

Physical activity levels and their correlates among secondary school adolescents in a township of Karachi, Pakistan

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Abstract

Objective: To determine physical activity level and its correlational factors among secondary school adolescents.

Methods: This cross-sectional study was conducted in two public and two private schools in Jamshed Town, Karachi, from March 2012 to June 2013, comprising students aged 10-17 years. The subjects, selected by simple random sampling were students of grades VI, VII, VIII. Physical activity was measured using the Physical Activity Questionnaire for older children. Socio-demographic data was also collected. SPSS 19 was used to analyse the data.

Results: Of the total 216 students, 131(60.6%) were girls and 85(39.5%) were boys, with an overall mean age of 13±1.4 years. Of the total, 151(70%) subjects had moderate and 65(30%) had low physical activity levels. Boys educated in public schools and those with parental support for sports were more physically active ($p < 0.05$).

Conclusion: Private school without playgrounds, female gender and lack of parental support for sports were correlates of physical inactivity among the students.

Keywords: PAQ-C, Physical activity, Adolescents, Schoolchildren, Socio-demographic factors. (JPMA 68: 737; 2018)

Introduction

Physical activity (PA) patterns instituted during childhood lay down the foundation for adult activity practices.¹ Both developed and developing countries are facing the challenge of the increasing numbers of physically inactive population.² Sedentary lifestyles in children lead to high prevalence of adult non-communicable diseases (NCDs)^{2,3} and it is a key contributor to the global obesity epidemic and in turn, to rising mortality from cardiovascular diseases.²⁻⁴

The World Health Organisation (WHO)² and the United States Department of Health and Human Services¹ recommend that children aged 5-17 years should undertake at least 60 minutes of moderate-to-vigorous-intensity PA (MVPA) daily, and vigorous-intensity PA at least thrice per week. The American Heart Association (AHA) recommends that of these 60 minutes, a minimum of 30 minutes of MVPA should be at school.⁵ PA levels have been further classified into level-1 (at least 60 min moderate PA every day), level-2 (at least 60 min PA on 4-6days/week), level-3 (at least 30 min PA/day), level-4 (at least 30 min moderate PA on at least 5 days/week), and level-5 (at least 30 min moderate to vigorous PA on at least 3 days per week).⁶

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PA levels of children are inadequate globally and decrease even more in adolescents, which is a major public health concern.^{3,7-9} The WHO³ and the Lancet Physical Activity Series⁷ report that 80% adolescents do not meet the optimal PA criteria. Low PA levels have been reported among Asian schoolchildren and adolescents,^{10,11} except from Taiwan and Singapore.⁶ In Pakistan, only 20% of children undertake one hour of PA four times a week, insufficient but consistent with WHO data.¹² Some variability of findings may be due to the different tools being used by different investigators.

Although both subjective and objective methods are used to measure PA,¹³ the easy-to-administer and validated PA questionnaires are the most widely used self-reporting instruments.

PA levels have been found to be influenced by socio-demographic factors including age,^{6,12} gender,^{2,3,6,11} socioeconomic status (SES),^{14,15} parental PA,⁹ peer^{8,16} and parental influence,^{8,11} time constraints,¹⁷ and neighbourhood variables (parks and recreation centres).¹⁸ AHA⁵ recommendations highlight schools as important places to lay PA foundations, and important mediators for obesity prevention,¹⁹ where playground availability²⁰ and physical education (PE) classes^{14,21} have had the greatest positive impact on PA levels. Physical inactivity patterns among adolescents create a negative impact on school climate.⁴ Variable results of PA have been reported with watching television, playing computer games, desk-jobs or other sedentary pursuits.^{8,9,16,22,23}

Asia has one of the largest adolescent populations worldwide, with increasing inactivity and obesity, yet data is available from only less than one-third of the Asian countries.⁶

The current study was planned to assess PA levels and its social correlates among secondary school adolescents.

Subjects and Methods

This cross-sectional study was conducted in two public and two private schools in Jamshed Town, Karachi, from March 2012 to June 2013, comprising students, aged 10-17 years.

Prevalence ranging from 38%²⁴ to 44%²⁵ was taken for the PA levels, and 16.2% and 78.7% for associated factors of maternal education and weekly PE classes, respectively.¹⁴ Using the WHO software²⁶ with 7% bound of error and the level of significance at 5%, the estimated final sample size was 216 after addition of 10% for non-responders.

Two public and two private schools were selected by simple random sampling among all schools in Jamshed Town. Students were selected by computer-generated random numbers from grades VI, VII and VIII.

The study was approved by the Aga Khan University ethical review committee. Written permission was obtained from the district education officer of the town for government schools followed by permission from the principals of all four selected schools. Then parents were informed about the study by school administrators and parental telephonic verbal informed consent was obtained as this study involved no invasive procedure. Written informed consent was obtained from the school-adolescents prior to any involvement.

All grade VI-VIII students, who gave informed written consent and were not physically challenged were included in the study. No selected student was absent on the days of data collection and none refused informed assent.

Adolescent PA levels were assessed using a nine-item validated Physical Activity Questionnaire for older children (PAQ-C) Questionnaire.^{27,28} Of the nine items, one is related to any illness in the last week and eight are related to PA. The PA levels are categorised as low, moderate or high when the PA scores on these eight items are one, two to four, or five or more, respectively.

The self-administered questionnaire consisted of demographic data (type of school, age, gender, grade, parental education, mother's employment), PAQ-C, and other PA-related factors (parental support for PA, parental PA, siblings' PA, availability of playground in schools and

neighbourhood, arrangement of PE classes in the school and community recreational centres). Sedentary activities such as watching TV/videos, listening to music, playing computer-games, using computer/internet, reading books, doing homework, talking on the phone, playing cards and playing indoors with toys were also included.

The PAQ-C is a seven-day recall questionnaire, with a 5-point Likert-type scale. It measures MVPA, has been validated for schoolchildren and adolescent aged 8-14 years (Grades IV-VIII), and it evaluates PA levels and frequency of participation in different types of activities. The PAQ-C had to be modified to represent common activities of children and adolescents in Karachi, Pakistan (cricket replaced 'rowing, tagging, baseball, dancing, American football, skateboarding, volleyball, ice hockey and cross country skiing'). One of the questions regarding activities during lunch time was not included as most of the schools in Pakistan either have only recess time, as children return home for lunch. The modified version was piloted in one of the schools and no changes were suggested. This pre-tested questionnaire was then administered by the principal investigator to the school-adolescents.

SPSS 19 was used to analyse the data. Mean scores of all activities in the questionnaire (PAQ-C) were taken as the PA levels of the school-adolescents, and the mean PA scores were then categorised as low, moderate or high as per defined criteria.²⁸

Descriptive analyses included frequency and percentage for qualitative variables, and means and standard deviations (SD) for quantitative variables. Pearson Chi-square test was used to analyse the correlation between levels of PA and socio-demographic factors (categorical variables). Binary logistic regression was applied and results were reported in the form of unadjusted and adjusted odds ratio with 95% Confidence Interval (CI).

Results

Of the total 216 students, 131(60.6%) were girls and 85(39.5%) were boys, and 109(50.5%) were from the private schools and 107(49.5%) from public schools (Figure). The mean age of the students was 13±1.4 years.

Of the 216 students, no student was found to have a high PA level. Moderate PA levels were found in 151(69.9%) and 65(30.1%) had low levels. Overall, significantly more public school-adolescents had moderate PA levels 83(77.6%) compared to private school-adolescents 68(62.4%), and fewer public school-adolescents 24(22.4%) had low PA levels compared to private school-adolescents 41(37.6%) (Table-1).

Table-1: Correlation of Socio-Demographic and Other Factors with Physical Activity Levels among Secondary School Adolescents in a township of Karachi.

Factors	Private Schools (n=109)			Public Schools (n=107)		
	Low levels PA (n=41)	Moderate Levels PA (n=68)	p- Value	Low levels PA (n=24)	Moderate Levels PA (n=83)	p- Value
Schools	41(37.6)	68(62.4)	0.015	24(22.4)	83(77.6)	0.015
Gender						
Male	13(29.5)	31(70.5)	0.152	1(2.4)	40(97.6)	0.000
Female	28(43.1)	37(56.9)		23(34.8)	43(65.2)	
Parental Support for PA						
Yes	32(37.6)	53(62.4)	0.990	16(17.4)	76(82.6)	0.002
No	9(37.5)	15(62.5)		8(53.3)	7(46.7)	
Listening to Music						
Yes	24(33.8)	47(66.2)	0.261	10(15.6)	54(84.4)	0.040
No	17(44.7)	21(55.3)		14(32.6)	29(67.4)	
Playing Computer Games						
Yes	21(30.4)	48(69.6)	0.042	11(22.9)	37(77.1)	0.931
No	20(50)	20(50)		13(22)	46(78)	
Doing Homework						
Yes	33(35.1)	61(64.9)	0.176	18(18)	82(82)	0.000
No	8(53.3)	7(46.7)		6(85.7)	1(14.3)	
Reading Books						
Yes	26(38.8)	41(61.2)	0.746	14(16.9)	69(83.1)	0.010
No	15(35.7)	27(64.3)		10(41.7)	14(58.3)	
Playing Indoors with Toys						
Yes	8(20.5)	31(79.5)	0.006	5(17.2)	24(82.8)	0.433
No	33(47.1)	37(52.9)		19(24.4)	59(75.6)	

Table-2: Factors associated with Physical Activity Levels among Secondary School Adolescents in a Township of Karachi.

Factors	Unadjusted Odds Ratio (Confidence Interval)	p-value	Adjusted Odds Ratio (Confidence Interval)	p-value
Type of School				
Public	2.085(1.14-3.78)	0.016	2.22(1.145-4.313)	0.018
Private	1		1	
Gender				
Male	3.23 (1.6-6.3)	0.001	4.2 (2.0-8.8)	0.000
Female	1		1	
Parental support for physical activity				
Yes	2.077 (1.01-4.2)	0.045	2.34 (1.05-5.2)	0.037
No	1		1	
Availability of playground in School				
Yes	2.26(1.19-4.29)	0.012	—	
No	1			
Listening to Music				
Yes	1.84 (1.01-3.3)	0.044	—	
No	1			
Doing homework				
Yes	4.9 (1.94 - 12.3)	0.001	3.89 (1.46-10.35)	0.006
No	1		1	
Playing indoors with toys				
Yes	2.292(1.17-4.57)	0.019	2.67 (1.25-5.6)	0.011
No	1		1	
Playing computer games				
Yes	1.348(0.741-2.379)	0.340	—	
No	1			
Reading books				
Yes	1.677(0.906-3.102)	0.012	—	
No	1			

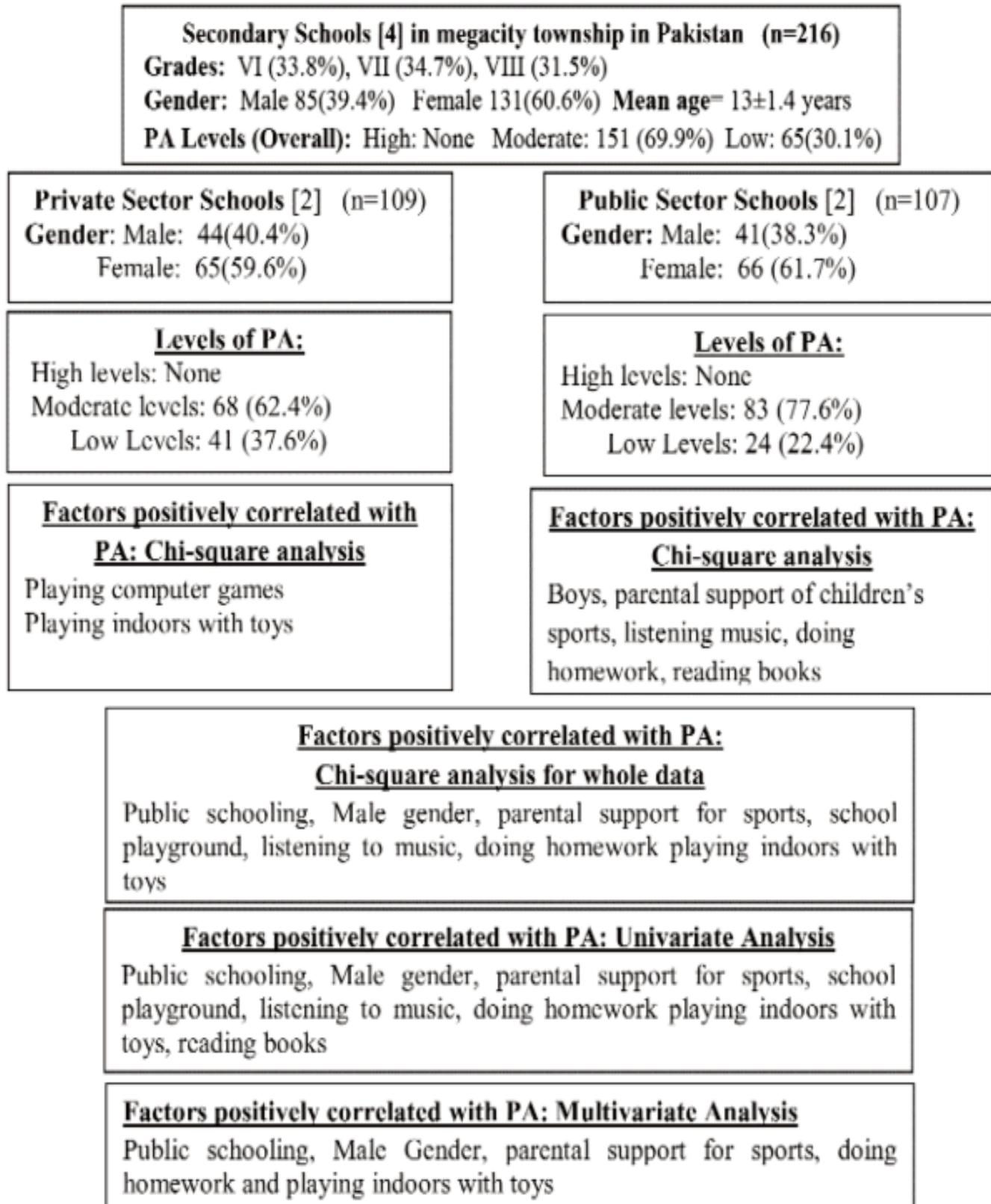


Figure: Demographics, Physical Activity levels and factors related to Physical Activity among Secondary School Adolescents in a township of Karachi (Summary Figure).

Most of the parents of children attending private schools had more intermediate and higher levels of education, while most of the parents of children attending public sector schools had education up to the level of secondary schools ($p < 0.05$). Besides, 191 (88.4%) mothers were unemployed.

Factors which were positive correlates of PA, in decreasing order of significance, were: male gender ($p = 0.000$), doing homework ($p = 0.000$), availability of school playgrounds ($p = 0.011$), public school ($p = 0.015$), playing indoors ($p = 0.017$), parental support for sports ($p = 0.042$) and listening to music ($p = 0.042$).

Analysing data for public and private schools separately showed that eight factors significantly correlated with PA. One of the private schools did not have a playground, and the presence of playground was not found to be a significant correlate to PA levels ($p > 0.05$). However, two other factors were found to be significantly correlated with high PA levels, including reading books (public schools) and playing computer games (private schools) ($p < 0.05$ each). No significant correlation was found in PA levels among students with age groups, different grades, educated or uneducated parents, employed or unemployed mothers, parental or sibling' PA, neighbourhood park or community recreation centre, or school-based PE classes ($p > 0.05$ each).

The univariate model confirmed these findings. Multivariate logistic regression results, after adjusting for the effects of other model variables and controlling the effects of confounders (adjusted odds ratio [OR] with 95% CI), showed five factors significantly correlated with PA (Table-2). Insignificant factors at multivariate levels were availability of a school playground, listening to music and reading books ($p > 0.05$).

Discussion

PA levels have been found to be sub-optimal among children and adolescents worldwide, both in the West⁷⁻⁹ and in the East.^{7,10-12} The WHO³ and the Lancet Physical Activity Series⁷ have reported low percentages of PA among adolescents 20% and 19%, respectively.

The current study highlighted the low PA levels among Pakistani school-adolescents and identified modifiable and non-modifiable PA correlates. In this study, about 30% of school-adolescents had low, about 70% had moderate, and none had high PA levels. Higher PA levels were positively correlated with male gender, public school education, parental support, and, surprisingly, those who did homework and played indoors. Low levels of PA found in the present study were consistent with

literature^{2,3,7} and a study from Malaysia¹¹ which reported that more than one-third (35.5%) of the adolescents were physically inactive. However, another study from Malaysia¹⁷ reported that only 20% of the school-adolescents were found to be physically inactive. These widely varying PA levels could be due to different PA measuring tools.

Male gender has been reported to be one of the important predictors of PA. Findings from this study are consistent with the literature that girls were physically less active than boys.^{2,3,6,7,21,29} However, this gender difference in PA levels was found to be most significant among the girls and boys from public schools as, rather surprisingly, both boys and girls from private schools were less physically active. This is a matter of concern as the risk of cardiovascular disease is high among women in Pakistan.³⁰ The gender differences may well be due to socio-environmental correlation including parental preference for boys to be encouraged for PA activities rather than girls, over-protection of girls, cultural barriers of modesty or avoidance of mixed-gender physical activities for girls and lack of safe outdoor playgrounds and personal barriers including self-efficacy and self-worth.^{16,31} A school-based feasibility trial on PA in preadolescent girls from Karachi showed that girls participated in PA when provided with an appropriate environment.³¹

Although nearly 70% of the adolescents had moderate PA levels in both types of schools, but the ratio of moderate to low PA levels was significantly higher among the public school-adolescents, which provide free education, as compared to the private schools who charge tuition fees. There are mixed correlation reports between SES and PA levels, with no consensus.^{14,15}

Parental support was found to be a positive correlate of higher PA levels in the present study, which is also supported by literature.^{8,11,16}

The availability of school playgrounds was another statistically significant correlate of higher PA levels among adolescents in both private and public schools, also cited as a factor positively correlated in the literature.²⁰ One of the private schools did not have a playground which may be a reason for lower PA levels among private school-adolescents in this study.

Scheduled school PE sessions and attending larger numbers of PE classes have been reported to correlate with higher PA levels.^{14,21} All four schools in the present study had PE sessions and this factor was not found to be significant.

Most studies showed an inverse correlation between age and adolescents' PA levels.^{6,18,29} In contrast, no difference was found in PA levels among students of VI, VII and VIII grades and it is also borne out by another study.¹⁰

There are mixed reports that adolescents whose parents had higher education were more physically active than those whose parents had lower educational levels^{9,14} and those children of working mothers had higher PA levels.^{14,17} A positive correlation between parental PA and higher levels of children PA levels has also been reported.^{9,16} No such relationships were found to be significant in the present study, endorsing findings from other studies.¹⁰

Public parks¹⁸ and community recreation centres¹⁴ are key components of environmental interventions to increase PA levels among children and adolescents were also not found to be significant in the present study.

There are mixed reports of the relationship of adolescent sedentary behaviours with PA levels; some studies report inverse correlation^{21,22} while others report no correlation.⁸ In the present study, public school adolescents who listened to music, spent more time on homework and reading books, were found to be more physically active. A positive correlation between time spent doing homework and higher PA levels has also been reported by a study on schoolchildren from Singapore.²³

Studies have reported variable results regarding the use of multimedia and technology and its relationship to PA levels. Gharaham et al.¹⁶ reported that screen-based activities resulted in decreased PA, while Lubans et al. reported no correlation.⁸ In fact, playing computer games was found to be significantly related to higher PA levels among students from private schools. Public schoolchildren may not have been able to afford computers.

The many factors found to be insignificant in the present study may be related to differences in cultures, social backgrounds or the unsafe environment of the city. Non-significance of many of the factors does not necessarily mean that there is no relationship. This can only be proven or disproven by conducting studies on larger scales, in safer environments, using same instruments. But with the present conditions in the country, safety issue limitations are likely to remain for some time.

It is the first school-based study conducted in the country focusing on PA levels and its related factors among adolescents. A thorough literature search was conducted of the most used and validated survey questionnaire. Contextual adolescent activities common among our

population were included and pre-tested. Samples were collected from students of both private and public sector schools in order to have representation of both school systems. Lastly, the study provides a baseline and a reference point for future PA studies from Pakistan.

The cross-sectional design limited the study findings to correlational rather than causal relationships. Even though the township was the biggest and similar in characteristics to all other townships in Karachi, drawing samples from only one township of the city limits the findings from being generalisable to schoolchildren of other townships. As girls usually have lower PA levels, a preponderance of girls in the schools may have inadvertently decreased the overall PA levels found for all adolescents. PAQ-C used in this study does not include questions on the duration and intensity of PA. Although information about PE sessions was collected, frequency of these sessions was not studied.

On the basis of the findings, we recommend that mass-media should target increased PA for adolescents; the government should not approve of schools without playgrounds; girls should be encouraged to go for more PA at school and at home; parents should be encouraged to support their children's sports, especially in the case of girls; and similar studies with public and private schoolchildren with larger representations of urban and rural townships should be undertaken.

Conclusion

Physical inactivity among adolescents is becoming a public health problem. Not a single school-adolescent was found to have a high PA level; 70% had moderate and 30% had low PA levels. Homework and indoor play does not negatively impact PA levels. The profile of an inactive adolescent is a girl studying in a private school without a playground, and having lack of parental support for PA.

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