizom utvrđena je značajna povezanost između tjelesne aktivnosti i neformalne društvene kontrole ($p = 0,01$), horizontalnog povjerenja u školi ($p = 0,04$) i međusobne suradnje učenika u gimnazijama ($p = 0,03$).

Zaključak: Rezultati ovoga istraživanja ukazuju na to da je viša razina društvenog kapitala u značajnoj povezanosti s višom razinom tjelesne aktivnosti dječaka u gimnazijama. Viša razina neformalne društvene kontrole je značajno povezana s višom razinom tjelesne aktivnosti djevojaka u gimnazijama.

Ključne riječi: društveni kapital, razina tjelesne aktivnosti, učenici srednjoškolske dobi, vrsta škole

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Background

Daily physical activity is an essential factor in the optimum growth and development of children and young people. Numerous benefits of regular physical activity on health have been scientifically proven.¹ The World Health Organization (WHO) recommends at least 60 minutes of daily physical activity, moderate to vigorous in intensity, for children and youth. However, despite this, the prevalence of physically inactive adolescents and children is continuously increasing.² According to scientific data, physical inactivity has been identified as one of the leading risk factors for global mortality.³

Evidence suggests that the rapport between the society and the individual has a significant effect on health and the health habits of youth.^{4,5,6,7} In the past ten years, the number of studies which explore the link between the social environment and the health of children and youth have greatly increased.^{8,9,10,11,12} Social capital is defined as a set of links between individuals who make up social networks, and the norms of mutual trust among people.¹³

The social capital theory posits that interpersonal trust, norms of reciprocity, and the exchange of social support between the members of networks constitute a type of resource, and that resources may be the most important prerequisite for a successful social and professional life. Social capital, according to Bronfenbrenner, is a link between the individual and his family and family members, friends, and relatives as well as his school colleagues or business partners.¹⁴

Children and youth spend a significant part of their time at school and, for this reason, schools play an important role in the shaping of an individual and her/his development. Recent scientific research indicates that the school social capital is mostly associated with academic success, outcomes of education, or health predictors.^{15,16} Depending on the

school type, a higher level of physical activity was determined in boys who attended comprehensive school or high school, while those enrolled in vocational schools were less active.¹⁷ According to preliminary studies, it remains unknown¹⁸ if school predictors, such as the school type, school size, class size, gender of teachers, lead to differences in the students' health outcomes.

The aim of the present study was to evaluate the link between the social capital and the level of physical activity among public high school and vocational school students, and to determine gender differences.

Material and methods

Participants

The study sample comprised the population of public high school and vocational high school students from 33 randomly selected secondary schools from the city of Zagreb, Croatia. Following the data analysis, the total number of respondents included 3,427 out of the invited 4,000 students. Vocational schools, which include between three and four years of schooling, provide education for students who will start working in a lower or mid-level business position or will start their own business. 2,032 students (1,146 male and 886 female) from vocational schools participated in this study. Public high schools prepare students for the tertiary level of education, university or college, and their duration is always four years. 1,395 students (543 male and 852 female) students attending a public high school participated in this study (Table 1). Public high schools included in this study were: I., II., III., IV., V., X., XI., XII., XIII., XV., and XVI. grammar school, Grammar School Lucijan Vranjanin, Grammar School Tituš Brezovački, and the Private Grammar School Dr. Časl. Vocational schools included in this study were: Food Technology School, School of Art and Design,

Catering Tourism Institution, Technical School Ruđer Bošković, Geodetic Technical School, Architectural Technical School, Technical School Faust Vrančić, I Technical School, Technical School Zagreb, I Economy School, II Economy School, School for Midwives, School for Textile, Leather, and Design.

Table 1 Descriptive parameters of the study sample
Tablica 1 Opisni parametri uzorka studije

	N	Age / Starost Mean ± SD
Public high schools <i>Javne srednje škole</i>	14	
Total number of students <i>Sveukupan broj studenata</i>	1395	
Male <i>Muško</i>	543	18,11 ± 0,39
Female <i>Žensko</i>	852	18,07 ± 0,36
Vocational schools <i>Strukovne škole</i>	19	
Total number of students <i>Sveukupan broj studenata</i>	2032	
Male <i>Muško</i>	886	18,12 ± 0,66
Female <i>Žensko</i>	1146	18,04 ± 0,52

N – total number, Mean – mean, SD – Standard deviation
N – sveukupan broj, Mean – prosjek, SD – standardna devijacija

Methods

Questionnaires were distributed in Zagreb, Croatia, during the school year 2015/2016, in Physical Education classes, and were filled out by the students. Questionnaires lacking the majority of required information (N = 573) were excluded from the analysis, which rendered a total of 3,427 questionnaires that were suitable for data analysis. Informed written consent was obtained from the students before filling out the questionnaires.

Instruments

School type

Students from two types of schools participated in this study – students from 14 public high schools (N=1,395) and 19 vocational schools (N=2,032). Students marked the school type at the beginning of the questionnaire.

Social capital

The survey explored the perceptions of social capital within the family, neighborhood, and high school.^{19,20,21} Family support in the school context was assessed with a single item: ‘Do you feel your family understands and gives you attention during high school?’¹⁹ Neighborhood social capital was assessed with two items: ‘Do you feel people trust each other in your neighborhood (neighborhood trust)?’ and ‘Do you feel your neighbors step in to criticize deviant behavior among high school students (informal social control)?’¹⁹ School social capital was assessed with three items: ‘Do you feel teachers and students trust each other in your high school (teacher-student interpersonal trust)?’, ‘Do you feel students trust each other in your high school (student interpersonal trust)?’, and ‘Do you feel students collaborate with each another in your high school (students’ collaboration in school)?’. The respondents could choose their responses to all questions using a Likert-type scale: ‘strongly agree,’ ‘agree,’ ‘neither agree or disagree,’ ‘disagree,’ and ‘strongly disagree’. The ‘disagree’ and ‘strongly disagree’ responses were combined to create a dichotomous variable indicating a lower perceived social capital.¹⁹

Physical activity level

The level of overall physical activity (PA) was assessed through an abbreviated version of the International Physical Activity Questionnaire (IPAQ-SF). The abbreviated version consisted of nine items and provided information on the time spent in walking, vigorous- and moderate-intensity activity, and in sedentary activity, and the respondents were instructed to report on all areas of physical activity in the last seven days. The questionnaire was translated into Croatian and the metric characteristics were determined. Ajman et al.²² identified the reliability level of the questionnaire at 0.64. The results referring to the physical activity level obtained by the IPAQ-SF questionnaire were categorized into one of the three possible categories of physical activity: insufficient physical activity (0-600 MET-minutes/week), minimum physical activity (601-3000 MET-minutes/week), and sufficient physical activity (x > 3001 MET-minutes/week) in order to be in line with the recommendations of the WHO on at least 60 minutes of moderate to vigorous physical daily activity for children and youth.²³ In further data analysis, the variable of the physical activity level was dichotomized to satisfactory (high-level PA) physical activity, indicated by number 0, and insufficient physical activity (low and moderate PA level), indicated by number 1.

Statistical analysis

The data analysis involved descriptive statistics, the nonparametric test, and the multivariate analysis. The descriptive statistic parameters were calculated for the physical activity variable and the Kolmogorov-Smirnov test was used to test the distribution normality. The frequency response was calculated for the social capital variables and all variables were dichotomized for further analysis. Statistically significant differences were tested using the Mann-Whitney U test with regards to the respondents' gender. The logistic regression analysis determines the association between the physical activity level and the social capital and school type. All conclusions were drawn at a 5% level of statistical error.

Ethical considerations

Survey procedures were designed to protect the students' privacy by allowing anonymous participation. The study protocol was approved by the Committee for Scientific Research and Ethics, Faculty of Kinesiology, University of Zagreb.

Results

The descriptive statistics for the physical activity level and independent variables are shown in Table 2. In all categories evaluating the level of physical activity, the average values are higher among the male

students. Students in vocational schools show higher values of physical activity level than students in public high schools. However, after dichotomizing the results in the variable of the physical activity level, the rates are similar for both male and female students in public high schools and vocational schools, which indicates that there is no gender difference in the physical activity level in those types of schools (Table 2). The results of the Kolmogorov-Smirnov test indicates that the distribution of results of all items of the physical activity questionnaire deviates significantly from normal distribution.

Social capital was tested with six questions, each representing a different category of social capital. Students estimated family support to be at a high level – about 80% students from vocational and public high schools confirmed that their family understands and gives them enough attention during high school education. There were no significant differences in social capital in terms of the school type for this question. Students estimated neighborhood trust to be at a very low level (76%). There were no significant differences in terms of the school type in this item; however, female students attending public high schools estimated neighborhood trust significantly higher than female students attending vocational schools (20.1 and 14.6%, respectively). Students estimated informal social control to be at a low level (64%). There were no significant differences in terms of the school type or students' gender in this item.

Table 2 Descriptive parameters of the level of physical activity according to the school type and the respondents' gender

Tablica 2. Deskriptivni parametri razine fizičke aktivnosti prema vrsti škole te spola ispitanika

Physical activity level (MET-min/week) <i>Razina fizičke aktivnosti (MET –min/tjedan)</i>	Mean ± Std. dev.	Med <i>Srednji</i>	Low/High <i>Nisko/visoko</i>
Public high schools (N=1395) <i>Javne srednje škole</i>	5410.20 ± 6279.14	3531.00	
Male (N=543) <i>Muško</i>	5676.68 ± 6174.52	3752.00	37.2/62.8
Female (N=852) <i>Žensko</i>	5240.37 ± 6342.68	3360.00	45.8/54.2
Vocational schools (N=2032) <i>Strukovne škole</i>	6480.80 ± 7586.09	4239.00	
Male (N=886) <i>Muško</i>	6930.61 ± 7610.35	4800.00	35.1/64.9
Female (N=1146) <i>Žensko</i>	5941.40 ± 7535.43	3360.00	46.5/53.5

Mean = mean, Std. dev. – standard deviation, Med – median, Low/High – percentage of low and high physical activity after dichotomizing data

Mean – prosjek, Std. dev. – standardna devijacija, Med – srednji, Nisko/visoko – postotak niže i više fizičke aktivnosti nakon dihotomizacije podataka

School social capital was tested with three items: teacher-student interpersonal trust, student interpersonal trust, and student collaboration at school. Students estimated the teacher-student interpersonal trust to be at a very low level (73%). There were no significant differences based on the school type or students' gender in this item. Student interpersonal trust was estimated to be at a low level (61.9 - 67.8%). There were significant differences in terms of school type in this item. Students attending public high schools estimated student interpersonal trust significantly higher than students from vocational schools (38.1 and 32.2%, respectively). Student collaboration in school was estimated at a high level (53.3 - 60.4%). There were significant differences based on school type in this item. Students from public high schools estimated student collaboration in school to be significantly higher than students from vocational schools (60.4 and 53.3%, respectively) (Table 3).

Gender differences were tested using the Mann-Whitney U test. The results indicate statistically significant differences in the physical activity variable and in all social capital predictors except in the family support variable (Table 4).

The logistic regression analysis determined a significant link between the physical activity level and the social capital variables at a 5% level of statistical error (Table 5). A significant link was determined between social capital and the physical activity level in students from public high schools. Male students show a significant link between student interpersonal trust and student collaboration in school and physical activity level. In female students, such a significant link was established between informal social control and the physical activity level. In students from vocational schools, no significant links were determined between social capital and the physical activity level either in male or female students (Table 5).

Table 3 Percentage of high and low-level social capital predictors according to the school type and the respondents' gender

Tablica 3 Postotak visoke i niske razine prediktora društvenog kapitala prema vrsti škole i spola ispitanika

	Public high schools (N=1,395) <i>Javne srednje škole</i>		Vocational schools (N=2,039) <i>Strukovne škole</i>	
	High (%) <i>Visoki</i>	Low (%) <i>Niski</i>	High (%) <i>Visoki</i>	Low (%) <i>Niski</i>
Family support / <i>Podrška obitelji</i>	81.8	18.2	82.3	17.7
Male / <i>Muško</i>	82.5	17.5	82.8	17.2
Female / <i>Žensko</i>	81.3	18.7	82.2	17.8
Neighborhood trust <i>Povjerenje okoline</i>	23.7	76.3	23.5	76.5
Male / <i>Muško</i>	29.3	70.7	30.1	69.9
Female / <i>Žensko</i>	20.1	79.9	14.6	85.4
Informal social control <i>Neformalna društvena kontrola</i>	36.1	63.9	35.3	64.7
Male / <i>Muško</i>	33.0	67.0	32.4	67.6
Female / <i>Žensko</i>	38.0	62.0	38.8	61.2
Teacher-student interpersonal trust <i>Međusobno povjerenje nastavnik-student</i>	27.9	72.1	26.4	73.6
Male / <i>Muško</i>	34.6	65.4	31.6	68.4
Female / <i>Žensko</i>	23.6	76.4	19.3	80.7
Student interpersonal trust <i>Studentsko međusobno povjerenje</i>	38.1	61.9	32.2	67.8
Male / <i>Muško</i>	46.4	53.6	39.4	60.6
Female / <i>Žensko</i>	32.9	67.1	22.9	77.1
Student collaboration in school <i>Studentstva suradnja u školi</i>	60.4	39.6	53.3	46.7
Male / <i>Muško</i>	65.4	34.6	59.5	40.5
Female / <i>Žensko</i>	57.2	42.8	45.1	54.9

% - percentage / % postotak

Table 4 Results of the Mann Whitney U test for physical activity and social capital predictors according to the respondents' gender

Tablica 4 Rezultati Mann Whitney U ispitivanja fizičke aktivnosti i prediktora društvenog kapitala prema spolu ispitanika

Physical activity <i>Fizička aktivnost</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	5618,48	3360,0	6996,37	0,00	-6,60
Boys <i>Dječaci</i>	6563,83	4536,0	7226,42		
Family support <i>Obiteljska podrška</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	4,21	4,00	0,90	0,28	1,08
Boys <i>Dječaci</i>	4,19	4,00	0,89		
Neighbourhood trust <i>Povjerenje okoline</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	2,75	3,00	0,92	0,00	-8,35
Boys <i>Dječaci</i>	3,03	3,00	1,01		
Informal social control <i>Neformalna društvena kontrola</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	3,20	3,00	1,05	0,00	3,38
Boys <i>Dječaci</i>	3,08	3,00	1,02		
Teacher-student interpersonal trust <i>Međusobno povjerenje nastavnik-student</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	2,82	3,00	0,93	0,00	-5,55
Boys <i>Dječaci</i>	2,99	3,00	1,03		
Student interpersonal trust <i>Studentsko međusobno povjerenje</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	2,94	3,00	0,93	0,00	-8,99
Boys <i>Dječaci</i>	3,23	3,00	1,02		
Student collaboration in school <i>Studentska suradnja u školi</i>	Mean	Med	Std. dev.	p	Z
Girls <i>Djevojke</i>	3,40	4,00	0,96	0,00	-7,92
Boys <i>Dječaci</i>	3,65	4,00	0,10		

Mean – mean, Med – median, Std. dev. – standard deviation, p – statistical error, Z – subjects' standardized result
 Mean – prosjek, Med – srednji, Std. dev. – standardna devijacija, p – statistička greška, Z – standardizirani rezultati subjekata

Table 5 Results of the logistic regression analysis with physical activity as the independent variable and social capital predictors as the dependent variable according to school type and respondents' gender

Tablica 5. Rezultati logističke regresijske analize sa fizičkim aktivnostima kao nezavisna varijabla i prediktori društvene kontrole kao zavisna varijabla prema vrsti škole i spola ispitanika

	Public high schools <i>Javne srednje škole</i>		Vocational schools <i>Strukovne škole</i>	
	Male/Muško (N=543)	Female/Žensko (N=852)	Male/Muško (N=886)	Female/Žensko (N=886)
Family support <i>Obiteljska podrška</i>	0.08*	0.70*	0.47*	0.95*
Neighbourhood trust <i>Povjerenje okoline</i>	0.49	0.09	0.31	0.24
Informal social control <i>Neformalna društvena kontrola</i>	0.92	0.01	0.11	0.31
Teacher-student interpersonal trust <i>Međusobno povjerenje nastavnik-student</i>	0.94	0.40	0.80	0.29
Student interpersonal trust <i>Studentsko međusobno povjerenje</i>	0.04	0.15	0.12	0.94
Student collaboration in school <i>Studentska suradnja u školi</i>	0.03	0.88	0.43	0.21

*- p value / * - p vrijednost

Discussion

Our findings suggest that young people demonstrating a higher level of neighbourhood informal social control and a higher level of student interpersonal trust and collaboration in school are likely to be physically active. Social connectedness within the neighbourhood and school appear to be important factors influencing activity levels among the youth. Previous studies have suggested that higher levels of social capital are associated with higher levels of children's and adolescents' development, their health and wellbeing.^{10,11,12,24,25,26,27,}

Generalized trust in other people is a major component of social capital.^{10,11,12,28,29} We found a statistically significant link between the higher level of student interpersonal trust and collaboration in school and the overall physical activity among boys, but only those attending public high schools. We can hypothesize that there is a concentration of male students who report a desire to increase their physical activity but think they need support to do so, especially from their peers.

The present study shows that only high informal social control is associated with a higher regular overall physical activity among girls in public high

schools. Interestingly, the effect of social capital seems to be strongly driven by the type of school and gender. We can speculate that this was found since those who attended vocational schools are physically more active, while those enrolled in public high schools were less active. These findings stand in contrast to some previous studies, mainly from Scandinavian countries, showing that high school students participate more frequently in leisure time sports and show better physical performance than students from technical and vocational schools.^{30,31} In recent years, extensive school curriculums in public high schools in Croatia have led to a greater emphasis on the recognized core academic subjects, such as Math and ELA, but also to a de-emphasis on subjects such as Physical Education and physical activity and health. We can speculate that this might be the reason why students in public high schools are less physically active. Also, adolescent boys are generally more physically active than girls. Previous findings also suggest that adolescent boys are more physically active and more persistent in exercise than girls.^{12,32,33} We might also hypothesize that boys and girls are treated differently and are encouraged to engage in different styles of play in physical activity contexts – usually by providing gender-based and gender-stereotyped activities whereby boys are

encouraged to play vigorously and girls quietly.

Our study has some limitations. First, due to the cross-sectional design, we cannot exclude the possibility of reverse causation, i.e., a lower physical activity level has led to lowered perceptions of social capital. Second, the physical activity level was measured using a questionnaire, which may have led to recall and social desirability bias. The strengths of this study are the representative number of respondents who participated in the study. Second, the level of physical activity of high school students was calculated and can be the starting point of future programs for youth health prevention. Future studies are needed to identify interventions that can increase the social capital level with the goal of achieving healthier students.

Conclusions

The present study shows that higher levels of student interpersonal trust at school and student collaboration social capital are associated with higher regular overall physical activity in boys attending public high schools and high informal social control is associated with higher regular overall physical activity in girls attending public high schools. Based on Bronfenbrenner's ecological systems theory of child development, we posited that school social capital may promote adolescent physical activity and that students who report higher social capital in school domains will experience higher levels of physical activity. Particular attention should be devoted to developing practical interventions to build social capital in communities and schools.

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