Rev Bras Cineantropom Hum

original article

DOI: dx.doi.org/10.1590/1980-0037.2019v21e58684

Social support, self-efficacy and level of physical activity of students aged 13-15 years

Apoio social, autoeficácia e o nível de atividade física em escolares de 13 a 15 anos

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Abstract – The aim of this study was to verify the relationship, the population attributable fraction (PAF) and the relative risk reduction (RRR) of social support and self-efficacy with level of physical activity in students. Probabilistic cross-sectional study with 1,472 students aged 13-15 years. Gender, age, social support from parents and friends, self-efficacy and levels of physical activity were evaluated through questionnaires. Data analysis was performed using Poisson regression with robust variance, PAF and RRR, adopting p≤0.05. A total of 56.1% (n = 826) of students were considered active, boys (68.7%) presenting the largest proportion. Social support from parents was positively associated with physical activity in boys (PR: 1.28, 95% CI: 1.12-1.48, PAF = 21.88) and girls (PR: 2.00; 95%CI: 1.59-2.51, PAF = 50.00). Social support from friends was positively associated with physical activity in boys (PR: 1.34, 95%CI: 1.16-1.54, PAF = 25.37) and girls (PR: 1.32, 95%CI: 1.06-1.64, PAF = 24.24). Self-efficacy was not associated with physical activity. Social support was associated with levels of physical activity, and PAF indicated that the absence of high social support from parents and friends might reduce the level of physical activity in adolescents.

Key words: Adolescent; Motor activity; Self-efficacy; Social support.

Resumo – *Objetivou-se verificar a relação, a fração atribuível populacional (FAP) e a redução relativa do risco (RRR) do apoio social e autoeficácia com o nível de atividade física em escolares. Estudo transversal probabilístico com 1472 escolares de 13 a 15 anos. Foram avaliados sexo, idade, apoio social dos pais e dos amigos, autoeficácia e nível de atividade física através de questionários. Para análise dos dados utilizou-se regressão de Poisson com variância robusta, FAP e RRR, adotando p≤0,05. Foram considerados ativos 56,1% (n=826) dos escolares, sendo os meninos (68,7%) em maior proporção. O apoio social dos pais foi positivamente associado à prática de atividades física dos meninos (RP: 1,28; IC95%: 1,12-1,48; FAP=21,88) e das meninas (RP: 2,00; IC95%: 1,59-2,51; FAP=50,00). O apoio social dos amigos foi positivamente associado à prática de atividades físicas dos meninos (RP: 1,34; IC95% 1,16-1,54; FAP=25,37) e das meninas (RP: 1,32; IC95%: 1,06-1,64; FAP=24,24). A autoeficácia não se associou com atividade física. O apoio social apresentou-se associado com o nível de atividade física, e as análises da FAP indicaram que sem o elevado apoio social dos pais e amigos pode haver uma redução do nível de atividade física em adolecentes.*

Palavras-chave: *Adolescente; Apoio social; Atividade motora; Autoeficácia.*

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Received: August 15, 2018
Accepted: April 22, 2019

How to cite this article
Campos JG, Bacil EDA, Piola TS, Silva MP, Pacífico AB, Campos W. Social support, self-efficacy and level of physical activity of students aged 13-15 years. Rev Bras Cineantropom Desempenho Hum 2019, 21:e58684. DOI: http://dx.doi.org/10.1590/1980-0037.2019v21e58684.

INTRODUCTION

The literature highlights the importance of physical activity (PA) in adolescence[1]; however, most adolescents do not meet minimum PA recommendations for health as indicated in the Study of Cardiovascular Risks in Adolescents (ERICA)[2] with Brazilian adolescents aged 12-17 years, indicating that about 54.3% of adolescents have insufficient PA practice.

The identification of factors that may influence PA practice is pointed as essential information for the development of programs that promote the habitual practice of this behavior in adolescents[3]. Among these factors, social support (SS) and self-efficacy represent significant influence for different health-related aspects such as: how to control body weight and fat percentage, cardiovascular system and psychological well-being improvement, which are important factors in PA promotion strategies among adolescents[4].

SS is defined as the incentive for PA practice offered by parents, relatives, siblings and / or friends[5], and self-efficacy refers to the confidence of action to perform PA[6]. In a systematic review by Lisboa et al.[7] involving adolescents aged 14-19 years in cross-sectional and longitudinal studies, the authors point out that SS from parents and friends was associated with PA practice in adolescents of both sexes. Self-efficacy corresponds to behaviors that are learned through observation, positive reinforcement and perception of success and failure[8] and its application in the PA practice context refers to the individual's ability to continue to practice PA even in the onset of obstacles that may limit the performance of this behavior. The literature shows positive associations of self-efficacy with PA practice, since the elevation of its levels may be an important component of strategies to promote PA in this population[8].

There are several studies indicating association of SS and self-efficacy with level of PA among adolescents[8-10], but there are no studies in the national and international literature with estimates of population attributable fraction (PAF) and relative risk reduction (RRR) in the relationship of SS and self-efficacy with level of PA in adolescents. PAF would allow estimating how much the practice of regular PA can be decreased without exposure to SS and self-efficacy. RRR would allow estimating how much regular PA practice can be reduced with SS exposure and self-efficacy. Thus, PAF and RRR estimates could go beyond these associations, showing the repercussion and consequences of exposure in relation to the outcome[11].

In this context, the aim of this study was to verify the relationship of population attributable fraction and the relative reduction of the risk of social support and self-efficacy with level of physical activity in male and female students from Curitiba / PR.

METHOD

This research is part of the project entitled: "Correlates of physical activity

and sedentary behavior of students aged 11-15 years from public schools of Curitiba / PR"[12]. This is a cross-sectional study conducted in 10 public schools of Curitiba, Paraná, from March to May 2016. Individuals of both sexes, enrolled in urban elementary schools from the 8th and 9th grades and high school students from the 1st year of the day shift were part of the study. The probabilistic sample was selected from the multi-stage sampling process in three stages. Initially, all state schools were listed and stratified according to each of the ten administrative regions of the city of Curitiba / PR. Then, a school was drawn in each administrative district of the city. Finally, a simple random selection of two classes of each year was made, according to the number of students, separated by sex.

Based on literature[13,14], for the sample calculation considering a population of 50,223, PA prevalence of 50% in adolescents was considered, confidence level of 95% (sd = 1.96), sampling error of 4.0 percentage points, design effect of 1.5 and increase of 30% for losses and refusals[15]. The minimum sample was estimated at 1,080 students. A total of 1,615 schoolchildren were evaluated. Of these, 57 were outside the age group of interest, two were physically disabled, one was a pregnant woman and 18 did not complete all questionnaire items. However, 22 students incorrectly completed it, 26 did not return the Informed Consent Form (ICF) signed by parents / guardians and 17 gave up participating in the study. Thus, the final sample consisted of 1,472 students of both sexes aged 13-15 years. The calculation of the *a posteriori* statistical power of the sample, considering α of 0.05 and β of 0.20, indicates that 1,472 subjects can identify prevalence ratios above 1.17 as risk and below 0.85 as protection.

Data collection was performed by a trained team from the Center for Studies in Physical Activity and Health (CEAFS - UFPR). A pilot study was previously conducted to train evaluators on the procedures of this study, aiming to improve the reliability of data collection.

The study was approved by the Human Research Ethics Committee (CEP) of the Federal University of Paraná (protocol No. 722.529; CAAE 30350514.3.0000.0102), according to Resolution of the National Health Council (CNS) 466/2012.

With the CEP authorization document, researchers contacted the selected schools requesting authorization to conduct the study, scheduling days of data collection as well as selecting classes that would participate in the research. A visit was scheduled to the school to present the objectives and relevance of the study, as well as clarification of possible doubts to the school board and faculty. Only one school refused to participate, and a new draw was held for a school within the same region of the city.

On the day before data collection, students in the selected groups were given the ICF so that parents or guardians could authorized their children to participate in the research and the written informed consent form (WICF). These documents should be signed and returned on the day of data collection so that students could participate in the study. The following day, the questionnaire was individually completed in the class-

room with the presence of researchers and teacher responsible for the class.

SS and self-efficacy for PA were measured by a four-point Likert scale[16]. The SS questionnaire is divided into two sessions (parents and friends). In each session, the six types of SS are specified: stimulate, practice together, transport, watch, comment and talk about. Among friends, the transport variable was replaced by invite. Based on a typical or normal week, students reported the frequency (never, rarely, frequently, always) with which parents and friends encourage them to engage in physical activity. The PA self-efficacy scale has 10 items, divided into two sessions in the questionnaire: SS and reasons for PA (tiredness and stress, lack of company, lack of motivation, among others) and resources for PA practice (lack of places and instruction to practice, among others). These questions were classified as: 1 (strongly disagree), 2 (disagree), 3 (agree) and 4 (strongly agree)[16]. Subsequently, a sum of these scores was made. SS and self-efficacy scales were classified by tertile: 1st tertile (low), 2nd tertile (moderate) and 3rd tertile (high). SS and self-efficacy scales have satisfactory validity and reproducibility, and the questionnaire had intraclass correlation coefficient (ICC) for SS of 0.92 (95% CI: 0.91-0.93) and for self-efficacy of 0.75 (95% CI: 0.71-0.79)[17].

The PA questionnaire analyzed in the present study was proposed by Farias Junior et al.[18], which is an adaptation of the Self-Administered Physical Activity Checklist[19], consisting of a list of 24 moderate to vigorous physical activities (> 3METS), with the possibility of adding two more. In determining the level of physical activity, the sum of the product of the time spent in each of the physical activity by the respective frequencies of practice was considered. Schoolchildren with PA practice equal to or greater than 420 minutes / week were considered sufficiently active and those who exercised for a shorter time were insufficiently active[20]. This questionnaire presented satisfactory validity and reproducibility (ICC = 0.88; 95% CI: 0.86-0.90)[21].

For data analysis, considering the influence of SS and self-efficacy on PA different in boys and girls, categorical variables were described through absolute and relative frequency, total and stratified by sex. The chi-square test was used for gender comparisons. SS and self-efficacy variables were analyzed by measures of central tendency and dispersion (mean and standard deviation) and divided by tertiles. To verify the association of SS and self-efficacy with PA, Poisson regression analysis with robust variance was used and then adjusted for all independent and control variables (age) with their respective confidence intervals (95% CI).

For SS and self-efficacy, PAF was calculated when the prevalence ratio indicated positive association between factor and outcome, and RRR when the prevalence ratio (PR) indicated negative association between factor and outcome, using equations PAF = PR - 1 x 100 / RP and RRR = 1 - PR x 100, respectively[11,22]. All analyses were performed using the IBM SPSS 24 software, with significance level set at $p \leq 0.05$.

RESULTS

The total sample was composed of 1,615 students, with loss of 8.86% (n = 143), thus, the final sample was composed of 1,472 students (51.9%, n = 764 boys), where the largest proportion of individuals belonged to the age group of 13-14 years (38.2% and 38.1%, respectively). Boys had higher SS from parents (33.0%, n = 252) and friends (48.8%, n = 373) for PA compared to girls. In contrast, girls had higher self-efficacy (39.7%, n = 281) for PA compared to boys. Most students (56.1%, n = 826) were considered active, with boys (68.7%, n = 525) in a higher proportion (Table 1). SS scores ranged from 12 to 48, averaging 25.41 (SD = 8.26), for self-efficacy from 10 to 40, averaging 22.75 (SD = 4.87), and for daily PA 134.1 minutes (SD = 171.8).

Table 1. Distribution of study participants, total and stratified by sex, according to age, social support from parents and friends and self-efficacy, 1,472 students, Curitiba, Brazil, 2016.

Variable	Total		Male		Female		p
	n	%	n	%	n	%	
Sex	1472	100	764	51.9	708	48.1	
Age							
13 years	563	38.2	269	35.2	294	41.5	0.01
14 years	561	38.1	284	37.2	277	39.1	
15 years	348	23.6	211	27.6	137	19.4	
Social support from parents							
Low (1st tertile)	568	38.6	243	31.8	325	45.9	0.01
Moderate (2nd tertile)	491	33.4	269	35.2	222	31.4	
High (3rd tertile)	413	28.1	252	33.0	161	22.7	
Social support from friends							
Low (1st tertile)	509	34.6	208	27.2	301	42.5	0.01
Moderate (2nd tertile)	410	27.9	183	24.0	227	32.1	
High (3rd tertile)	553	37.6	373	48.8	180	25.4	
Self-efficacy							
Low (1st tertile)	419	28.5	239	31.3	180	25.4	0.01
Moderate (2nd tertile)	530	36.0	283	37.0	247	34.9	
High (3rd tertile)	523	35.5	242	31.7	281	39.7	
Level of Physical Activity							
Active	826	56.1	525	68.7	301	42.5	0.01
Insufficiently active	646	43.9	239	31.3	407	57.5	

Note. p<0.05.

Tables 2 and 3 describe the results of the association of PAF and RRR of SS and self-efficacy with PA level. In the crude analysis, boys with moderate and high SS from parents had prevalence of 20% (PR: 1.20; 95% CI: 1.04-1.37) and 42% (RP: 1.42; 95% CI: 1.26 - 1.61) higher of being active than students with low SS from parents. In the adjusted analysis, only boys with high SS from parents maintained higher prevalence of being active than boys with low SS from parents (PR: 1.28; 95% CI: 1.12-1.46). Girls with moderate and high SS from parents showed higher prevalence of

being active in both crude (PR: 1.80; 95% CI: 1.45-2.24) (PR: 2.17; 95% CI: 1, 75-2.69) and adjusted analysis (PR: 1.69; 95% CI: 1.35-2.11) (RP: 2.00; 95% CI: 1.59-2.51) compared to girls with low SS.

Regarding support from friends, boys with high SS, both in the crude and adjusted analysis, had prevalence of 44% (PR: 1.44; 95% CI: 1.26-1.65) and 34% (PR: 1.34; 95% CI: 1.16-1.54) higher of being active than boys who did not receive SS from friends to practice PA. Girls with moderate and high SS from friends had prevalence of 43% (PR: 1.43; 95% CI: 1.16-1.77) and 60% (PR: 1.60; 95% CI: 1.30- 1.88) higher of being active than girls with low SS from friends in the crude analysis. The same occurs in the adjusted analysis, where girls with moderate and high SS from friends

Table 2. Relationship between social support and self-efficacy with physical activity in 13 to 15-year-old male students from Curitiba, Paraná, Brazil, 2016.

	Active		Crude analysis				Adjusted analysis*			
	n	%	PR	95% CI	PAF (%)	RRR (%)	PR	95% CI	PAF (%)	RRR (%)
Support from parents										
Low (1st tertile)	138	56.8	1.0				1.0			
Moderate (2nd tertile)	183	68.0	1.20	1.04 – 1.37	16.67	-	1.13	0.98 – 1.30	11.50	-
High (3rd tertile)	204	81.0	1.42	1.26 - 1.61	29.58	-	1.28	1.12 – 1.46	21.88	-
Support from friends										
Low (1st tertile)	114	54.8	1.0				1.0			
Moderate (2nd tertile)	116	63.4	1.16	0.98 – 1.36	13.79	-	1.13	0.96 – 1.34	11.50	-
High (3rd tertile)	295	79.1	1.44	1.26 – 1.65	30.56	-	1.34	1.16 – 1.54	25.37	-
Self-efficacy										
Low (1st tertile)	171	71.5	1.0				1.0			
Moderate (2nd tertile)	183	64.7	0.90	0.80 – 1.02	-	10.0	0.91	0.81 – 1.02	-	9.00
High (3rd tertile)	171	70.7	0.99	0.88 – 1.11	-	1.00	0.98	0.87 – 1.09	-	2.00

Note. PR: prevalence ratio; 95% CI: 95% confidence interval; PAF: population attributable fraction; RRR: Relative risk reduction;*adjusted for all independent variables and chronological age.

Table 3. Relationship between social support and self-efficacy with physical activity in 13 to 15-year-old female students from Curitiba, Paraná, Brazil, 2016.

	Active		Crude analysis				Adjusted analysis*			
	n	%	PR	95% CI	PAF (%)	RRR (%)	PR	95% CI	PAF (%)	RRR (%)
Support from parents										
Low (1st tertile)	91	28.0	1.0				1.0			
Moderate (2nd tertile)	112	50.5	1.80	1.45 – 2.24	44.44	-	1.69	1.35 – 2.11	40.83	-
High (3rd tertile)	98	60.9	2.17	1.75 – 2.69	53.92	-	2.00	1.59 – 2.51	50.00	-
Support from friends										
Low (1st tertile)	99	32.9	1.0				1.0			
Moderate (2nd tertile)	107	47.1	1.43	1.16 – 1.77	30.07	-	1.27	1.03 – 1.57	21.26	-
High (3rd tertile)	95	52.8	1.60	1.30 – 1.98	37.50	-	1.32	1.06 – 1.64	24.24	-
Self-efficacy										
Low (1st tertile)	73	40.6	1.0				1.0			
Moderate (2nd tertile)	108	43.7	1.08	0.86 – 1.35	7.41	-	1.00	0.81 – 1.25	-	0.00
High (3rd tertile)	120	42.7	1.05	0.84 – 1.32	4.76	-	0.92	0.74 – 1.14	-	8.00

Note. PR: prevalence ratio; 95% CI: 95% confidence interval; PAF: population attributable fraction; RRR: Relative risk reduction; *adjusted for all independent variables and chronological age.

had prevalence of 27% (95% CI: 1.03-1.57) and 32% (95% CI: 1.06-1.64) of being active than girls with low SS from friends.

Regarding the associations of self-efficacy with PA, no significant association was observed for both male and female students.

When calculating PAF based on PR resulting from the adjusted analysis, it was observed for high SS from parents PAF = 21.88 for males, and for girls, for moderate and high SS from parents PAF = 40.83 and PAF = 50.00, respectively. For high SS from friends, boys presented PAF = 25.37, and girls, PAF = 21.26 and PAF = 24.24 for moderate and high SS from friends, respectively.

DISCUSSION

The present study aimed to verify the relationship between SS and self-efficacy with level of PA in students from Curitiba / PR. The results indicated that SS from parents and friends were associated with higher level of PA, but self-efficacy was not associated. Additionally, the present study aimed to estimate the exposure of SS and self-efficacy at level of PA through PAF measurements, which allowed measuring how much level of PA could decrease without SS exposure and self-efficacy, and RRR that could estimate how much level of PA could decrease with SS exposure and self-efficacy. These analyses indicated that without SS from parents and / or friends both boys and girls would have a large reduction in their level of PA.

In the present study, students who reported having high SS from parents to practice PA had higher prevalence of being active for both males (PR: 1.28; 95% CI: 1.12-1.46) and females (PR: 2.00; 95% CI: 1.59-2.51) in the adjusted analysis. SS has been identified as an important correlate for the maintenance of levels of PA[3]. Our results are similar to those of Prado et al.[9] performed with 1,469 adolescents aged 14-18 years from the public school system of Curitiba / PR, who indicate that frequent company of family members during PA practice was positively associated with PA of boys (PR: 2.88; 95% CI: 2.00-4.13) and girls (PR: 3.39 95% CI: 1.49-7.69). The study by Cheng et al.[10], conducted with 2,361 adolescents aged 14-19 years from public and private schools in the city of João Pessoa / PB, showed that the father's PA practice was associated with that of the son ($\beta = 0.10$ <0.001) and mother's PA practice with that of the daughter ($\beta = 0.08$ p <0.05).

It is evident in literature that during adolescence, there is a decline in PA[23]. Greater contact with friends, especially outside the school environment, seems to influence this decline[24], as friends who are engaged in PA can increase the likelihood of adolescents practicing PA, and may facilitate the promotion of healthy habits throughout life[25].

The study by Prado et al.[9] also points out that frequent company of friends is associated with PA for both sexes (boys PR: 5.46; 95% CI: 2.33-12.78; girls PR: 4.06; 95% CI: 2.22-7.45). Kirby et al.[26], in a longitudinal study with 1,632 adolescents aged 11-15 year from 4 areas of Scotland,

point to significant results, as adolescents who received high SS from friends are 3 times more likely of being active when compared with adolescents receiving low SS from friends (boys: OR: 3.53; 95% CI: 1.77-7.04 and girls: OR: 3.27; 95% CI: 1.80-5.92).

As for SS from parents, the results of the present study indicate that SS from friends seems to be an important factor for PA practice among adolescents. Active adolescents tend to have active friends[27], as they influence to initiate and continue PA[10]. Adolescents tend to join the same social group, presenting an identity, adapting to their friends' choices and end up exhibiting the same behaviors[4,10]. Thus, identifying the factors associated with low PA facilitates the promotion of intervention programs in adolescents, encouraging the practice of PA[7].

Regarding self-efficacy, no associations were found with levels of PA in both boys and girls. However, studies such as Hearst et al.[28] conducted with 578 adolescents aged 10-16 years in the United States, and Souza et al.[8] conducted with 1,698 adolescents aged 14-18 years from Curitiba / PR, showed that there is a positive association between self-efficacy and PA practice in adolescents. Self-efficacy is a psychosocial variable, resulting from other factors such as self-esteem and self-confidence, which may influence the relationship with PA and make the comparison with other studies unfeasible[29,30].

PAF analyses estimated that without high SS from parents for PA, there would be a PA decrease of 21.88% and 50.0% for male and female students, respectively. As shown in literature[10] and in the present study, boys tend to perform more PA, so girls need greater incentive to perform PA, so if there is no influence of SS, there is greater impact on girls in relation to boys. However, without the influence of high SS from friends, the chances of students being active decrease similarly in both sexes. For males, the probability decreases by 25.37% and for females, the probability decreases by 24.24% of being active. To belong to a certain group, adolescents tend to adhere to behaviors similar to their peers, indicating that both groups had similar behaviors. These results show that if adolescents have no encouragement from parents and friends to practice PA, they tend to be less active.

The present study has strengths to be mentioned. The research presents PAF and RRR analyses that go beyond association measures and allow a better understanding of the relationship between SS and self-efficacy on level of PA in a representative sample of 13-15-year-old schoolchildren from Curitiba / PR. The previously tested instruments have adequate psychometric qualities suitable for application in schoolchildren in the age group of this study. However, the study is not free of limitations, the use of self-reported measures to measure SS, self-efficacy and level of PA limit accuracy, and may overestimate responses. A sample of students from public schools only would not allow extrapolation of results to students from private schools and those not regularly enrolled in educational institutions. Finally, studies that investigate psychological variables such as self-esteem, stress, body image as mediators of the association between SS,

self-efficacy and level of PA should be conducted, as well as longitudinal studies to verify the determinant factor for the reduction of PA practice in adolescence, and the possible identification of the cause effect relationship, as well as studies with students from private schools and with age groups different from that used in this study.

CONCLUSION

Based on the findings of the present study, positive association between SS from parents and friends for the practice of PA among students of both sexes was verified. In addition, the present study showed indicators of the impact of this variable on population-level PA, indicating that without high SS from parents, there could be a decrease in the level of PA, especially for girls, and without SS from friends, there would be a similar reduction in the level of PA in both sexes. Regarding self-efficacy, no significant associations were found with PA in both males and females.

COMPLIANCE WITH ETHICAL STANDARDS

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-profit sectors. This study was funded by the authors.

Ethical approval

Ethical approval was obtained from the local Human Research Ethics Committee – Federal University of Paraná and the protocol (no. 722.529; 30350514.3.0000.0102) was written in accordance with standards set by the Declaration of Helsinki.

Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

Conceived and designed the experiments: JGC, EDAB, WC. Performed the experiments: JGC and EDAB. Analyzed the data: JGC, EDAB and WC. Contributed with reagents/materials/analysis tools: JGC, EDAB and WC. Wrote the paper: JGC, EDAB, TSP, MPS and ABP.

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