

# A Cross-Sectional Study on Physical Activity and Perceived Stress among School Going Adolescents

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## ABSTRACT

**Background:** Stress is defined as events in the environment or chronic conditions that objectively threaten the physical and/or psychological health and well-being of individuals of a particular age in a particular society. Adolescence is a period of change and transition that usually brings with it numerous stressors. The levels of stress also tend to show an increase from the period of preadolescence to adolescence. Studies show that changes from low physical activity, to moderate or high physical activity levels was associated with lower levels of stress. But many studies suggest that students, including young adults do not meet the standard recommendations for physical activity. Hence this study was conducted to ascertain the association between Physical activity and perceived stress levels among adolescent school students.

**Material and Methods:** This cross-sectional study was conducted in a random sample of 400 adolescent school students' studying in the Higher/Senior Secondary classes in schools in Kancheepuram town, in the state of Tamil Nadu. Physical activity was assessed by the International Physical Activity Questionnaire (IPAQ) and stress levels were analyzed by Perceived stress scale.

**Results:** It was observed that 170 (42.5%) of the students had low levels of physical activity, and only 90 (22.5%) reported high levels of physical activity. Around 156 (39%) of the students had high stress and 144(36%) of them reported moderate amount of stress. It was observed that nearly 50% of the students who indulged in low levels of physical activity had high levels of perceived stress, and students who were highly

active had low stress. This association between physical activity and stress was found to be statistically significant.

**Discussion:** Given the humongous academic stress the students have to undergo in India during their, 11<sup>th</sup> and 12 grades, it is preferable that more time is allotted for leisure time physical activity in their schools, so as to help the students manage their stress more effectively.

**Keywords:** Physical activity, perceived stress, adolescent, school students

## INTRODUCTION

Stress is defined as events in the environment or chronic conditions that objectively threaten the physical and/or psychological health and well-being of individuals of a particular age in a particular society. <sup>(1)</sup> Adolescence is a period of change and transition that usually brings with it numerous stressors, like change in responsibilities, and interpersonal relationships as well as the increasing demands in schools. <sup>(2,3)</sup>

Studies have shown that, at this age group, there's a significant lack of proper coping skills, and many of these adolescents resort to ineffective coping methods. <sup>(4,5)</sup> The subjective experience of these stressors may lead to poor quality of life, and can also compromise their ability to cope with day to day problems, which in turn may influence the academic performance of the student. <sup>(6,7)</sup> Though, exposure to negative stressors, is an inevitable and normal part of

adolescent development, <sup>(8)</sup> exposure to cumulative stressors, is related to development of clinical symptoms of clinical symptoms, including depression. <sup>(9)</sup>

It is also well established that the levels of stress tend to show an increase from the period of preadolescence to adolescence. <sup>(9)</sup> Studies also show that girls experience higher levels of stress and tend to suffer from more negative psychological health effects of stress than boys. <sup>(10,11)</sup>

Physical activity refers to “any bodily movement that is produced by skeletal muscle that results in a substantial increase over the resting energy expenditure.” <sup>(12)</sup> Sedentary lifestyle, or physical inactivity, is usually defined as “a state, when body movement tends to be minimal, and also the total energy expenditure is approximately equal to the Resting metabolic rate”. <sup>(13)</sup>

Research has proven that regular physical activity is an effective means of reducing anxiety and stress among adults. <sup>(14)</sup> Less or nonactive individuals have a tendency to experience more susceptibility to the adverse influences of life stress. <sup>(15)</sup> Studies have shown that participation in sports may be protective for mental health, and it was found that athletes in college reported less perceived stress than non-athletes in the institution. <sup>(16)</sup> Studies show that changes from low physical activity, to moderate or high physical activity levels was associated with lower levels of stress. <sup>(17)</sup>

While physical activity may help the students to deal with perceived stress, and other related psychological issues, to a certain extent, literature suggests that students, including young adults, are not meeting the standard recommendations for physical activity. A review of physical activity patterns, by Irwin found out that more than half of students in Canada and America were not engaging in sufficient physical activity to be beneficial to health. Similar findings were obtained from other countries. <sup>(18)</sup> The Centre for disease control in America revealed that less than one fifth

one fifth of college students engaged in recommended amounts of moderate physical activity. <sup>(19)</sup>

## MATERIALS AND METHODS

This cross-sectional study was done with both descriptive and analytical components, and was conducted in a random sample of school going adolescents in Kancheepuram town, in the state of Tamilnadu. The sample size was calculated assuming the most probable prevalence of moderate to high stress levels among adolescent school students to be 50%, and the limit of accuracy fixed at 5% of prevalence, and the Z value of 1.96. The sample size arrived at was 400.

All the higher secondary/senior secondary schools in Kancheepuram town were contacted, and requested permission to conduct the study in their respective schools. Among all those schools that consented to be part of the study, 4 schools were selected by simple random sampling technique. There is widespread criticism that many schools significantly cut down on the physical education classes for students during their 11<sup>th</sup> and 12<sup>th</sup> grade. Hence it was decided only to include only the students studying in those grades in the sampling frame. The total number of students studying in the 11<sup>th</sup> and 12<sup>th</sup> grades from these four schools was calculated, and the number of students to be included from each school was derived by the PPS sampling technique. The names of the students in those two grades were written in alphabetical order and the study subjects were chosen by simple random sampling technique till the sample size in school was reached.

On a pre appointed day, each of the four schools were visited and the students who had been included in the sampling frame, were asked to assemble in small groups. After assuring them of complete confidentiality, and obtaining informed consent from them, they were administered the study instruments, which consisted on the International Physical Activity

Questionnaire and the Perceived Stress scale.

Study Instruments:

**The International Physical Activity questionnaire (IPAQ):** The level of Physical activity of an individual can be measured by various methods, like time and motion studies, calorimetry, motion sensors, doubly labelled water etc. Many of these methods are costly and difficult to administer in large populations. Whereas, questionnaires are easy to administer, more cost effective and can be used in large population based studies. International Physical Activity Questionnaire (IPAQ) is one such instrument that is widely used to measure physical activity. It consists of both long and short versions. This questionnaire gives us an internationally comparable data on health-related physical activity. The validity and reliability studies of IPAQ were conducted in 12 countries spread across 6 continents. The results showed a Spearman's Rho around 0.8, which indicated high reliability between repeated administrations of all version of IPAQ. The criterion validity had a median Rho of 0.3 against the CSA accelerometer for minutes of different activities. (IPAQ-20) In this study, the short form of the questionnaire was used to measure physical activity. Based on the responses obtained, the student's physical activity was categorized into either, low activity, Moderate activity or High activity.

**High Physical Activity:** Vigorous intensity activity reported by the student at least on three days, aggregating a MET of 1500 MET minutes/week, Or 7 days of any combination of walking, moderate or vigorous intensity activities, so that he or she accumulates at least 3000 MET Minutes/week.

**Moderate Physical Activity:** Three or more days of vigorous activity of at least 20minutes/day or 5 or more days of vigorous intensity activity and/or walking for at least 30 minutes/day. Any combination of the above achieving a

minimum of at least 600 MET minutes /week.

**Low physical activity:** The student doesn't report any activity, or he or she reports some amount of activity that was less than the above two criteria.

**Perceived Stress Scale:** The perceived stress scale (PSS) devised by Sheldon Cohen is one of the most widely used psychological scale for measuring the perception of stress across the globe. It measures the degree to which the situations in one's life are appraised as stressful. The items were designed to trap how unpredictable, overloaded and uncontrollable; the respondents find their lives. The PSS is actually designed to be used among population who had at least junior high school education. The questions are easy to understand, general in nature and, free of content that is specific to any subpopulation group across geographies. The 10 odd questions in the PSS ask about the thoughts and feelings during the last month. In each of those cases, the respondents are asked how often they have felt in a certain way. The individual scores in PSS can range from 0-40. Higher score, indicates higher perceived stress. Scores ranging 0 to 13 will be considered as low stress, scores between 14 to 24 will indicate moderate stress, and scores from 27 to 40 will be considered high perceived stress. The evidence of reliability and validity has been well established. <sup>(20)</sup>

### Statistical Analysis:

The data obtained from the students was tabulated, and analysed using SPSS (Statistical package for Social Sciences) version -18. A Pearson chi-square test was done to determine whether there was a significant association between the level of physical activity that the students indulge in and their perceived stress levels.

## RESULTS

The total number of students who participated in this study was 400. Out of this 400 students, 176 (44%) were male

students and the rest 224 (56%) were females. The minimum age was 16 years and the maximum age was 19 years. The mean age of the study population was ---. All the 400 students were day scholars.

Their level of physical activity was assessed by the International Physical

Activity Questionnaire. It was observed that 170 (42.5%) of the students were indulging in low levels of physical activity, whereas, only 90 (22.5%) reported high levels of physical activity. Details are given in Figure-1.

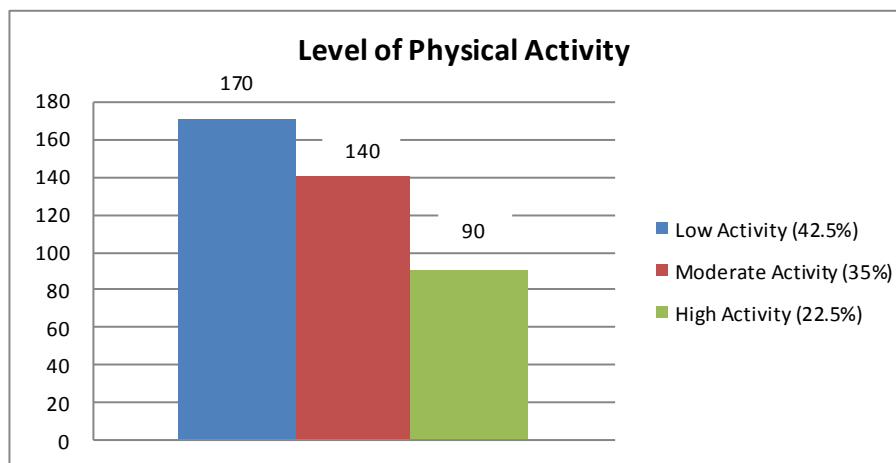


Figure – I : Figure showing the Physical activity levels of the participants as assessed using the International Physical Activity Questionnaire (IPAQ):

The level of stress was assessed by ‘Perceived stress scale’. It was observed that around 156 (39%) of the students reported high levels of stress and 144(36%) of them reported moderate amount of stress. The rest of them were experiencing low stress levels. Details given in Figure – II.

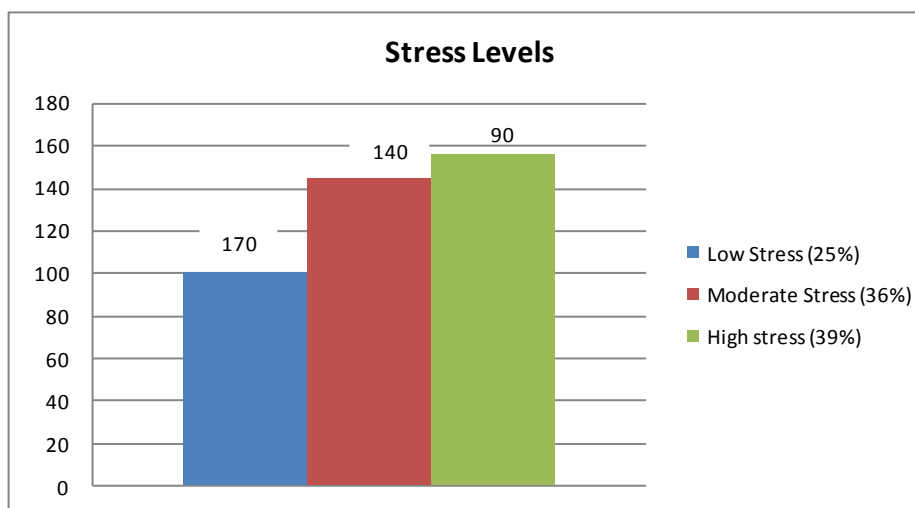


Figure – II: Figure showing the stress levels of the students determined by the Perceived Stress Scale

The sex difference in the level of physical activity was analyzed. It was observed that more number of male students were highly active as per the IPAQ guidelines, than female students. Similarly, prevalence of low physical activity was more among female students than male students. This difference was found to be statistically significant. Details given in Table-I.

**Table –I: Table showing the difference in Physical activity between male and female students:**

Sex	Level Of Physical activity			P = .007 (t = 9.829, df =2)
	Low (n-170)	Moderate (n-140)	High (n-90)	
Male (n-176)	62	63	51	
Female (n-224)	108	77	39	

Are male students more stressed or it's the other way round? This study observed that more number of female students was found to have moderate and high stress levels than the male students. This difference in the prevalence of stress levels among the male and female students was not found to be statistically significant. Details are given in Table -2.

**Table – II: Table showing the difference in stress levels among male and female students:**

Sex	Stress levels			P = .471 (t = 1.507, df =2)
	Low stress (n-65)	Moderate Stress (n-146)	High stress (n-89)	
Male (n-176)	48	58	70	
Female (n-224)	52	86	86	

The association between physical activity and stress in the study population was analyzed. It was observed that nearly 50% of the students who indulged in low levels of physical activity had high stress, and students who were highly active had low stress. This association between physical activity and stress was found to be statistically significant. Details are given in Table-III

**Table-III: Table showing the association between physical activity levels and stress levels among the students:**

Level of Physical Activity	Stress Levels			P = <.001 (t = 40.147, df =4)
	Low Stress (n- 65)	Moderate Stress (n- 146)	High stress (n- 89)	
Low(n-170)	29	56	85	
Moderate(n- 140)	29	66	45	
High(n- 90)	42	22	26	

## DISCUSSION

This study was conducted among 400 adolescent school students in the temple town of Kancheepuram, in Tamilnadu, a state in the Southern part of India. This study found a statistically significant association between physical activity and stress. Students who were more physically active had a lower level of perceived stress than those who did not engage in significant physical activity regularly. A similar study done in a cohort of Norwegian adolescents 13 to 18 years of age, found that adolescents with moderate or high physical activity levels had reported lower stress than adolescents with lower physical activity levels. (17) Various other studies done abroad found a consistent association between weekly physical activity mental health. (21,22) One study also reported that adolescents who did not exercise scored higher on psychological discomfort, than adolescents who were more frequent exercisers. (23) On the contrary, a three year follow-up study done by Sagatun et al found that physical

activity was weekly associated with psychological health in adolescents. (24) Ishii and Osaka also reported that students who disliked physical education and sport did not benefit from stress reducing potential of physical education. (25) But, a review of reviews conducted by Biddle and others concluded that the association between physical activity and mental health is evident. (26)

This study also found that 42.5% of the participants indulged in low physical activity, and only 22.5% of them were highly active. These results are consistent with a similar study done in Chennai among college students, co-authored by one of the current authors, wherein, they observed that nearly half of the students engaged in low physical activity. (27) In yet another study done in the UK, only 28% in the age group of 18-25 years achieved adequate physical activity levels. (28) The current study also observed that male students were more active than their female counterpart. This difference was statistically significant too.



This finding concurs with a study done by Slatera et al, who reported similar findings that boys were more physically active than girls. <sup>(29)</sup>

The current study also found that around 39% of the students had high perceived stress levels and 36% of them had moderate stress levels. The study also observed higher stress levels in female students than male students, though this difference was not found to be statistically significant. A study done in Pakistan among undergraduate medical students came out with similar findings. <sup>(30)</sup> A similar study done in India also observed that female students had more stress levels than male students. <sup>(31)</sup> There were studies which did not find any difference between the two sexes in stress levels. <sup>(32)</sup> But, majority of the studies observed that female students, whether in school or college, experienced more stress than their male counterparts.

## CONCLUSION

In spite of the documented evidence of its role in stress reduction, regular physical activity in schools, especially during the Higher/Senior secondary years, has taken a back seat to academics. Even the mandatory physical education classes in school are often cancelled to make way for academics. Given the humongous academic stress the students have to undergo in India during their, 11<sup>th</sup> and 12<sup>th</sup> grades, it is preferable that more time is allotted for leisure time physical activity in their schools, so as to help the students manage their stress effectively. Apart from the role played by the schools, the rest of the community and the government also have a major role to play in providing safer infrastructure in cities, towns and villages to enable our children to be more physically active.

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