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**AGA KHAN UNIVERSITY**

*School of Nursing and Midwifery*

***COMPARISON OF PHYSICAL ACTIVITY LEVELS AMONG SCHOOL-AGE  
ADOLESCENTS IN THE RURAL AND URBAN AREAS OF DISTRICT SWAT KPK,  
PAKISTAN- AN ANALYTICAL CROSS-SECTIONAL STUDY***

**By**

***IMRAN UDDIN***

Student of Master of Science in Nursing (MScN)

A thesis submitted in partial fulfilment  
of the requirements for the degree of  
***Master of Science in Nursing***

Karachi, Pakistan

10<sup>th</sup>, November 2023

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**Aga Khan University**

*School of Nursing and Midwifery*

Submitted in partial fulfilment of the requirements for the degree  
of

[Master of Science in Nursing]

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10<sup>th</sup>, November 2023

## **Dedication**

I would like to dedicate this thesis to my beloved parents who are the most significant source of inspiration and who were always there to support me continuously throughout this academic journey. Their support, wisdom, love, motivation, and prayers gave me the strength, motivation, and confidence to pursue this degree. In addition, I also dedicate this thesis to my family, especially my elder brother whose support and guidance helped me pursue higher education in the noble profession of nursing. I also would like to dedicate this thesis to my committee members, friends, and colleagues, especially Tariq Ali and Abdul Kabir whose guidance and support helped me carry out this degree programme.

Lastly, I am extremely grateful to ALLAH ALMIGHTY for bestowing me the guidance, physical strength and mental strength through which I was able to easily pursue this degree programme and carry out other tasks in my life.

## **Abstract**

### **Background**

Obesity and overweight represent significant global public health concerns. Young adolescents are in particular increasingly experiencing obesity and overweight due to their sedentary lifestyles, excessive electronic media use, and lack of physical activity (PA). This trend is linked to the development of non-communicable diseases in later life. Moreover, data regarding the lack of PA is available in Pakistan, but a gap exists in the comparative analysis of physical activity levels between rural and urban adolescents. Rural and urban areas exhibit distinctions in both geographical settings and technological advancements, potentially influencing the PA levels of their respective inhabitants.

### **Purpose**

The study aimed to compare physical activity levels among school-age adolescents in rural and urban areas of Swat, KPK, Pakistan. In addition, the study also aimed to explore how gender, age, grade, and school type influenced the PA levels of adolescents.

### **Method**

A cross-sectional analytical study was carried out with a sample size of 287 school-age adolescents (aged 10 to 14 years) selected from 08 public and private middle schools in rural and urban areas of district Swat, KPK, Pakistan. The data about physical activity was collected using a researcher-administered questionnaire adapted from the Physical Activity Questionnaire for Older Children (PAQ-C). In addition, the Statistical Package for the Social Sciences (SPSS) version 22 was used for the analysis of data.

## **Findings**

The mean PA score for rural adolescents was  $3.65 \pm 0.38$ , whereas the mean PA score for urban adolescents was  $2.22 \pm 0.47$ . Thus, there was a mean difference of 1.43 which was significant at 0.05 level of significance ( $t = 28.11$ ,  $P \text{ value} = < 0.001$ ). In addition, a significant difference between private and government school-age adolescents' PA levels was found ( $t\text{-value} (3.73)$ ,  $df (285)$   $p\text{-value} \text{ of } (< 0.001)$ ). Moreover, there was no significant difference in PA levels in terms of gender and grade of adolescents. Further, a very low negative correlation was found ( $r = -0.1$ ) between the age and PA scores of school-age adolescents.

## **Conclusion**

Place of residence has an impact on the PA level of adolescents because the study found a significant difference in the mean PA levels of school-age adolescents in rural and urban areas. It is recommended to conduct future research to identify the factors that contribute to disparities in PA among adolescents residing in rural and urban areas.

## **List of Abbreviation / Acronyms**

ANOVA	Analysis of Variance
BMI	Body Mass Index
COVID	Corona Virus Disease
DEO	District Education Officer
DF	Degrees of Freedom
DRC	Departmental Review Committee
ERC	Ethical Review Committee
GPAQ	Global Physical Activity Questionnaire
GSHS	Global School-Based Student Health Survey
H <sub>0</sub>	Null Hypothesis
H <sub>1</sub>	Alternate Hypothesis
KPK	Khyber Pakhtunkhwa
M	Mean
MD	Means Difference
MScN	Master of Science in Nursing
MVPA	Moderate to Vigorous Physical Activity
n	Sample Size



PA	Physical Activity
PAQ-A	Physical Activity Questionnaire-Adolescent
PAQ-C	Physical Activity Questionnaire for Older Children
PE	Physical Education
r	Correlation Coefficient
SAPAC	The Self-Administered Physical Activity Checklist
SD	Standard Deviation
SEM	Social Ecological Model
SPSS	Statistical Package for Social Sciences
TV	Television
US	United States
USA	United States of America
WHO	World Health Organization
Y-PAQ	Youth Physical Activity Questionnaire

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Thank you all

## Declaration

I declare that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university and to the best of my knowledge it does not contain any material previously published or written by another person, except where due reference has been made in the text.

The editorial assistance provided to me has in no way added to the substance of my thesis which is the product of my own research endeavours.



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(Signature of Candidate)

10<sup>th</sup>, November 2023

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## **Chapter One: Introduction**

This chapter outlines the background of the study and covers an overview of the comparison of physical activity levels among school-age adolescents in rural and urban areas of district Swat KPK, Pakistan. In addition, this chapter also presents the rationale for conducting the study, its significance, the research purpose, and definitions of some of the keywords used in the study.

### **The Background**

Physical activity (PA) for school-age adolescents is very necessary because adolescence is the stage of life in which more physical growth and cognitive and emotional development occurs (Lewis, 2022). Thus, it is very necessary to assess and monitor those behaviors and practices in adolescents which negatively affect their health.

Likewise, PA is the most important practice that has a rudimentary impact on adolescents' health. So, it is essential to measure the PA levels in school-age adolescents because inactivity results in obesity, which ultimately leads to the development of non-communicable illnesses like hypertension and diabetes mellitus. In addition, the place of residence also impacts one's health. If the environment in which a person lives is friendly and healthy then it would naturally have an optimistic effect on the individual's health. Furthermore, one's place of residence has a formative impact on one's physical fitness (Torres-Luque et al., 2018) Hence, this study will also investigate the difference in the levels of physical activity of school-age adolescents in terms of their place of residence.

Health is a very important aspect of human life. "Life without good health is like an army without soldiers and chocolate without cocoa" (Mushtaq & Tayyab Alam, 2014). Life is a

struggle and to live this struggle in the best way, one needs to have and develop some capabilities and strengths. Some of those capabilities are in the form of having sound health. If an individual is in good health, then he/she can lead a happy life. There are many definitions of health. The World Health Organization (WHO) defines health as, “ a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948, as cited in (McCartney et al., 2019). There are many other definitions of health, the overall conclusion of those definitions is, that it is the physical and mental ability of an individual to participate and function actively in society. Undoubtedly, health is a very precious gift in one’s life. So, it is very important to take care of it in the best way. As WHO has defined that “health is a state of full physical and mental well-being”. This state of well-being can be maintained in several ways like healthy eating and carrying out regular PA. Maintaining a good state of health is important for every individual, regardless of one’s age, but building your health and its maintenance is very crucial in the adolescent stage of life because your quality of life in later years will depend on it.

Maintenance of health in adolescents is a very important aspect of human life. The health of this age group of adolescents will be maintained by adopting certain healthy behaviors like eating healthy, having regular checkups, avoiding substance use, etc. One of those behaviors is maintaining a healthy level of PA. If adolescents adopt good PA habits in their early developing age, it will be easy for them to continue it in the future. “The habits acquired during adolescence may continue into adulthood” (Kaya & Dalgiç, 2021). Kumar et al. (2015) state that physical activities act as a potent medicine and it has many advantages for adolescents’ health, regular PA enhances cardiovascular functioning in adolescents, such as improving lipid profile, blood pressure, endothelial function, and insulin sensitivity. In addition, it increases calorie expenditure

which aids in weight control. Furthermore, Weight-bearing exercises play vital roles in increasing muscle mass and achieving the highest bone density in adolescents. Moreover, PA has also positive effects on the mental health of adolescents as it increases the blood flow to the brain and enhances the circulating levels of norepinephrine and endorphins, which improves mood, self-esteem, and concentration while reducing stress and anxiety at the same time (Kumar et al., 2015). On the other hand, the lack of physical activity leads to obesity, which ultimately will increase the likelihood of the onset of other health problems like diabetes mellitus, cardiovascular diseases, and some musculoskeletal problems in later life. As evidence, many researches have shown that obesity is a basic cause of chronic diseases, which can result in serious cardiovascular issues, diabetes, and early death (Siddiqui et al., 2018).

In many nations throughout the world, the prevalence of severe obesity has emerged as a main public health concern. It is estimated that there is a dramatic rise in obesity among children and adolescents, which has become a significant health problem (Nicolucci & Maffei, 2022). The rise in childhood and adolescent obesity was first noticed in the USA in the middle of the 1970s (Pinhas-Hamiel et al., 2022). Another study shows that obesity in the age group of 2 to 18 has rapidly increased, and more than a hundred million children were obese in 2015 (Lee & Yoon, 2018). In addition, obesity has emerged as a significant health problem in high income, low income, lower middle income and upper middle income countries, which leads to many long-lasting non-communicable diseases like type 2 diabetes, hypertension and cardiovascular diseases. Furthermore, adolescent obesity is linked to the incidence of many diseases in adulthood and premature death due to complications (Lee & Yoon, 2018).

In fact, according to WHO, obesity could be a non-communicable epidemic in the twenty-first century if the increasing rate of obesity is not controlled. It means that obesity will

be as high as any contagious disease spread in an epidemic way, but since obesity cannot be transmitted from person to person, it will still be a non-communicable epidemic.

Furthermore, obesity in adolescence is likely to be carried by an individual in adulthood and is a risk factor creating health complications at a later age. Therefore, a state must create and implement effective and timely interventions which would reduce the incidence of obesity in adolescents(Karpova et al., 2021).

In the developing context, the prevalence of obesity and lack of physical activity in school-age children and adolescents in Asian countries like Pakistan is also a problem of concern. A study conducted in India highlights that obesity is not a problem in high income countries, but it has become a serious health issue in most low- and lower middle-income countries like India (Malik & Chatterjee, 2022). Data available in the literature suggests that obesity is also an emerging health problem in Pakistan. In this respect, Siddiqui et al., 2018 have stated that obesity is the most popular health problem in the world, and approximately 30% of the world's population is either obese or overweight. In addition, they highlighted that according to WHO, more than 60% of the universal disease burden will be attributed to chronic diseases related to obesity. Furthermore, they also stated that Pakistan is the world's ninth obese country suffering from this epidemic, which is affecting all age group people, especially adolescents, and females (Siddiqui et al., 2018).

According to WHO, physical activity is defined as, “any bodily movement produced by skeletal muscles that require energy expenditure” (Ali et al., 2022). Likewise, previous researches show that PA plays a significant role in the prevention of obesity in school-age adolescents. The new WHO guidelines also emphasize the importance of PA for children, adolescents, adults, and pregnant women. It states children and adolescents, need to engage in an

average of sixty minutes per day of moderate to vigorous-intensity aerobic physical activity to get optimum health outcomes. (Bull et al., 2020). Hence, it can be deduced that although the prevalence of obesity in school adolescents is very high, providing adolescents opportunities to indulge in rigorous physical activities and encouraging them to use them can help in counterbalancing the situation to a large extent.

Moreover, a considerable amount of research has taken place on the assessment of PA among school-age adolescents, but little is known about the comparison of PA among rural and urban school-age adolescents in Pakistan. Thus, it is very important to assess the levels of PA among rural and urban adolescents because the geographical environment has a very basic influence on PA. Comparing the urban and rural contexts, it can be deduced that in urban areas, people live in congested areas, and there are no open spaces for PA available to them like in rural areas. On the other hand, the urban and rural areas are different in terms of technological development. Meanwhile, the availability of advanced technological facilities in urban areas like the Internet is high as compared to rural areas. So, due to these technological development and modern facilities, the lifestyles and habits of inhabitants in rural and urban areas are different from each other.

Particularly, in developing countries the levels of PA among adolescents in rural and urban are different. A study conducted in India revealed that children and adolescents in rural areas were more physically active than children and adolescents in urban areas. The percentage of rural adolescents who were unable to achieve the adequate PA criterion was 16.8%, which was much lower than the percentage of urban adolescents, which was 33.2% (Malik & Chatterjee, 2022). Hence, this will be the first study that will assess the difference between the levels of PA among rural and urban school-age adolescents in District Swat KPK, Pakistan. In

addition, this study will also assess the factors associated with the difference between the levels of PA like gender, type of school (private vs government), and grade, and their effect on PA.

### **The Problem Statement**

The research related to the comparison of PA among rural and urban school-age adolescents in Pakistan is limited. Since rural and urban environments are different which can affect the level of PA, hence, this study was planned with the aim to address a significant knowledge gap by assessing the difference in PA levels among adolescent in rural and urban areas.

### **The Rationale for Conducting this Study/ Researcher's Reflection**

The researcher's attention was drawn to the seriousness of this issue after seeing school-age adolescents who were mostly engaged in playing mobile games, watching television, and using social media. The advancement in technology has influenced the behavior of this new growing population to a large extent, and most of them have adopted a sedentary lifestyle, which is very dangerous for their health (Woessner et al., 2021).

In addition, it is also observed that students nowadays are not participating in physical activities, they prefer to use sedentary behaviors like playing games on mobile or computer instead of participating in physical activities. Furthermore, in some schools, there is an unavailability of physical education teachers and classes. So, all these factors of inactivity are leading to obesity in children and adolescents. So, PA is very important for health because regular physical activity and limited screen time exposure effectively reduce and prevent obesity in children (Jerome et al., 2022). However, significant literature is available both nationally and internationally on the assessment of physical activity in school children and adolescents, but no



such study is available in Pakistan on the comparison of PA levels among school-age adolescents living in rural and urban areas of district Swat KPK, Pakistan.

### **The Significance of the Study**

Global and Pakistani populations are experiencing a rise in sedentary lifestyles and obesity among all age groups. According to the World Health Organization (WHO), obesity is becoming a significant non-communicable epidemic in the 21st century, with global rates doubling since 1980. Notably, the prevalence of obesity is also increasing among children and adolescents in Pakistan. A Karachi-based study revealed high rates of overweight (19.1%) and obesity (10.8%) among children and adolescents (Mansoori et al., 2018).

The main factor which leads to the high prevalence of obesity in children and adolescents is inactivity. It is recommended that regular PA and limited exposure to screens have an effective role in the reduction and prevention of obesity in children (Jerome et al., 2022).

Based on this background, the main purpose of this study was to determine the difference in the levels of PA among rural and urban school-age adolescents. By comparing PA levels, it can shed light on whether adolescents in one setting are at a higher risk of sedentary lifestyles or insufficient PA, which are associated with various health issues such as obesity, cardiovascular diseases, and mental health issues. In addition, the results of this study will help the researcher in identifying the differences in the level of PA among adolescents in urban and rural areas in terms of their gender, age, and type of school. Moreover, it is envisaged that the findings of the study will potentially help the researcher in directing the attention of schools' administration, health policy makers and other healthcare organizations towards developing effective interventions for the reduction of obesity and the improvement of PA in adolescents. In

addition, the researcher will also motivate the school administration for the addition and implementation of physical education as an essential part of the school curriculum.

Furthermore, the findings of this research can also serve as a base for designing and carrying out interventional research in the future for the improvement of PA in school-age adolescents. Overall, it is envisaged that the enhancement of PA will lead to the reduction of obesity which will lead to the reduction of non-communicable diseases like hypertension and diabetes, etc., in the multitude.

### **The Study's Aim**

The main aim of the study was to compare the levels of PA in school-age adolescents living in the rural and urban areas of district Swat KPK, Pakistan. As the rural and urban areas are different in terms of technological development and natural environment, so the researcher was interested to find out the difference in PA levels among the school-going-age adolescents living in these two different populations. In addition, the study also aimed to find out the association of gender, age, grade, and type of school with the PA levels of adolescents.

### **The Research Questions**

- What is the difference in the levels of physical activity among rural and urban school-going-age adolescents in District Swat, Pakistan?
- How does the association of physical activity vary based on factors like age, grade, gender, and school type (private vs government)?

### **The Research Objectives**

- To compare the levels of physical activity among rural and urban school-age adolescents in District Swat Pakistan.

- To assess the association of physical activity with factors like age, grade, gender, and school type (private vs government).

### **Conceptual Definitions**

The following conceptual definitions have been used in this research:

#### ***Physical Activity***

A physically active adolescent is “an individual having at least 60 minutes of moderate to vigorous-intensity physical activity daily” (WHO, 2018, as cited in (Imtiaz et al., 2020).

#### ***Adolescent***

An adolescent is defined by the World Health Organization (WHO) as someone in “the second decade of life (10–19 years of age)”(Singh et al., 2019).

### **Operational Definitions**

The following operational definitions have been used in this research:

#### ***Physical Activity***

The operational definition of ‘physical activity’ in this study is those are physically active students whose overall mean score of PAQ-C is 3 to 5.

#### ***Adolescent***

A school-age adolescent will be a student in the age range of 10 to 14 years.

### **A Summary of Chapter One**

This chapter presented the introduction of the current study. In addition, it also provided the background of the study, the rationale for conducting this study, and the significance of the study. Finally, this chapter also highlighted the purpose of the study, along with definitions of some key terms. The next chapter will present the literature relevant to the research study.

## **Chapter 2: Literature Review**

The main aim of this chapter is to explore and review the available literature on the “Comparison of Physical Activity Levels among School-age Adolescents in Rural and Urban Areas”. There are three sections in this chapter:

The first section presents the search strategy for searching the relevant literature on the research problem and questions. The second section covers the relevant literature on physical activity among school-age adolescents under the themes of “Prevalence of Physical Activity in School-age Adolescents”, “The Benefits of Physical Activity for Adolescents”, “The Role of Gender, Age, and Grade on Physical Activity”, “The Role of Social Support on Physical Activity”, “The Type of School and Physical Activity”, “A Comparison of Physical Activity among Rural and Urban Adolescents”. The last section discusses gap analysis and rationalizes the need to conduct this study.

### **The Background**

Physical activity (PA) is a fundamental component of human health and well-being. Regular physical activity has been linked to a variety of positive health outcomes, including better cardiovascular health, better weight control, a lower chance of developing chronic diseases, improved cognitive function, and an overall higher quality of life. (Kumar et al., 2015). However, the disparity between urban and rural locations is a crucial aspect that influences how much physical activity is present in certain populations and environments.

In this respect, urban areas are characterized by dense populations and expansive built environments. On the other side, rural areas are frequently characterized by a lower population density, huge open spaces, and a lack of built infrastructure. The level of PA in adolescents is therefore impacted accordingly by these disparities between the rural and urban environments.

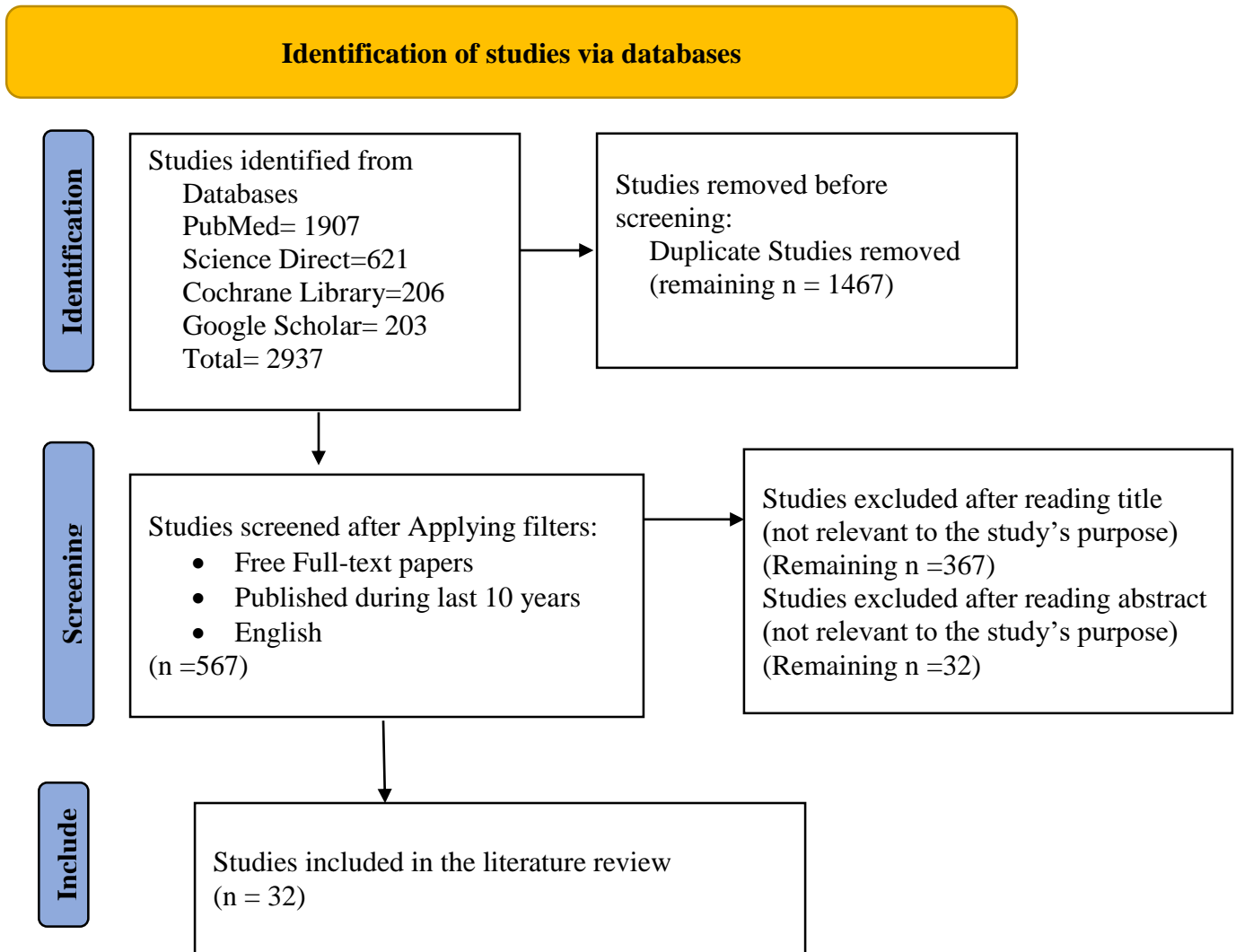
Hence, there are mixed results from studies comparing the levels of physical activity in urban and rural locations. According to some studies, people who live in urban areas tend to be more physically active than people who live in rural areas. In urban locations, facilities like parks, hiking trails, and fitness centers are readily available. On the other hand, the rural inhabitants may participate in higher levels of PA because of the unique chances for outdoor recreational activities like hiking, biking, and gardening that the natural landscapes and open spaces in rural areas may provide. Thus, these activities can have a good impact on PA levels (Euler et al., 2019).

### **The Search Strategy**

The relevant literature related to physical activity in school-age adolescents was searched using electronic databases of Google Scholar, PubMed, Science Direct, and Cochrane Library. The keywords of *“level of Physical activity OR exercise; the prevalence of physical activity; school-age adolescent; benefits OR advantages of physical activity; gender differences of physical activity; age-wise physical activity differences; the role of school type on physical activity of students; the role of family on physical activity of adolescents; the role of teacher on physical activity of students and rural and urban differences”* were used to search the relevant literature related to the research questions and purpose.

Furthermore, the Boolean operators were used to identify focused and relevant literature. The inclusion criteria for the selection of articles were that the article should be published within a defined range, from 2013 to 2023, be a full-text free article, and should be in the English language.

Figure 1 The PRISMA Flow Diagram



From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372, 71. doi 10.1136/bmj.n71  
Retrieved from: <http://www.prisma-statement.org/>

### The Social Ecological Model

The Social Ecological Model (SEM) was used to guide the literature review of this thesis. This model was proposed by Urie Bronfenbrenner 1970s. According to the SEM, the interaction among an individual, a community, and the environment which encompasses its physical, social,

and political elements affects one's health (Kilanowski, 2017). Moreover, the SEM is mainly concerned with in what way people interact with their environment on a physical, social, and policy level. The model helps us in the identification of different factors like individual (e.g. beliefs, sex, , and attitudes), behavioral (sedentary lifestyle), social (family, teachers, peers, etc.), and physical environmental (e.g., availability of PA equipment and facilities that may affect one's capability to be adequately physically active), thereby support us in recognizing opportunities to promote PA(Mehtälä et al., 2014).

### **The Prevalence of Physical Activity in School-age Adolescents**

The prevalence of PA among adolescents is low worldwide, but its prevalence is very low in developing countries. In this respect, a systematic review was conducted to find out the prevalence of insufficient physical activity among adolescents worldwide. For the said purpose, they used online databases for the identification of articles related to the prevalence of PA conducted in different countries of the world. Next, they used the WHO-defined cutoff point which is less than 60 minutes per day of moderate and vigorous PA, as a baseline for physical activity level assessment. Their results showed that the prevalence of PA among adolescents was low worldwide, especially in developing countries. In addition, the prevalence of low PA was higher in girls than boys(de Moraes et al., 2013).

Furthermore, the prevalence of PA in high income countries is also low. A study was conducted in the US to find out the prevalence of physical activity among adolescents and to find out the percentage of adolescents who meet the 2008 physical activity guidelines for Americans. Their study results showed that less than 20% of adolescents reported engagement in physical activities (Song et al., 2013). Likewise, the prevalence of insufficient PA in Brazil is also high,

which is about 77.2%. It was also found in Brazil that the prevalence of PA was low in older students and in those students who slept more often(de Lima & Silva, 2018).

Moreover, the preventive measures during the period of the COVID-19 pandemic have also increased the prevalence of physical inactivity and sedentary lifestyle in school-age adolescents. The children and adolescents were confined to their homes because of the risk of transmission or getting the infection of corona versus. So, those students become habitual of sedentary behaviors like TV watching, playing video games, and using mobile.

Similarly, a study was conducted in Ukraine with the purpose of “to determine the level of physical activity among school-age children, and the impact of the external and internal factors on their PA during the lockdown”. The study results showed that there was a significant decline in Moderate to Vigorous Physical Activity (MVPA) by 12.7% in 2021 as matched to 2020. In addition, they stated that being from the female gender, having chronic diseases, being overweight, obese, not participating in prearranged activities, and a drop in the average air temperature were factors that prevented students from achieving 60 minutes of MVPA per day (Yelizarova et al., 2022).

Similarly, the prevalence of physical activity among school-age adolescents in Asian countries is also low. A review of the literature was conducted between 2000 and 2011 to find out the prevalence of physical activity among school-age children and adolescents. The results of that review showed that the prevalence of physical activity in young adolescents in Asian countries is low. The authors further stated that the main reason behind the high prevalence of physical inactivity in Asian countries is their developing age. It means that in developing countries people tend to achieve higher education and strive to make their country developed. The students in these countries spent most of their time on school-based activities rather than



participating in physical activities (Müller et al., 2013). Thus, the students and their parents give importance to academic achievement because they think that this will help their children in finding good job opportunities if their grades are good. Consequently, they give little importance to their children's physical activities. Similarly, there is a reduced level of physical activity, a high level of sedentary behaviors, and a high prevalence of obesity and the tendency to be overweight among Chinese school-age adolescents and children (Zhu et al., 2019). In addition, another study also reports that there is a high prevalence of obesity, but a low level of physical activity in Chinese students(Liu et al., 2021). Conclusively, it can be said that the level of PA among adolescents is low in high income as well as in low income countries at a global level.

Coming to our context, Pakistan as a developing country also has a low prevalence of physical activity in school-age adolescents. A systematic review was conducted in 2019 to find out the prevalence of PA among adolescents in Pakistan. The results of that review indicated that there was a low level of PA among school-age adolescents in Pakistan(Imtiaz et al., 2020). Similarly, another study also shows that the prevalence of PA among school-age adolescents in Pakistan is low. There were 216 participants in their study, out of which no student was found to have a high level of PA. A moderate level of PA was found in 69.9% of students, and there were 30.1% of low PA levels in students (I. Jabeen et al., 2018). In general, adolescents in Pakistan are not physically active and there is a low level of PA among them which can predispose them to the development of many diseases in their later age(Ali et al., 2022).

So, it was concluded that the prevalence of physical activity is low, and it is a significant health problem in high income as well as in low income, lower middle income and upper middle income countries.

## **The Benefits of Physical Activity for Adolescents**

There are three types of PA light, moderate and vigorous. Light-intensity activities are those which require less amount of effort for example sitting at a computer, eating or preparing food. Moderate-intensity physical activities require more oxygen consumption than light PA, for example, brisk walking, sweeping the floor, etc. Vigorous intensity PA requires the highest amount of oxygen consumption like running, hiking and swimming, etc.(MacIntosh et al., 2021).

There are many health benefits of MVPA in adolescents. These benefits include lowering of blood cholesterol, lowering of blood pressure, lowering the chance of metabolic syndrome, and it also increases bone strength and density. Likewise, PA also has positive effects on mental health as it relieves depression and anxiety (Kumar et al., 2015). Furthermore, the association between moderate-to-vigorous physical activity (MVPA) and health-related physical fitness was assessed in adolescents in a study in the South Punjab region of Pakistan. They found that there was a strong association of MVPA with health-related physical fitness. Their results showed that there was an improvement in muscular strength, cardiovascular stamina, and aerobic fitness(Hamdani et al., 2022).

Some of the health benefits of PA for children and adolescents are healthy and functional bones and muscles, a decreased chance of getting chronic diseases like obesity and diabetes, improved psychological well-being, lowered levels of stress, anxiety, and depression, and angiogenesis and neurogenesis(Archer, 2014).

Furthermore, PA has also a positive impact on the mental health of adolescents, especially in middle-income countries. The different types of PA result in improvement in the mental health of adolescents, but it varies in degree from country to country. The common benefits that PA has on the mental health of adolescents are a decrease in the likelihood of

anxiety, loneliness, and a decrease in the likelihood of suicidal ideations. This happens because while engaging in PA, there is increased communication between team members which reduces the likelihood of loneliness (Arat & Wong, 2017).

But, most parents are worried about the academic performance of their children, so they assume that participating in PA will waste the time of their children and will lead to academic failure. However, this assumption of parents is not correct because research have shown that participating in physical activities improves the cognitive ability of a child which, in turn, improves academic achievement (Barbosa et al., 2020). In fact, the academic performance of students can be improved by reducing the number of academic classes and replacing them with exercise and PA. Furthermore, exercise and PA will have positive effects on adolescents' cognition and self-esteem which will result in better academic performance(Rasmussen & Laumann, 2013). Thus, these studies concluded that PA is beneficial both for the physical as well as for the mental health of adolescents.

### **The Role of Gender, Age, and Grade on Physical Activity**

Previous researches show that PA differs in terms of gender, age, and grade of education as a study conducted in Japan revealed that boy and younger students were engaged in PA more often than girls and higher-grade students. They took the students in the age range from 3 to 15 years old. They highlighted that the boys were more active twice in meeting the WHO guidelines for PA than girls(Ishii et al., 2015). However, the level of PA in adolescents declines during their lifespan. Recent studies show that more decline has been reported among girls than boys. Literature review shows that the prevalence of participating in PA every day declines over the age from 28.2% at the age of 11–12 years to 21.2% at the age of 16–17 years amongst boys; and from 19.4% to 11.1% amongst girls. In addition, they found that the likelihood of participating in

PA rises from nations with the lowest human development index to nations with the greatest(Adilson Marques et al., 2020). A systematic review and pooled analysis found that beyond the age of ten years, physical activity dropped by approximately 7% per year. Moreover, after age 5 years, there was a 4.2% annual average cross-sectional reduction in overall physical activity, mostly as a result of more time being spent in a sedentary lifestyle and less time doing PA. They further stated that at all ages, boys were more active and less sedentary than girls (Cooper et al., 2015).

A study was conducted in South Carolina which is a state in the United States to find out the change in total MVPA in children, as they transitioned from elementary to high school. They detected a relatively steep age-linked decline in the total PA in children between the ages of 10 and 14, with a slower rate subsequently this age. Moreover, overall physical activity was higher in boys than girls, and the age-linked decline was greater in girls than in boys(Pate et al., 2022). It means that the level of PA decreases as age increases, but this age-wise decline in PA in girls is higher than in boys.

Similarly, a study conducted in China with the purpose of “to determine whether dietary behavior, physical activity, and screen time varied among students in different stages of their education” revealed that physical activity, moderate exercise, and nutritional behavior all reduced as the education level increased, whereas the screen time increased. They further stated that PA gradually decreases in students, as they proceed to a high level of education because physical education is not given as much importance in colleges and universities as it is given at the middle school level. In addition, they state that Physical education is highly emphasized at the middle school level (Liu et al., 2017).

Moreover, a study conducted in Saudi shows that male adolescent students (44%) were found to be more physically active than female adolescent students (20%). For instance, the male students in government schools were more active than male students in private schools, while females in private schools were more active than females in government schools (Al-Hazzaa et al., 2014).

Similarly, the PA level among female students in Pakistan is also low. A study conducted in Karachi Pakistan to determine the level of PA among young adolescents revealed that the majority of the students were found physically inactive, but the score of PA was lower in girls than boys. The author further stated that there are many impeding factors like the lack of support and motivation for PA, due to which the students were not participating in physical activities. (Gulzar, 2021).

Examining the existing literature revealed that PA of adolescents is affected by factors such as gender, age, and grade. Most of the literature results revealed that PA levels are high in boys than girls, and PA levels decrease as students progress to higher grade of study and as their age increases.

### **The Role of Social Support in Physical Activity**

Several studies have highlighted that the social support of parents has a great influence on the physical activity of adolescents. Also, the development of adolescents' good lifestyle habits is greatly influenced by parents. Thus, in all instances when a strong positive association between parental support and a child's perception of parental support was demonstrated, it, in turn, had a substantial impact on the child's engagement in physical activity (Wilk et al., 2018).

Furthermore, a study was conducted in four schools in Rawalpindi city of Pakistan, with the purpose of “exploring individual, interpersonal, and organizational factors that may influence the PA of adolescents (ages 10–14) in Pakistani schools”. Their study findings showed that individual-level factors like motivation, self-efficacy, and attitude were strongly predicted by physical activity. Meanwhile, age, gender, and BMI did not affect PA among the demographic correlates; however, it was found that socioeconomic level and regional factors had a significant correlation with PA. Likewise, at the interpersonal level, teenagers' perceptions of family support may have an impact on their physical activity, but teachers' and friends' support had little bearing on their PA. Thus, the presence of a PA facility was positively correlated with PA in schools(Kiyani et al., 2021).

Moreover, a systematic literature review shows that social support has been recognized as a possible changeable correlate of PA that can be used to update interventions to enhance the PA levels of adolescent girls. In addition, they state that social support from friends, parents, and families has a small but positive relationship with PA in adolescent girls(Laird et al., 2016).

Similarly, social support from classroom teachers also has a positive effect on the enhancement of PA among students. The research aimed at promoting PA in children through social support from classroom teachers, which has been instrumental in improving their ability to exercise. Thus, the results showed that the role of classroom teachers in influencing physical activity behavior outcomes for children was significant (Eather et al., 2013). The available literature demonstrates that social support plays a vital role in enhancing PA in adolescents

### **The Type of School and Physical Activity**

The level of physical activity in students enrolled in private or government schools also varies in developing countries like Pakistan. One study highlighted the low PA levels among

Pakistani school adolescents and identified modifiable and non-modifiable PA correlates. Their results showed that about 30% of school adolescents had low levels of PA, while 70% had moderate levels, but none had high levels of PA in this study. Moreover, higher PA levels were positively correlated with the male gender, public school education, parental support, and, remarkably, with those who did homework and played indoors. In addition, they stated that PA increased among boys who were educated in public schools and whose parents supported sports. On the other hand, a low level of PA among students has been associated with private schools that do not have playgrounds, female gender, or lack parental support for sports(I. Jabeen et al., 2018).

Similarly, a study was conducted in Saudi Arabia, and the purpose of the study was the examination of patterns and determinants of PA among Saudi adolescents. According to that study, males from government schools were more active than their counterparts from private schools, whereas females were more active in private schools than in government schools(Al-Hazzaa et al., 2014).

Likewise, another study from India shows that physical activity levels were higher among government school children than among private school children. In addition, in the public school system, more than 70% of adolescents were underweight, compared to 35% in private schools. The authors of the study state that there could be many factors that could affect the level of PA of students attending private versus government schools. Some of those factors are the differences in the socioeconomic status and style of life of children and the varying degrees of expectations parents have for their children (Mahaur & Badiger, 2018).

## **The Comparison of Physical Activity among Rural and Urban Adolescents**

The geographical environment has a very basic influence on the physical activity of adolescents, because in urban areas, people live in congested areas, and there are no open spaces like in rural areas. On the other hand, the urban and rural areas are also different in terms of technological development. So, a growing body of literature shows that the level of PA among adolescents living in rural and urban areas is different.

Likewise, a descriptive cross-sectional study was carried out in Pernambuco, Brazil in 2011. The aim of the study was “To analyze the levels of physical activity and sedentary behavior in adolescents living in urban and rural areas, in the light of socio-environmental characteristics.” For this purpose, the researchers selected a sample of 6,234 adolescents in the age group of 14 to 19 who were enrolled in public high schools. Next, they used a translated version of the “Global School-Based Student Health Survey” (GSHS). The main findings of their research showed that the students who were residing in rural areas were more physically active than the students who were living in urban areas. They stated that the students living in rural areas had healthier habits like less exposure to electronic media like computers, television, and video games, less sedentary behavior, and, in turn, a high level of physical activity. Further, they stated that adolescents living in rural areas were more active because they were participating in labor market, agricultural activities, and common household activities(Regis et al., 2016).

Comparatively speaking, the differences in the levels of PA between urban and rural adolescents in the United States are not clear. One study showed mixed results, which stated that 9 out of 16 studies showed that PA levels increased as urbanization decreased. They also found that urban adolescents were less active than rural adolescents. Only two studies found that



MVPA was greater among urban middle school students in the southeastern United States than among rural middle school students (Euler et al., 2019).

Similarly, a cross-sectional study was conducted in Western Maharashtra, India to compare the levels of physical activity among adolescents living in rural and urban areas. They selected a sample of 416 adolescents between the age group of 10 to 17 years. They selected a total of four schools, two from a rural area and two from the urban area of Western Maharashtra. Moreover, the data was collected using a pre-tested questionnaire adopted from the “Global Physical Activity Questionnaire” (GPAQ) and “Physical Activity Questionnaire-Adolescent” (PAQ-A). Their study results showed that rural children/ adolescents were more physically active as compared to urban. The proportion of rural adolescents who were not fulfilling the adequate physical activity criteria was 16.8 %, which was quite less as compared to urban that was 33.2%. In addition, they stated that rural adolescents are more involved in physical activities like walking from one place to another, cycling, and helping with agricultural activities and home chores as compared to urban adolescents (Malik & Chatterjee, 2022).

Similarly, a cross-sectional study was conducted in the middle schools of Mangalore, India. The aim of the study was “To evaluate and compare physical activity and physical fitness among urban school children and their rural counterparts”. For this purpose, a total sample of 650 students in the age group of 9 to 13 was selected from four schools. Furthermore, the Self-Administered Physical Activity Checklist (SAPAC) was used for the collection of data. This study showed a significant difference in the level of physical activity and physical fitness among rural and urban children. This study also revealed that rural children showed more flexibility with good cardiovascular stamina as compared to urban children. This might be a result of rural children engaging in more physical activity. Next, their study also showed significant differences

in the Body Mass Index (BMI), flexibility, Volume of Oxygen (Vo<sub>2</sub> max), and SAPAC score among the rural and urban children. The boys showed the best performance in the Sit-Up test as compared to girls, but there was no significant difference in the mean sedentary activity duration between them. (Karkera et al., 2014). Please refer to Appendix L for the Literature Review Synthesis Table.

### **The Gap Analysis**

The above literature review revealed that PA is low both nationwide and worldwide in school-age adolescents which has many adverse effects on the health of adolescents. Moreover, many factors can influence the PA of adolescents like social support, school type, internal motivation of student, age, and gender of an individual. The review also showed that the area of residence also has an impact on the physical activity of school-age adolescents.

Although the PA level differs in rural and urban school-age adolescents, the researcher did not find any single published Pakistani study under the title of “comparison of physical activity levels among school-age adolescent students living in rural and urban areas of Pakistan”. In addition, the trend of increasing cardiovascular diseases is increasing in urban areas as compared to rural areas in Pakistan. For instance, a study was conducted with the purpose of, “To potentiate cognizance regarding cardiovascular disease risk factors”. They selected the village named Nagial as a rural area and Sialkot city as an urban present in District Jhelum. The study results showed the prevalence of hypertension, diabetes, and sedentary lifestyle among urban area inhabitants was high as compared to rural areas inhabitants (Nasir et al., 2017). A sedentary lifestyle and lack of physical activity are one of the factors mentioned in that study for the incidence of chronic diseases like hypertension and diabetes. So, this study was planned to

find out the “Comparison of physical activity levels among school-age adolescents in rural and urban areas of district Swat KPK Pakistan”.

### **The Summary of the Chapter**

The chapter provided an in-depth review of literature related to the prevalence of physical activity in school-age adolescents and its benefits on the health of adolescents. In addition, the chapter also provided the impeding and promoting factors for PA in adolescents. Moreover, it highlighted the comparison and differences in levels of PA among adolescents based on their living place i.e. rural or urban. Finally, the chapter highlighted the gap in the current literature and presented the significance of conducting this study.

### **Chapter Three: Methodology**

This chapter describes the research methodology for this study. It includes the study design, the study population, the study setting, and the eligibility criteria which further include the inclusion and the exclusion criteria. In addition, the chapter also illustrates the sample size calculation procedure and sampling strategy. Moreover, the data collection tool used in this study, the study variables, the duration of the study, the data collection plan, and the data entry and analysis plan have been described in detail in this chapter. Finally, this chapter explains the study rigours, pilot testing, and the ethical considerations of the research participants. The chapter concludes with a summary at the end.

#### **The Study Design**

An analytical cross-sectional study design was used for conducting this study to compare the level of physical activity among rural and urban school-age adolescents in the district of Swat KPK, Pakistan. Since cross-sectional study designs are used for the determination of proportion or mean at a single point in time, thus this was an appropriate design for the said study because the measure of interest was the determination of the difference between the mean levels of physical activity (PA) among school-age adolescents between two kinds of population, i.e., urban and rural.

Moreover, the cross-sectional study was suitable for this study because the researcher was interested in determining the frequency of PA among rural and urban school-age adolescents at a single point in time. Additionally, cross-sectional study designs are often used to assess the prevalence of health outcomes, describe features of the population, and recognize the determinants of health (Wang & Cheng, 2020). Likewise, these types of designs are used to

measure and determine the prevalence of illnesses or health problems in a population at a single point in time.

Furthermore, factors such as operational limitations, for example, resource constraints, and the limited duration of this study, contributed to the adoption of this particular study design. Previous researchers also used these types of designs for two reasons: these designs are inexpensive and convenient; and secondly, they only use the inclusion and exclusion criteria as a baseline for selecting the research participants. Moreover, in this study design, the researcher does not alter the exposure status of a variable but just measures the relationship between the exposure and outcome at one point in time (Setia, 2016). Furthermore, since the second objective of this research was to find out the level of PA of adolescents based on age, gender, grade, and school type, the analytical cross-sectional design was suitable for the said purpose.

In addition, the association and relationship between two or more variables are determined in analytical cross-sectional studies, while in descriptive studies, only a description of a phenomenon is presented (Juliana Zangirolami-Raimundo, 2018); hence, the latter complemented the purpose of my study better. Moreover, previous researches have also used this methodology for the comparison of PA among adolescents in rural and urban areas (Malik & Chatterjee, 2022).

### **The Study Population and Setting**

This study was carried out in the district of Swat, Khyber Pakhtunkhwa, Pakistan. For this purpose, four middle schools (two private and two government) were selected in a rural area of Tehsil Bahrain and four middle schools (two private and two government) were selected in the urban area of Mingora city district, Swat, KPK, Pakistan.

Moreover, the target population for this study was all the school-age adolescents studying in private as well as in government schools in the district of Swat KPK, Pakistan. The source population was the students of grades 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> in the eight selected schools from urban and rural areas of district Swat. The total population of the eight selected schools from the 6<sup>th</sup> to 8<sup>th</sup> class was around 2000. Furthermore, Tehsil Bahrain was selected as a rural area because it is a hilly area and the main source of income in farming. It is located around 50 kilometers away from Mingora City. Ullah (2022) also states that in Pakistan, rural areas are characterized by scattered populations without a town, a travel distance of more than 75 minutes to a city, and are often associated with agricultural activities. On the other hand, Mingora city was selected as an urban area because it is the largest city in the district Swat. It is a highly populated area and has a population of around 331,377 according to the Pakistan Bureau of Statistics (Michael Ratcliffe, 2016). Ullah (2022) also states that an urban area in Pakistan is defined as a city core, which includes a population of 100,000 or more according to a single census urban place, along with its associated built-up and surrounding areas. This classification applies when these areas exhibit a minimum density of 500 persons per square kilometer.

### **The Eligibility Criteria**

The following eligibility criteria were used for the study:

#### ***The Inclusion Criteria***

The students who met the following criteria were included in the study:

- The age of the participants (adolescents) should be in the range of 10 to 14 years, and students of grades six to eight will be included in the study.
- The study participants should be in good health and should have no such conditions that affect their physical activity like asthma, back pain, joint pain, polio, etc.

### ***The Exclusion Criterion***

The participants who had the following characteristics were excluded from the study:

- The students having a known history of cardiopulmonary or neuromuscular problems were excluded from the study. Likewise, the researcher asked about the history of back pain, joint pain, difficulty in walking, difficulty in breathing while doing exercise, or palpitation while doing exercise. Since these factors would have affected the participation of students in physical activities, students with these conditions were excluded from the study.

### **The Sample Size**

The sample size was calculated through the online software of openEpi Version 3.0. Moreover, the sample size was calculated by taking into account both the purpose of the study and ensuring the true representation of the population. Thus, the final sample size was calculated by taking a confidence interval of 95% and a margin of error of 5%. In addition, the researcher was interested in the identification of the mean difference in physical activity between the two samples (rural and urban areas adolescents). So, the final sample was calculated using the mean difference option in the online sample size software of OpenEpi. Furthermore, the mean difference of 2 was taken between the two samples (rural and urban areas), and the sample calculated by the online calculator was 284. Next, an adequate sample of 312 participants was selected taking into account the non-responding rate of 10%. So, the final sample size for both samples consisted of 156 participants in each sample, i.e., the rural and urban areas. Therefore, there were 156 participants from the rural area schools and 156 participants from the urban area schools.

## **The Sampling Strategy**

A convenient sampling method was used in the selection of schools for this study among the government and private schools in the district Swat. A convenient sampling method was used because most of the school's administration was not willing to participate in the study. Moreover, the researcher approached 10 schools randomly in a rural area of tehsil Bahrain and 10 schools in the urban area of Mingora city. The researcher then selected those four schools whose administration voluntarily signed the permission letter. Convenience sampling is a type of nonprobability sampling method where individuals from the target population are included in the study based on practical criteria, such as ease of access, availability at a specific time, or willingness to participate. This term is also applied to participants who are readily accessible to the researcher. (Etikan et al., 2016).

In addition, a systematic random sampling technique was used in the selection of study participants in the selected schools. The participants were divided into the strata like grades 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> in each school and then a random sample was selected from each stratum. Moreover, 13 participants were selected from each stratum, i.e., each grade, a total of 39 participants from each school, and a total of 156 from each area were selected in the study. The students of class/grades 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> were selected as a study population in the selected government and the private schools of district Swat, KPK Pakistan.

A total of 287 participants participated in the study, with an expected nonresponse rate of 10%, from the eight selected schools from rural and urban areas of district Swat, Pakistan.

## **The Data Collection Tool**

A thorough literature review was carried out by the researcher to find the relevant tool for assessing the PA of school-age adolescents. Finally, the adopted questionnaire of *Physical*



*Activity Questionnaire for Older Children (PAQ-C)* was used by the researcher for the collection of data related to the level of physical activity of school-age adolescents. This questionnaire was developed by Crocker, Kowalski and Faulkner in 1997. It is a reliable and validated questionnaire. It has been used in many studies and research internationally. Moreover, the PAQ-C is appropriate for elementary school-aged children (grades 4 to 8<sup>th</sup>) and for the age group of 8 to 14 years (Kowalski et al., 2004). Furthermore, many studies have shown that it is a reliable and validated questionnaire for data collection related to physical activity. For instance, the participants' age in this study was in the range of 10 to 14 years, and they were students in grades 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup>, so this was an appropriate tool for this age group.

Similarly, some games in the questionnaire were not related to the local context, so the local games were added in front of those games by using slashes (/). Moreover, the sequence and numbering of the sequence of questions in the questionnaire have not been changed.

The questionnaire consisted of two sections: The first section contained demographic information of the student. On the other hand, the second section contained 10 questions related to the assessment of PA level of students in the last week. Equally importantly, the permission to use this questionnaire in this study was taken from the authors before the commencement of the study. Please refer to Appendix- E.

### **The Study Variables**

The following study variables were used for this study:

#### ***The Independent Variables***

The independent variables were gender, age, private and government schools, and rural and urban areas.

### ***The Dependent Variables***

The dependent variable was the level of physical activity mean score.

### **The Conceptual Definitions**

The following conceptual definitions were used in this research:

#### ***Physical Activity***

A physically active adolescent is “an individual having at least 60 minutes of moderate to vigorous-intensity physical activity daily” (WHO, 2018, as cited in (Imtiaz et al., 2020, p. 4).

#### ***Adolescent***

An adolescent is defined by the World Health Organisation (WHO) as someone in “the second decade of life (10–19 years of age)”(Singh et al., 2019, p. 1).

#### ***Urban Area***

According to the U.S. Census Bureau, urban areas are those areas that are denser, have large populations, build up, and are close together (Michael Ratcliffe, 2016).

#### ***Rural Area***

According to the U.S. Census Bureau, rural areas are those areas that are less denser, sparsely populated, not built up, and are at a distance (Michael Ratcliffe, 2016).

#### ***Private School***

A private school is a type of school that is independent and it generates its own funding through various resources like student tuition fees, private grants, and endowments (Farooq et al., 2017).

### ***Government School***

Government schools are supported and funded by the government and are free for all students to attend (Farooq et al., 2017).

### **Operational Definitions**

The following operational definitions were used in this research:

#### ***Physical Activity***

The operational definition of ‘physical activity’ in this study is, are the activities undertaken by those physically active students whose overall mean score of PAQ-C is 3 to 5.

#### ***Adolescent***

A school-age adolescent is a student in the age range of 10 to 14 years.

#### ***Urban Area***

The operational definition of the urban area is the same as the conceptual definition. For instance, Mingora city, which is a highly populated area, is taken as an urban area in this study.

#### ***Rural Area***

The operational definition of the rural area is the same as the conceptual definition. The less dense and sparsely populated area in Tehsil Bahrain is taken as a rural area in this research.

#### ***Private school***

The operational definition of the private school is taken the same in this study as the conceptual definition.

#### ***Government School***

The operational definition of the government school is taken the same in this study as the conceptual definition.

## **The Study's Rigours**

An adopted well-validated and reliable questionnaire was used for the collection of the data. The two studies conducted by the developers of the questionnaire that were Kowalski, Crocker, and Faulkner (1997) have supported that PAQ-C was a valid questionnaire for the assessment of general physical activity levels (Kowalski et al., 2004). In addition, it has been an internationally used questionnaire for the assessment of Physical activity. Moreover, national studies conducted in Karachi, Pakistan, also revealed that PAQ-C was a valid questionnaire for the assessment of physical activity (Gulzar, 2021; Ismat Jabeen et al., 2018).

## **The Pilot Testing**

The pilot study is very important in research because it guides the researcher on whether to proceed with the research or not. In addition, it also checks the statements of the used data collection scale and can help refine the scale items (Hazzi & Maldaon, 2015).

A pilot study was conducted before the collection of data from the large sample. For the pilot testing phase, the researcher randomly selected 24 participants (10% of the sample size) in one of the selected schools to check the reliability and internal consistency of the data collection tool. Next, the questionnaire was explained to the participants in the local language and formal written consent was taken from them. The participants filled out the questionnaires and returned them to the researcher. Then, the researcher checked and analysed the questionnaires. Moreover, the items of the questionnaire were analyzed in SPSS, and Cronbach's alpha was calculated. The Cronbach's alpha for the pilot data was 0.884, indicating that the tool was reliable, and the internal consistency of the items in the questionnaire was good. Additionally, the reliability of the questionnaire was rechecked, and Cronbach's alpha was calculated for the entire study

sample, resulting in a value of 0.973, once again demonstrating the tool's reliability and the excellent internal consistency of the questionnaire items.

After analysing the data, the reliability statistics are given in the following table:

<b>The Reliability Statistics</b>		
Number of Items	Cronbach's Alpha for Pilot data	Cronbach's Alpha for the Entire Study Sample
37	.884	0.973

Another purpose of the pilot study was to find any confusing or irrelevant questions or items in the questionnaire and to determine the estimated time for the completion of the questionnaire. After the pilot testing, it was concluded that there was no irrelevant question and the total expected time for the completion of the questionnaire was 30 minutes. Thus, the researcher concluded that there were no irrelevant or confusing questions in the questionnaire.

Moreover, after the pilot testing of the questionnaire, the data was collected from the months of June to August 2023. The researcher approached the selected schools a week before the collection of data. Moreover, the administration of the schools was informed about the days of data collection to avoid absenteeism of the students and to ensure the maximum participation of students. Furthermore, on the day of data collection in each school, the researcher randomly selected students from each grade that was class 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup>. The total duration of this study was around six months from 1<sup>st</sup> May 2023 to October 31<sup>st</sup>, 2023 after the approval of the Ethical Review Committee (ERC) of the Aga Khan University Karachi, Pakistan.

## **The Data Collection Plan**

When the study was approved by the ERC, formal written permission was taken from the District Education Officer (DEO) of district Swat. After that, formal written permission was also being taken from the selected schools' principals. Next, the researcher met with the teachers and selected students for study. Then, the researcher met with the parents of the students on the parents' and teachers' meeting day. Moreover, the researcher explained the purpose of the study to the parents and resolved their concerns. Alongside this, the written consent was taken from the parents of the student by explaining again the purpose of the study and the consent form to them in their native language. Also, the researcher instructed the parents that if they had any questions or any confusion, it would be explained to them. In addition, they were informed that they were free to make their own decisions. When the parents gave formal written consent, written assent was taken from the participants in the study. Likewise, the questionnaire and assent form were explained to the study participants in the local language in detail before the collection of data. Alongside, the hard copies of the questionnaire were distributed among the study participants during the break time at the school. The researcher also trained some research assistants and they helped in the data collection process. Thus, the questionnaires were explained to the study participants by the researcher and research assistants in detail before the collection of data/ filling of the questionnaire.

## **The Data Analysis Plan**

Once the data was collected it was entered electronically by the researcher in the Statistical Package for Social Sciences (SPSS) version 22. Moreover, the data entry was double-checked and tallying of the soft data with the hard copies of the questionnaire was done to avoid double entry or any other discrepancies and chances of errors in the data entry. Furthermore,

random checking of the data entry was done to ensure the precision and accuracy of the data entry.

The statistical software IBM SPSS version 22 was used to analyse the data. Moreover, the mean and standard deviation were calculated for the quantitative variables like age and level of physical activity, while frequency and proportion were calculated for qualitative variables like gender, school type (private and government schools), etc. Furthermore, the T-test for two independent samples was used to identify the difference in the means of physical activity levels between the two populations, i.e., rural and urban school-age adolescents. In addition, a T-test for two independent samples was also used to find the difference in the level of PA based on school type (private vs. government) and based on gender. Moreover, one-way ANOVA was used to compare the mean of physical activity based on the grade (6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup>). Lastly, a correlation was used to find out the association of age with PA level.

### **Ethical Considerations**

This study was approved by the ERC of the Aga Khan University Karachi, Pakistan. Moreover, formal and written permission was taken from the district education officer (DEO) and the concerned principals of the selected schools before the commencement of data collection. In addition, the researcher also obtained signed consent from the parents/ guardians and written assent from the students participating in the study. Furthermore, the researcher met with the parents of the participants in schools in a teachers' and parents' meeting day before the commencement of data collection. Also, the questionnaire and consent form were explained to the parents in detail in the native language. The students were also instructed that if there was any confusion or clarification their parents/guardians could contact the researcher at the provided contact number in the consent form. Further, the purpose of the research was explained to the

DEO, principals, parents, and research participants. More importantly, the confidentiality of the participants was maintained by giving codes to the questionnaires. Similarly, the collected data was kept in a locker, and only the primary investigator and supervisor had access to it. Lastly, after the conclusion of this research, the data will be kept in record for a period of seven years and then be destroyed.

### **A Summary of the Chapter**

This chapter explained the research methodology that was used in this research, followed by a detailed discussion of the study design used in this particular study. In addition, the study variables, the study setting, the data collection tool, and the eligibility criteria of the study participants were explained in this chapter. Furthermore, the chapter also described the data collection procedure, the data analysis plan, and the ethical considerations of the research participants.



## **Chapter Four: Results**

This chapter presents the findings of the study titled “A Comparison of Physical Activity Levels among School-age Adolescents in the Rural and Urban Areas of District Swat KPK, Pakistan”. It presents the descriptive statistics of the socio-demographic characteristics of study participants as a part of the findings. In addition, the descriptive statistics of all the activities mentioned in the PAQ-C questionnaire have been provided in this chapter. Moreover, the differences between Mean Physical Activity (PA) scores throughout the previous week between urban and rural males and female adolescents have been provided. Furthermore, a detailed description of the spare time physical activities of male and female adolescents and their mean PA scores have been cited. The objective-wise descriptive and inferential statistics have also been presented in this chapter.

Firstly, the descriptive and inferential statistics of objective one, i.e., “To compare the levels of physical activity among rural and urban school-age adolescents in District Swat Pakistan” have been presented. Secondly, the descriptive and inferential statistics of the secondary objective of the study, i.e., “To assess the association of physical activity with factors like age, grade, gender, and school type (private vs. government)” have been presented in the chapter. Alongside, tables and figures have been used to present the results of the study logically. The chapter concludes with a summary at the end.

### **The Socio-Demographic Characteristics of School Age Adolescents**

A total of 287 adolescents participated in this study from eight schools selected from the rural and urban areas of districts Swat, as illustrated in Table 1. Out of those, 142 (49.5 %) were from rural areas and 145 (50.5%) were from urban areas. In addition, 197 (68.6%) were male and 90 (31.4%) were female. Moreover, the study participants' ages ranged from 10 to 14 years, with

a mean age of  $12.99 \pm 0.96$  years. Furthermore, 143 (49.8%) were from private schools and 144 (50.2%) were from government schools. Furthermore, 95 (33.1%) were from grade 6<sup>th</sup>, 95 (33.1%) were from grade 7<sup>th</sup> and 97 (33.8%) were from grade 8<sup>th</sup>.

*Table 1 The Socio-demographic characteristics of study participants*

<b>Variable Name</b>	<b>Frequency</b>	<b>Percentage</b>
	<b>n<sup>a</sup> = 287</b>	<b>%</b>
<b>Age of participant in years</b>		
(12.99±0.96)*		
<b>Location of living</b>		
Rural	142	49.5
Urban	145	50.5
<b>School Type</b>		
Private	143	49.8
Government	144	50.2
<b>Grade of Study</b>		

6 <sup>th</sup> Grade	95	33.1
7 <sup>th</sup> grade	95	33.1
8 <sup>th</sup> grade)	97	33.8

**Gender**

Male	197	68.6
Female	90	31.4

\* The mean and standard deviation

<sup>a</sup> Sample Size

**The PAQ-C Scores for Rural and Urban School-Age Adolescents’ Males and Females**

The mean PA score of all the activities mentioned in the PAQ-C questionnaire depicts a difference among rural and urban school-age adolescent male and female students. Please refer to Table 2 which presents the results of rural and urban male and female adolescents for all the activities mentioned in the PAQ-C questionnaire. To elaborate further, the spare time activity includes playing different games in the spare time. The total mean score for spare time activities was 5, where a score of 1 represents low physical activity, and a score of 5 indicates high physical activity. Furthermore, the mean spare time physical activity for rural males was 3.24, and for rural females, it was 2.82.

On the other hand, the mean spare time PA for urban males was 1.71, and for urban females, it was 1.35. In addition, the mean PA during physical education classes for rural male adolescents was 3.92, and for rural female adolescents, it was 4.02. The mean PA during physical education classes for urban male adolescents was 2.63, and for females, it was 1.77.

Moreover, the mean PA at recess time for rural male adolescent students was 3.78, and for female adolescents, it was 3.59. On the other hand, the mean PA at recess time for urban male adolescents was 2.39, and for urban female adolescents, it was 1.68. Furthermore, the mean PA at lunchtime was 2.47 and 2.00 for rural male and female adolescents respectively. Similarly, for urban male and female adolescents, the mean PA score at lunchtime was 1.78 and 1.45 respectively. The mean PA score of adolescents after school was 4.58 and 3.61 for rural males and females respectively, and 2.77 and 1.94 for urban males and urban females respectively. Similarly, the mean PA score in the evening time for rural males was 3.35 and for rural females, it was 4.10.

The mean PA score in the evening for urban males and females was 2.43 and 1.81 respectively. The mean PA last weekend was 4.10, 4.05, 2.69, and 1.94 for rural males and females, and for urban males and females respectively. The mean PA for all seven days of last week for rural male adolescents was 3.89, and for rural female adolescents, it was 3.69. On the other hand, the mean PA for all seven days of the last week for urban male adolescents was 2.69, and for urban female adolescents, it was 1.94. The mean PA for each day of last week for rural male adolescents was 3.79, and for rural female adolescents, it was 3.29. On the other hand, the mean PA for each day of last week for urban male adolescents was 2.11, and for female adolescents, it was 1.53.

*Table 2 The Mean PA Scores of The PAQ-C Overall Activities for Rural and Urban School-Age Adolescents' Males and Females*

<b>PAQ-C Questions</b>	<b>Mean PA <sup>a</sup>, Rural Male n<sup>b</sup>=83</b>	<b>Mean PA, Rural Female n= 59</b>	<b>Mean PA, Urban Male n= 144</b>	<b>Mean PA, Urban Female n= 31</b>
1: Physical activity in your spare time	3.24	2.82	1.71	1.35
2: PA during your physical education (PE) classes	3.92	4.02	2.63	1.77
3: PA at the time of recess	3.78	3.59	2.39	1.68
4: PA at lunch besides eating lunch	2.47	2.00	1.78	1.45
5: PA after school	4.58	3.61	2.77	1.94
6: PA in the evening	4.35	4.10	2.43	1.81
7: PA at last weekend	4.10	4.05	2.69	1.94
8: PA for overall seven days of last week	3.89	3.69	2.78	1.65
9: PA for each day last week.	3.79	3.29	2.11	1.53

<sup>a</sup> Mean PA score: 1= low physical activity, 5= high physical activity

n<sup>b</sup> Sample Size

## The Mean PA Score for Each Day of the Last Week for Rural and Urban Males and Females Adolescents

The PA score for each day of the last week was assessed in Question 9 of the questionnaire. The results show that the mean PA score for rural and urban male and female adolescents was different, please refer to Table 3. The mean PA on Monday for rural male adolescents was 3.52, and for rural female adolescents, it was 3.03. In contrast, the mean PA on Monday for urban male adolescents was 1.78, and for female adolescents, it was 1.39.

In addition, the mean PA for rural male and female adolescents on Tuesday was 3.52 and 3.12 respectively. However, the mean PA for urban male and female adolescents on Tuesday were 1.96 and 1.48 respectively. Furthermore, the mean PA on Wednesday for rural male adolescents was 3.72, and for rural female adolescents, it was 3.08. Conversely, for urban male and female adolescents, it was 2.03 and 1.39 respectively. The mean PA on Thursday for rural male and female adolescents was 3.73 and 3.10 respectively. Contrarily, it was 2.10 and 1.42 for urban male and female adolescents. The mean PA for rural male and female adolescents on Friday was 3.72 and 3.12 respectively. But, for urban male and female adolescents, it was 2.02 and 1.32. The mean PA on Saturday for rural male and female adolescents was 3.73 and 3.31 respectively. On the other hand, the mean PA for urban male and female adolescents on Saturday was 2.13 and 1.48 respectively. The mean PA on Sunday for rural male and female adolescents was 4.57 and 4.31 respectively. On the other hand, it was 2.77 and 2.23 for urban male and female adolescents.

*Table 3 Differences between Mean PA scores across the last Week between Urban and Rural Males and Female Adolescents*

<b>Location of living of participant</b>	<b>Gender of participant</b>	<b>Mean<sup>a</sup></b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>	<b>Saturday</b>	<b>Sunday</b>
Rural	Female	Mean <sup>a</sup>	3.03	3.12	3.08	3.10	3.12	3.31	4.31

	Male	Mean	3.52	3.52	3.72	3.73	3.72	3.73	4.57
	Total	Mean	3.32	3.35	3.46	3.47	3.47	3.56	4.46
Urban	Female	Mean	1.39	1.48	1.39	1.42	1.32	1.48	2.23
	Male	Mean	1.78	1.96	2.03	2.10	2.02	2.13	2.77
	Total	Mean	1.70	1.86	1.89	1.95	1.87	1.99	2.66

<sup>a</sup> Mean PA score: 1= low physical activity, 5= high physical activity

### **Comparison of Spare Time Physical Activities between Rural and Urban School-age Adolescents**

One aspect of PAQ-C was to measure the differences in physical activities performed by students in their spare time. These physical activities included different games. Some other games were included in place of those games which were not played in the local context. It was observed that there were differences in the frequency of performing those physical activities among the rural and urban male and female adolescent students. Table 4 represents the mean PA for each of the most performed physical activities undertaken by rural and urban male and female adolescents in their spare time. For instance, one of the games which was popular and mostly played in the local context was cricket. There were differences among male and female adolescents in the frequency of this game in rural and urban areas. The mean PA score for cricket for rural males was 4.40, and for rural females it, was 3.53.

In contrast, the mean PA score for cricket in urban male and female adolescents was 3.12 and 2.16 respectively. In addition, the other PA which was mostly performed by students was jogging or walking for exercise. So, its mean score for rural male adolescents was 4.34, and for females, it was 4.00. On the other hand, the mean score for urban male adolescents was 2.54, and

for urban female adolescents was 1.48. Moreover, another PA that was mostly performed was Aerobic exercise like hiking. Thus, its mean score for rural males was 4.13, and for rural females was 4.17. Conversely, its mean score for urban males was 1.90, and for urban females, was 1.39. Moreover, another game was bicycling, its mean score for rural male adolescents was 3.17, and for females, it was 1.95. In contrast, its mean score for urban male adolescents was 1.90, and for females, it was 1.39. Furthermore, another activity was swimming. So, its mean score for rural males and females was 3.76 and 2.54 respectively. The mean score for urban males and females was 1.55 and 1.32 respectively. Similarly, another game was football OR *Cheendro* (a local game). Thus, the mean score for it in rural male adolescents was 3.42, and for female adolescents, it was 4.22. The mean score for it in urban male and female adolescents was 1.58 and 1.35 respectively. Yet, another game was badminton, its mean score for rural male and female adolescents was 2.90 and 2.36 respectively. Its mean score for urban males and females was 1.46 and 1.26 respectively.

Likewise, another most-played game was soccer, its mean score for rural male and female adolescents was 2.90 and 2.59 respectively. Its mean score for urban male and female adolescents was 1.73 and 1.55 respectively. Another game was Skipping, its mean score for rural male and female adolescents was 4.54 and 4.05 respectively. Its mean score for urban male and female adolescents was 1.31 and 1.55 respectively.

*Table 4 Differences in Frequency of Spare Time Activities between Rural and Urban School-age Adolescents*

<b>Activities</b>	<b>Rural Males Mean <sup>a</sup></b>	<b>Rural Females Mean</b>	<b>Urban Males Mean</b>	<b>Urban Females Mean</b>
Cricket	4.40	3.53	3.12	2.16
Jogging or running	4.34	4.00	2.54	1.48



Walking for exercise	4.45	3.98	2.46	1.29
Aerobics like hiking etc.	4.13	4.17	1.90	1.39
Bicycling	3.17	1.95	1.90	1.39
Swimming	3.76	2.54	1.55	1.32
Football OR Pashto game(Cheendro)	3.42	4.22	1.58	1.35
Badminton	2.90	2.36	1.46	1.26
Soccer	2.90	2.59	1.73	1.55
Skipping	4.54	4.05	1.31	1.55

<sup>a</sup> Mean PA score: 1= low physical activity, 5= high physical activity

### **The Mean Physical Activity Score based on the Place of Residence (Rural vs. Urban)**

The main objective of the study was:

To compare the levels of physical activity among rural and urban school-age adolescents in District Swat Pakistan.

The mean PA scores for both rural and urban school-age adolescents are represented in Table 5. The mean PA score for rural adolescents was  $3.65 \pm 0.38$ , whereas the mean PA score for urban adolescents was  $2.22 \pm 0.47$ . So, there was a difference in the mean PA score and a standard deviation between rural and urban school-age adolescents.

*Table 5 Mean PA score for rural and urban school-age adolescents and its standard deviations.*

<b>Location of living of participant</b>	<b>N</b>	<b>Mean PA</b>	
		<b>Score</b>	<b>Std. Deviation</b>
Rural	142	3.6552	.38411
Urban	145	2.2200	.47502

***Inferential Statistics of Rural and Urban School-age Adolescents' PA Score***

**H<sub>1</sub>.** There is a significant difference in the mean PA levels between rural and urban school-age adolescents.

A t-test for two independent samples was applied to test the hypothesis that there was a significant difference in the mean PA levels between rural and urban school-age adolescents. As illustrated in Table 6, the independent T-test results showed that the rural school-age adolescents had a mean PA score of 3.65, with a standard deviation of SD= 0.38 that reported a significant difference in the mean level of physical activity ( $t= 28.11$ ,  $P \text{ value} < 0.001$ ) as compared to the urban adolescents, with a mean of 2.22 and standard deviation of 0.47. Hence, H<sub>1</sub> was supported and it was concluded that there was a significant difference in the mean PA level between rural and urban school-age adolescents ( $p\text{-value} < 0.05$ ).

*Table 6 Independent T-test for Comparing mean PA levels of School-age Adolescents based on their place of residence, school type, and gender.*

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Mean difference</b>	<b>df</b>	<b>t-value</b>	<b>p-value</b>
<b>Place of Residence</b>			1.43	285	28.110	<.0001*
Rural	3.65	.38				
Urban	2.22	.47				
<b>School Type</b>			0.36	285	3.73	<.0001*
Private	2.74	0.91				
Government	3.11	0.71				
<b>Gender</b>			-.11	285	1.09	.274
Male	2.96	.80				
Female	2.84	.90				

\*significant results, p-value< 0.05

### **PA Level of School-age Adolescents Based on the Factors of School Type, Gender, Grade, and Age**

The secondary objective of the study was:

To assess the association of physical activity with factors like age, grade, gender, and school type (private vs. government).

### ***Mean PA Levels Difference based on the School Type of Adolescents***

**Ho.** There is no significant difference between private and government school-age adolescents' PA levels.

An independent samples t-test was conducted to assess the mean PA difference between the PA levels of private and government school-age adolescents. Table 6 illustrates that the t-value (3.73) is significant at a P value of ( $<0.001$ ), which is less than alpha (0.05). So, the null hypothesis could be rejected at a 95% level of significance and it could be concluded that there was a significant difference in the mean PA levels of private and government school-age adolescents.

### ***Differences in the Mean PA of Adolescents in Rural Private and Public Schools and Urban Private and Public Schools***

The mean PA levels of adolescents in rural private and government schools were compared to identify any difference among them. It was identified that the mean PA score of rural private school-age adolescents was not much different from that of rural government school-age adolescents. The mean PA for rural private school-age adolescents was 3.61, and for rural government school-age adolescents was 3.69, so there was a slight difference between the means of these two groups i.e., Means Difference (MD)= 0.08. In addition, the mean PA for urban private school-age adolescents was compared with the urban government school-age adolescents. The mean PA for government school-age adolescents in urban areas was 2.52, and for private school-age adolescents in urban areas, it was 1.91. So, there was a difference in the mean PA of these groups in urban areas i.e., MD= 0.3 which was high as compared to the rural area mean PA of the same groups. The results are illustrated in Table 7.

*Table 7 Differences in Mean Physical Activity of Adolescents in Rural Private and Public Schools and Urban Private and Public Schools*

<b>Location of living of participant</b>	<b>School type of participant</b>	<b>N</b>	<b>Mean <sup>a</sup></b>	<b>Minimum</b>	<b>Maximum</b>
Rural	Private	70	3.6154	2.76	4.18
	Government	72	3.6939	2.98	4.44
	Total	142	3.6552	2.76	4.44
Urban	Private	73	1.9176	1.31	2.64
	Government	72	2.5267	1.67	3.60
	Total	145	2.2200	1.31	3.60

<sup>a</sup> Mean PA score: 1= low physical activity, 5= high physical activity

***A Comparison of PA Levels of School-age Adolescents based on their Gender i.e., Male and Female***

**H0.** There is no significant difference in the mean PA levels among male and female school-age adolescents.

An independent T-test was applied to test the null hypothesis that there is no significant difference in the mean PA levels among male and female school-age adolescents. Moreover, the independent T-test showed that the male school-age adolescents had a mean PA score of 2.96, with a standard deviation of SD= 0.80 that reported no significant difference in the mean level of physical activity (t= 1.09, p value=0.274) when compared to the female school-age adolescents, with a mean of 2.84 and standard deviation of 0.90 as illustrated in table 6. Hence, H0 was supported and it could be concluded that there was no significant difference in the level of PA between male and female school-age adolescents (p-value >0.05). Although there was a slight

difference in the means of PA levels between these groups i.e. -0.11, it was not significant (P value= 0.274).

***The Difference in the Mean PA Score in Urban and Rural Males and Females***

There was also a difference in the mean PA score among male and female students in rural areas. The mean PA for male students was 3.79, and for female students, it was 3.46, so there was a mean difference of 0.33. In addition, there was a difference in the mean PA score between male and female students in the urban areas. Furthermore, the mean PA score for male students in urban areas was 2.36, and for urban female students, it was 1.67, so there was a mean difference of 0.69. Therefore, it was concluded that the mean PA difference between urban male and female was higher than the mean PA difference between rural male and female students (i.e., MD for urban = 0.69, MD for rural = 0.33), as illustrated in Table 8.

Moreover, there was a significant difference between the mean PA of rural female adolescent students, as compared to the urban female adolescent students. The mean PA score for rural female adolescent students was 3.46, and for urban female adolescent students, it was 1.67. There was a difference of 1.79 between the means of PA for rural and urban female adolescent students. Furthermore, there was also a difference in the means of PA for rural and urban male adolescent students. The mean PA score for rural male adolescent students was 3.79 and for urban male adolescent students was 2.36. So, there was a difference of 1.43.

*Table 8 The Difference in the Mean PA Score in the Urban and Rural Males and Females*

<b>Location of living of participant</b>	<b>Gender of participant</b>	<b>n</b>	<b>Mean PA Score</b>
Rural	Female	59	3.4650

	Male	83	3.7904
Urban	Female	31	1.6791
	Male	114	2.3671

***Comparing the Mean PA Levels of School-age Adolescents based on their Grades of Study (grades 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup>)***

The mean PA score for 6th-grade school-age adolescents in rural areas was 3.83, for 7<sup>th</sup> grade, it was 3.62, and for 8th-grade students, it was 3.50. Moreover, there was a slight decrease in the mean PA score with the advancement of a grade of study of adolescents. Furthermore, the students in 6<sup>th</sup> grade had more PA scores (M= 3.83) than 7<sup>th</sup> and 8<sup>th</sup> grades, and 7th-grade students had more PA scores (M=3.51) than 8th-grade students. In addition, the mean PA scores for 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grade students in urban areas were 2.32, 2.20, and 2.13 respectively. There was also a decrease in mean PA level, with the advancement of a grade of study of adolescents in the urban areas. The results are illustrated in Table 9.

*Table 9 Descriptive data of Mean PA difference in different grades of students in rural and urban adolescents.*

Location of living of participant	Grade of Study	n	Mean	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Rural	6th grade	47	3.8302	3.7271	3.9332	2.98	4.44
	7th grade	48	3.6276	3.5158	3.7394	2.82	4.18
	8th grade	47	3.5084	3.4052	3.6116	2.76	4.07
	Total	142	3.6552	3.5915	3.7189	2.76	4.44

Urban	6th grade	48	2.3256	2.1863	2.4650	1.38	3.47
	7th grade	48	2.2007	2.0727	2.3288	1.31	3.28
	8th grade	49	2.1355	1.9942	2.2769	1.49	3.60
	Total	145	2.2200	2.1421	2.2980	1.31	3.60

***Inferential Statistics for Comparing the Means of PA Level of Different Grades of Students***

**H1.** There are significant differences in mean PA scores among different grades of school-age adolescents.

To test the hypothesis, the school-age adolescents were divided into different groups based on their grades of study i.e. grade 6<sup>th</sup>, grade 7<sup>th</sup>, and grade 8<sup>th</sup>. One-way ANOVA was applied, and Table 10 presents the results of one-way ANOVA. The one-way ANOVA results showed that there were no significant differences in the mean PA scores among different grades of study groups, (F=2.38, DF= 2,284, P value= 0.094).

*Table 10 Mean Physical Activity Questionnaire Score based on the Grade of Study*

***ANOVA Table***

	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>(p-value)</b>
Between Groups	3.322	2	1.661	2.386	.094
Within Groups	197.740	284	.696		
Total	201.062	286			



### ***Correlation of Adolescents' PA Level with the Age (10 to 14 years)***

**H0.** There is no correlation between the age of school-age adolescents and PA activity scores.

To test this hypothesis, the Pearson correlation was run in SPSS, because both the variables were quantitative ratio continuous in nature. Table 11 shows the results of the Pearson correlation. It is clear from the table that there is a very low negative correlation because the correlation coefficient (r) value was ( $r = -0.1$ ) between the age and PA score of school-age adolescents. This correlation is insignificant because the P-value is greater than the level of significance of 0.05 ( $p\text{-value} = 0.09 > 0.05$ ). Hence, the null hypothesis cannot be rejected at a 0.05 level of significance.

*Table 11 Correlation of Adolescents' PA Level with the Age (10 to 14 years)*

<b>Age of participant in years</b>	<b>Sample size</b>	<b>Mean PA level of adolescents</b>	
	<b>n=287</b>	Correlation Coefficient (r)	p-value
		-.100	.092

### **A Summary of the Chapter**

A total of 287 school-age adolescent students participated in the current study. Among them, 142 (49.5%) were from a rural area, and 145 (50.5%) were from an urban area of district Swat. It was estimated that there was a significant difference in the mean level of PA of adolescents in rural and urban areas. Moreover, the rural area adolescents were more physically active as compared to the urban area. Furthermore, the mean PA score for rural-area adolescents

was 3.65 and the mean PA score for urban-area adolescents was 2.22. In addition, there was also a significant difference in the mean level of PA among private and government school adolescents. Also, government school-age adolescents were more physically active than private school-age adolescents in both rural and urban areas. Moreover, the differences in the mean PA level among male and female adolescent students have also provided in this chapter. It was observed that there was a very weak negative correlation between PA level and age of the adolescents, and it was not significant at 0.05 level of significance. (p-value (.274) > the alpha (0.05)).

## **Chapter Five: Discussion**

This chapter discusses the findings of the current study. Initially, the study's key findings are presented in the context of existing literature, followed by the study's strengths, and limitations. Lastly, some recommendations are provided in the context of policy, practice, and future research.

### **The Mean Physical Activity Score based on the Place of Residence (Rural vs. Urban)**

This study attempted to find out the difference in the mean Physical Activity (PA) levels of school-age adolescents in rural and urban areas of district Swat KPK, Pakistan. The findings of the current study revealed that there was a significant difference in the mean PA levels among rural and urban school-age adolescent students. The mean PA level of rural adolescents was higher than that of their urban counterparts. This difference was statistically significant, as confirmed by the t-test for two independent samples.

Moreover, these findings are consistent with previous studies as a study conducted by Regis et al. (2016) in the State of Pernambuco, Brazil, to evaluate the levels of PA and sedentary behaviours of adolescents living in rural and urban areas. The results of their research indicated that rural adolescents exhibited higher levels of physical activity compared to their urban counterparts. They further reported that rural adolescents also displayed healthier habits, including reduced exposure to electronic media and decreased sedentary behaviour, contributing to increased PA participation. Additionally, their increased PA was attributed to their involvement in labour, agriculture, and household activities.

In addition, Wattlez et al. (2021) also reported that about 66% of adolescents, with ages ranging from 11 to 16 years, including boys and girls reported doing more than 60 minutes of physical activity per day. Furthermore, their findings revealed that adolescents living in rural

regions were the most physically active and spent the minimum amount of sedentary time outside of school. Moreover, this type of active physical activity was not prevalent in urban adolescents. They further reported that both male and female adolescents were more physically active in rural areas than in urban areas (97 min/day in boys,  $p = 0.018$ ; 133 vs. 115 vs. 93 min/day in girls,  $p = 0.018$ ).

Similarly, a cross-sectional study was conducted in Western Maharashtra, India, to compare the levels of PA among adolescents living in rural and urban areas. Their study results also showed that the proportion of rural adolescents who did not meet the adequate PA requirements was 16.8%, which was much lower than the urban proportion of 33.2%. Furthermore, they reported that rural adolescents were more interested in physical activities such as going from one location to another, cycling, and assisting with agricultural activities and household work when compared to urban adolescents (Malik & Chatterjee, 2022).

In addition, another study in India by Karkera et al. (2014) also revealed a significant difference in the level of PA and physical fitness between rural and urban adolescents. They reported that rural adolescents were more flexible and had better cardiovascular stamina than urban adolescents because rural adolescents were more engaged in physical activities than urban adolescents.

On the other hand, the disparities in PA levels among adolescents residing in the urban and rural areas of the United States remain inadequately illuminated. A recent narrative review showed mixed results, which stated that 9 out of 16 studies showed that PA levels increased as urbanisation decreased. They also found that urban adolescents were less active than rural adolescents. Only two studies found that “moderate to vigorous physical activities” (MVPA)

were greater among urban middle school students in the southeastern United States than among rural middle school students (Euler et al., 2019).

However, this study finding is contrary to a study conducted in Rawalpindi, Pakistan, which showed that there was no significant difference in PA levels between rural and urban high school-age children. However, they found that height and weight were better in rural students, but the “Body mass index” (BMI) rate was higher in urban students (Chaudhary et al., 2022). A possible explanation for this difference in the findings of both studies was the changes in the setting of the study.

The rural areas of the district of Swat are more natural, which means these are hilly areas, and the main profession of people is farming, so the rural adolescents participate in agricultural activities and spend more time walking instead of using motorised transport. In addition, the study participants' age in this study is different from the study of Chaudhary et al. They selected high school children; however, in the current study middle school adolescents were selected. Furthermore, there was also a difference in the sample size and data collection tools, the sample size in their study was lower (n=200) than in this study (n=312), and there was also a difference in the data collection tools in both the studies. Moreover, they used the Physical Activity Questionnaire for Adolescents (PAQ-A) and Youth Physical Activity Questionnaire (Y-PAQ), whereas the current study used Physical Activity Questionnaire for older Children (PAQ-C). Furthermore, the researcher concluded that the PA levels in rural adolescent students were higher than in urban adolescents because the rural students were living in a more natural environment than the urban students. In addition, they were walking to schools instead of going by bus, and they were also involved more in farming activities with their families than urban adolescents.

### **Physical Activity and School Type (Private vs. Government)**

The study findings depicted a difference in PA levels of adolescents in the rural and urban areas of district Swat based on their school type (private vs government). Moreover, the study results revealed that there was a significant difference in the PA levels of students attending private schools versus government schools. Further, the t-test statistics for two independent samples also showed that there was a significant difference in the two groups (private vs government school adolescents) PA levels.

Similar findings were also reported from other studies conducted in Pakistan. For instance, a study conducted by Ismat Jabeen et al. (2018) in Karachi, Pakistan, showed that the PA was higher in students who attended public (government) schools and whose parents encouraged their children for sports. On the other hand, low PA was noted in students who were in private schools, and whose parents did not encourage sports in their children.

Likewise, another study conducted in India showed that there was a higher level of PA in government school adolescents than in private school adolescents. In addition, they found that more than 70% of students in government schools were underweight compared to 35% in private schools (Mahaur & Badiger, 2018). Similarly, the findings from a study conducted in Saudi Arabia showed that students from public schools were more active than their counterparts from private schools. The researchers rationalised that private schools' adolescents often have higher socioeconomic status, thus having easier access to computers and technology, which, in turn, leads to sedentary behaviour. This sedentary behaviour in turn leads to reduced physical activity participation (Al-Hazzaa et al., 2014).

The possible explanation for low physical activity levels in private schools in Pakistan would be the unavailability of physical education classes and teachers, the unavailability of

playgrounds in private schools for PA, and the easy access of private schools' students to technology. Most of the private schools in urban areas are built in congested environments, with the unavailability of PA facilities like playgrounds. These factors are also highlighted in the literature from developing countries. For instance, a study from Pakistan showed that the lack of playgrounds, lack of parental support for sports, and being female gender were associated with low PA in private schools (Ismat Jabeen et al., 2018). Another study highlighted that organisational factors such as the availability of playground in school is positively associated with increased levels of PA among school adolescents (Kiyani et al., 2021).

Similarly, Qutub and Anjum (2015) reported that in urban areas of Pakistan, there are no open spaces in private schools for adolescents to engage in PA. They also reported that there is also restriction on adolescent girls to access open spaces or playgrounds for participating in PA. In addition, Mushtaq and Tayyab Alam (2014) also highlighted that most private schools are located in heavily populated regions, thus, providing their students easy access to open spaces is problematic for the schools. First and foremost, obtaining an acceptable school building with a favourable environment, such as, open spaces with cross ventilation and locations suitable for physical activities is a tedious and demanding task. Furthermore, rental agreements between building owners and school proprietors are often for very short periods. In addition, most of the private school's children are from high socioeconomic status, so they have easy access to technology like video games, TV, mobile, etc. (Al-Hazzaa et al., 2014).

### **The Physical Activity and Gender**

This study also aimed to find out the difference in the PA levels of adolescents based on their gender. The findings revealed that the number of male school-age adolescents and female adolescents was not equal in the study because in some public schools, there was no coeducation

system. Moreover, in accordance with the present results, previous studies have demonstrated that the enrollment of female students from middle level to higher education is lower than male students in all provinces of Pakistan (Rizwan, 2022).

The study's findings revealed that the mean PA score for male adolescents was slightly higher than that for female adolescents. Thus, there was a low difference in the mean PA level between male and female adolescents, which was not significant at the 0.05 level of significance. Additionally, differences in mean PA levels were also noted among rural male and female adolescents. Furthermore, differences in mean PA levels were observed in urban male and female adolescents as well.

On the other hand, there were also differences in the mean PA levels among rural male adolescents and urban male adolescents. Similarly, there was a difference in the mean PA levels between rural female and urban female adolescents. Hence, these findings are consistent with other studies, as the study findings of Ishii et al. (2015) showed that male and younger students were engaged in PA more often than female and higher-grade students.

Similarly, another study's findings revealed that male adolescent students (44%) were found more physically active than female adolescent students (20%) (Al-Hazzaa et al., 2014). Moreover, a study conducted in Karachi, Pakistan, also revealed that the level of PA was higher in boys than girls (Gulzar, 2021). Likewise, another study from Pakistan supported that male adolescents attending public schools and receiving parental encouragement for sports exhibited higher levels of physical activity ( $p < 0.05$ ) than female adolescent students. They reported that socio-environmental factors, such as parental preferences for boys to participate in physical activity rather than girls, overprotection of girls, modesty-related cultural barriers, and a lack of



safe outdoor playgrounds for girls, may be the reasons behind the gender disparities in PA (Ismat Jabeen et al., 2018).

Moreover, the study found that there were differences in PA levels among rural male adolescents and urban males and among rural female adolescents and urban female adolescents. This finding was also reported by Wattlez et al. (2021) who stated that there were differences in PA levels in rural male adolescents and urban male adolescents (74.79% in rural and 45.83% in urban). They also reported a difference in PA levels in rural female and urban female adolescents (75.78% in rural and 46.67%).

Moreover, the possible explanation for the low PA levels in adolescent girls is the societal and cultural restrictions on them regarding participating in physical activities in open spaces. As a cultural influence, many parents do not allow their adolescent daughters to participate in PA in open spaces to protect their modesty, which is a form of gender discrimination. Similarly, it has also been reported in many other studies from Pakistan that there is cultural pressure on adolescent girls forbidding them from moving freely in open spaces which results in low participation in PA and is a form of gender discrimination (Almas et al., 2020; Qutub & Anjum, 2015).

### **The Physical Activity and Study Grade**

This research also attempted to find out the difference in PA levels among adolescents based on their grades of study (grade 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup>). The study findings revealed that there was a slight reduction in PA level with the advancement of the grade of study. For example, the students in grade 6<sup>th</sup> were more physically active than grade 7<sup>th</sup> students, and grade 7<sup>th</sup> students were more physically active than grade 8<sup>th</sup> students. Although, there was a slight difference in

the mean PA levels among different grades students, the ANOVA results showed that it was insignificant at 0.05 level of significance.

Moreover, in accordance with the present results, previous studies have also demonstrated that the PA levels decrease with the advancement of grades of study of students. For instance, the findings of a study by Pate et al. (2022) demonstrated that the PA levels decreased in students aged 10 to 14 years, as they progressed from elementary class to high school. In addition, their findings also revealed that the decline in PA with advancement of grade was higher in girls than boys.

Likewise, another study's findings from China showed that PA gradually decreases in students, as they progress to a high level of education because physical education is not given as much importance in colleges and universities as it is given at the middle school level (Liu et al., 2017). Similarly, a systematic review and meta-analysis findings indicated that MVPA levels drop in students as they progress from lower class to higher class. The findings exhibited that the proportion of time spent in MVPA by middle school students was higher (48.6%) than the proportion of time spent in MVPA by high school students (35.9%) (Hollis et al., 2017).

A possible explanation for this drop in PA level with the advancement of level of study would be the heavier academic workload in higher classes as compared to the lower classes. In addition, in colleges and universities, Physical Education (PE) is not given as much importance as it is given at the primary and elementary levels. For example, the study findings of Oluyinka and Endozo (2019) showed that lack of time due to a busy lesson schedule and prioritising academic success over exercise are significant factors hindering physical activity participation among higher grades students. Moreover, the study findings of Liu et al. (2017) also revealed that PA levels decrease in students as they progress to higher classes because physical education

is not given as much importance in colleges and universities as it is given at the middle school level.

### **Association of Physical Activity with Age of Adolescents**

This study also aimed to explore the association of PA with the age of school-age adolescents. The study findings revealed that there was a negative correlation of PA with the age of adolescents. It was also found that the PA level decreased with the increase in age of adolescents. Although there was a negative correlation between age with PA, the value of the correlation coefficient ( $r$  value =  $-0.1$ ) showed that it was a very low negative correlation. So, the correlation was insignificant because the  $p$ -value ( $0.09$ ) was greater than the level of significance ( $0.05$ ). Thus, these results are in line with those of previous studies, as one of the significant findings of the study of A. Marques et al. (2020) was that the participation of adolescents in sufficient PA decreased with age in both boys and girls. Moreover, their study unveiled a decline in daily physical activity participation, with the percentage dropping from 28.2% for boys aged 11-12 years to 21.2% for boys aged 16-17 years. Similarly, among girls, the proportion decreased from 19.4% at the age of 11-12 years to 11.1% at the age of 16-17 years.

Similar findings were also reported by Cooper et al. (2015) who revealed that total physical activity and the percentage of time spent in MVPA declined progressively in each age group after the age of 5 years. There was an overall 4.2% decrease in PA level each year as compared to age five (3.7% for boys and 4.6% for girls). Light physical activity decreased as sedentary time increased, paralleling the decline in overall physical activity and the percentage of time spent in MVPA between age groups. Similarly, another study revealed that there was a steep age-related decline in overall physical activity in children aged 10 to 17 years, with a slower rate after that age. PA declines at 1.76 minutes per hour per year (Pate et al., 2022).

Likewise, the findings of the Baldursdottir et al. (2017) study found that as age increased, PA declined, with more than half of adolescents in upper-secondary schools failing to meet the necessary daily PA requirements. The proportion of children who nearly never participated in MVPA declined from 26.3% at age 10 to 8.9% at age 14. Although the findings of the study showed that the level of PA decreased as the age of adolescents increased, the Pearson correlation coefficient value ( $r = -0.1$ ) showed that it was insignificant. The possible explanation for it would be that the age range in the study was not high because only students of middle classes, grades 6th to 8th were included, and the age range of those students was from 10 to 14 years. So, if more aged students were included like the students beyond the age of 14 years, then maybe the r-value could be significant.

Moreover, the study findings of Baldursdottir et al. (2017) also showed that the level of PA decreased with the advancement of age and with the transition of students from elementary to high school. Their findings further suggested that PA increased from the age of 10 to around the age of 14, then reduced, with only 43% of 16 to 19-year-old adolescents participating in MVPA four times per week. In addition, another potential explanation for this insignificant correlation would be that there were young students in high grade (grade 8<sup>th</sup>) and older students in lower grade (grade 6<sup>th</sup>). As discussed earlier, the level of PA decreased with the advancement of the grade of study, so there were young students in higher classes less physically active than the older students in lower classes. This finding was also reported by Gulzar (2021) that as students progress through the grades, the study pressure builds, and they are subsequently unable to allocate time to leisure and physical activities.

## **The Comparison of Physical Activity of Adolescents at Weekend Vs Other Weekdays**

The study results also presented that the PA score for adolescents on the weekend was high as compared to other weekdays. In the local context of Pakistan Sunday is regarded as a weekend because most of the schools are closed on this day. Thus, comparing the PA score of adolescents on Sunday with other weekdays revealed that it was high for Sunday. The mean PA scores for both rural and urban male and female adolescents on Sunday were high compared to other weekdays.

These findings are in line with the findings of a study from Malaysia, they reported that adolescents were more physically active on weekends than other weekdays because school adolescents in Asian countries are normally busy on weekdays attending school, tuition, and other school related activities (Cheah et al., 2015).

On the other hand, this study's findings are contrary to the findings of studies from high income countries. For example, the findings of a study on ‘Differences in physical activity between Weekdays and Weekend Days among U.S. children and adults’. showed that children were more physically active on weekdays as compared to weekend days. They supported that on weekdays more physical activity opportunities like travelling to school or attending physical education classes are available as compared to weekend days (To et al., 2022).

In addition, another study's finding also showed that boys and girls participate more in MVPA on weekdays as compared to weekend days (Brazendale et al., 2021). In addition, Kallio et al. (2020) also reported similar findings that moderate to vigorous physical activity (MVPA) declines and sedentary time increases on weekends in the school children of Finland.

Similarly, a study finding from Pakistan showed that there was a significant decrease in PA among both genders of adolescents during the weekend. They reported that weekends are typically viewed as relaxation time, and adolescents may participate in less physical activity. Additionally, due to safety concerns, parents often restrict their children from participating in outdoor activities such as playing cricket, football, and cycling. Another notable factor contributing to reduced physical activity is the growing prevalence of sedentary lifestyles among adolescents, primarily due to advances in entertainment and technology (Naseer, 2020).

The possible explanation for the higher level of PA observed on weekends compared to weekdays in the current study may be attributed to the natural and highly scenic environment of the Swat district. Moreover, Swat is a hilly area and the main profession of people is farming in rural areas. Thus, the adolescents could be involved in farm activities with their family members on weekends. In addition, the adolescents in the study may not be involved in the use of technological equipment like mobile games and watching TV at weekends due to the restriction from the family or the unavailability of these resources. In contrast, the existing literature reports that adolescents' PA level decreases at weekends because the students view the weekend as a relaxation time and spend it in sedentary activities like watching television and playing mobile games, etc.

### **Frequently Played Physical Activities**

There were different physical activities mentioned in the PAQ-C questionnaire, but the findings of the study showed that the most played physical activities by school adolescents in the local context of district Swat were cricket, jogging or running, walking for exercise, aerobics like hiking, etc., bicycling, swimming, football or a Pashto game *cheendro* [a local game],

badminton, soccer, and skipping. Among these physical activities, the high PA scores were for cricket, running, walking, hiking, and skipping as mentioned in the result section.

These findings are in line with the findings of a qualitative study on ‘Physical Activity in South Asians’, they expressed that the physical activities in which South Asians like Pakistanis enjoy participating were walking, swimming, going to the gym, football, cricket, badminton, and swimming (Jepson et al., 2012). In addition, the same findings are reported by Gulzar (2021) that most of the adolescent boys and girls were engaged in skipping, walking, badminton, aerobics, bicycling, football, and cricket in the city of Karachi, Pakistan.

Similarly, the findings of the systematic review and meta-analysis on ‘Global participation in sport and leisure-time physical activities’ also identified four predominant physical activities among adolescents in different regions: soccer in America and Europe, walking in the Eastern Mediterranean, running in the Western Pacific, and athletics in Africa.

### **The Study’s Strengths**

The following are the strengths of this study:

- Numerous research studies are available in Pakistan on the prevalence of physical activity and obesity, but this was the first study that compared the physical activity levels of school-age adolescents in the district of Swat Khyber Pakhtunkhwa, Pakistan.
- A systematic random sampling technique was employed to select study participants, constituting a fundamental strength of this study. Thus, the random sample is a true representation of a population.

- This study employed an appropriate cross-sectional analytical study design. This choice of cross-sectional design was appropriate because it gave us a clear picture of the current PA levels of adolescents in both the rural and urban areas at a single point in time.
- The study reported differences in PA levels in rural and urban adolescents which can be used as a baseline for conducting qualitative and quantitative research on physical activity in the future in Pakistan. In addition, these findings can serve as a foundation for future research aimed at identifying the factors that contribute to the differences in the PA between these two populations. Furthermore, if the findings are appropriately utilised and policies for enhancing physical activity in the specified area are implemented, it can lead to a significant reduction in non-communicable diseases.
- This study can support policymakers, educational institutions, and stakeholders to develop interventions and programmes regarding the enhancement of physical activity among adolescents.
- A well-structured internationally recognised ‘Physical Activity Questionnaire for Older Children (PAQ-C)’ was utilised for data collection in this study. This questionnaire has been validated and is employed both nationally and internationally as a data collection instrument in numerous studies.

### **The Study Limitations**

Every research study possesses its own limitations, the following are some limitations pertaining to the current study:

- In this study, the female participants’ representation was lower than the male participants’ representation, due the limited enrolment of female students. Although the researcher tried to achieve parity in the inclusion of male and female adolescents in the



study, the selected schools had a limited enrollment of female students. In addition, some female students refused to participate in the study.

- A convenience sampling technique was employed in the selection of schools for this study. Although the researcher initially approached several schools using random methods, a significant portion of school administrations showed reluctance to participate in the study. Consequently, the researcher opted for a convenience sampling approach, including those schools whose administrations willingly granted permission. Thus, the use of random sampling techniques for school selection could have potentially yielded more valuable and comprehensive findings.
- There was also a potential for recall bias, as the questionnaire assessed the level of physical activity (PA) for the previous week. Participants may inaccurately remember or selectively report information, compromising the reliability of the gathered data.

### **The Study Recommendations**

In light of the study's findings, the following recommendations are presented for health policymakers, educational institutions, and future researchers.

- The present study has focused on the assessment of physical activity among school-age adolescents, considering factors such as place of residence, gender, grade, school type, and age. Thus, future research endeavours should be directed toward a more in-depth exploration of the factors responsible for disparities in physical activity levels between rural and urban adolescents.
- The schools should integrate physical activity into their curricula and provide resources such as playgrounds, parks, etc., for students to participate in the physical activities.

- The educational institutions and public health personnel should design campaigns that promote the importance of PA for the health and well-being of adolescents.
- The government should provide improved infrastructure, such as parks, playgrounds and safe routes for walking or cycling, in both rural and urban areas. Thus, accessible infrastructure can encourage physical activity.
- The educational institutions and community healthcare workers need to work collaboratively with policymakers to develop and implement policies that support physical activity among adolescents. This might include allocating resources for physical education, creating safe outdoor spaces, and reducing screen time.
- The role of school health nurse should be introduced in the specified area of study because in the selected schools there was no concept of school health nurse. The involvement of healthcare professionals will help in promoting physical activity as part of preventive healthcare measures. In addition, regular check-ups focusing on health indicators should be encouraged like measuring height, weight, BMI and including assessments of physical activity.
- The government and private schools' administration should develop and implement physical activity interventions and programmes targeted at adolescents in both rural and urban areas. These programmes can include holding a competition of different physical games among different schools' adolescents at the local and national levels.
- The media can also contribute to the promotion of physical activity by disseminating information about the benefits of being physically active and the risks associated with inactivity, such as the development of obesity, cardiac diseases, and diabetes mellitus.

- Opportunities for the professional development of PE teachers should be provided like arranging training and workshops on physical education. These initiatives will ultimately contribute to the enhancement of students' physical activity levels.

### **A Conclusion of the Study**

The present study was the first of its kind which compared the PA levels among school-age adolescents in rural and urban areas of the district Swat KPK, Pakistan. The study's findings revealed that there was a significant difference in the mean PA levels of adolescents in rural and urban areas. Moreover, the rural male as well as female adolescents were found to be more physically active as compared to their urban counterparts. In addition, the study found that there was a significant difference in PA levels of private and government school adolescents. Furthermore, the decreased level of PA in private school adolescents may be due to the unavailability of playgrounds for PA and the easy access to technology. Moreover, the study found a slight difference in the mean PA levels of male and female adolescent students. Furthermore, there were no significant differences in the PA levels of different grades students. A possible reason for this would be the inclusion of young adolescents in the study. Thus, if more age variation of adolescents were included then the difference would be more significant. Additionally, the study identified a very weak negative correlation between age with physical activity, which is in line with the previous research that PA levels decrease with the advancement of age.

Thus, the study successfully accomplished its primary objective by identifying a significant difference between rural and urban adolescent PA levels. Furthermore, more comprehensive research is needed to be conducted in the future for the identification of factors that lead to the difference in PA levels among rural and urban adolescents in Pakistan. In

addition, the policymakers have to design policies that focus on the improvement of PA among adolescents. In addition, the schools also have to arrange awareness sessions on PA and provide PA facilities for students. Finally, the collaborative efforts of health policymakers, school administration and healthcare workers can contribute towards the enhancement of PA levels. This, in turn, may lead to reductions in the burden of non-communicable diseases and to the cultivation of a healthier society.

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Appendices A Ethical Review Committee Approval Letter



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

09-Jan-2023

Dr. SALEEMA GULZAR  
Department of School of Nursing and Midwifery  
Aga Khan University  
Karachi

Dear Dr. SALEEMA GULZAR,

2022-8652-25216, SALEEMA GULZAR: Comparison of physical activity levels among school-age adolescents in rural and urban areas of district Swat, KPK, Pakistan: An analytical cross-sectional study

Thank you for submitting your application for ethical approval regarding the above mentioned study.

Your study was reviewed and discussed in ERC meeting. There were no major ethical issues. The study was given an approval for a period of one year with effect from 09-Jan-2023. For further extension a request must be submitted along with the annual report.

List of document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
GCP-certificatio-eg	01-Apr-2023	1
Fazria Hussain citCompletionCertificate 2023	01-Apr-2023	1
citCompletionReport4895075 Sabana Shah Nov 2024	01-Apr-2023	1
Ismayil Uddin citCompletionCertificate	01-Apr-2023	1
approval of permission for using data collection tool	01-Apr-2023	1
DEO	01-Apr-2023	1
Al-Adhar	01-Apr-2023	1
Comanial school	01-Apr-2023	1
Dawan school	01-Apr-2023	1
GIS not	01-Apr-2023	1
GIS time data	01-Apr-2023	1
GIS Madyan	01-Apr-2023	1
khanbal private school	01-Apr-2023	1
Affidavit of translation	10-May-2023	2
ERC RESPONSE sheet	11-May-2023	1
Questionnaire PAQ-C - English	05-Jan-2023	3
PAQ-C urdu	05-Jan-2023	2
Parental consent form English (1)	05-Jan-2023	3
URDU - Parental consent form	05-Jan-2023	3
ERC Response sheet 2	05-Jan-2023	2
Study Protocol	06-Jan-2023	4
Assent Form English (Adolescent)	06-Jan-2023	3
URDU - Assent form (Adolescents)	06-Jan-2023	3
ERC Response sheet 3	06-Jan-2023	3



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Any changes in the protocol or extension in the period of study should be notified to the Committee for prior approval. All informed consents should be retained for future reference.

Please ensure that all the national and institutional requirements are met.

Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read 'Bushra Moiz', is enclosed in a rectangular box. The signature is written in a cursive style with a long horizontal stroke at the end.

Dr. ~~Bushra Moiz~~  
Chairperson  
Ethics Review Committee

## Appendices B Permission Letter from District Education Officer Swat



A. Hossain  
*[Signature]*

Faculty of Health Sciences  
School of Nursing & Midwifery

January 05, 2023

To,  
Muhammad Riaz,  
District Education Officer,  
District Swat, Pakistan.

### **Subject: Permission for Data Collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of District Swat, KPK Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know that in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which eventually leads to many health problems like the development of diabetes mellitus, heart problems, and musculoskeletal problems.

**Procedure of data collection:** I will collect the data from school-age adolescents using an adopted "Physical activity questionnaire for older children (PAQ-C). I will select 2 to 4 schools in the urban area of Mingora city and 2 to 4 schools in the rural area of Tehsil Bahrain based on my sample size. Your permission is needed for the approval of this study by the Ethical review committee of Aga Khan University Hospital, Karachi. After the approval of this study from the ERC Committee, I will collect data between May and September 2023.

**Risk factor and benefit:** This study is only for academic purpose and no potential harm is anticipated for study participants. The advantage of this study is, it would help the government and other healthcare organizations to develop interventions for improving the physical activity of children if there is high prevalence of physical inactivity.



**Ethical Consideration:** Data collection will start after approval from the Ethical Review Committee of AKUH. The proposed study will take into account all the possible ethical considerations which includes anonymity, confidentiality, informed consent and institution's permission.

If you kindly give me permission to collect the data for my research in some schools in the urban area of Mingora city and the rural area of Tehsil Bahrain. Your permission will be necessary to process the Ethical Review Committee application and approval.

I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

Imran Uddin  
MScN Student, AKU-SONAM

[imran.uddin@scholar.aku.edu](mailto:imran.uddin@scholar.aku.edu)

Dr. Saleema Gulzar  
Associate Professor & Head of  
Public Health Stream  
[saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)




**Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Associate Professor & Head of Public Health Stream  
Aga Khan University School of Nursing,  
Karachi.

I, Muhammad Riaz, District Education officer of Swat, accept to access schools for data collection after seeking informed consent in the above study.

  
Signature  
District Education Officer (M)  
Swat.

17-01-2023  
Date

*Appendices C Permission Letters from Schools*



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Muhammad Ibrahim,  
Principal,  
Al-Azhar Public School & College,  
Madyan, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know, in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on a sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which, eventually leads to many health problems like diabetes mellitus, heart problems, and musculoskeletal problems.

**Procedure of data collection:** I will collect the data from school-age adolescents using an adopted "Physical activity questionnaire for older children (PAQ-C). I will select 2 to 4 schools in the urban area of Mingora city and 2 to 4 schools in the rural area of Tehsil Bahrain based on my sample size. Your permission is needed for the approval of this study by the Ethical review committee of Aga Khan University Hospital Karachi. After the approval of this study, I will collect data from May 2023 to September 2023.

Stadium Road, P. O. Box 3500, Karachi 74800, Pakistan  
Tel: +92 21 3493 0051 Ext. 5400; Direct: +92 21 3414 6880; Fax: +92 21 3493 4294, 3493 2095,  
sonam.pk@aku.edu; www.aku.edu



This study is only for academic purpose and no potential harm anticipated for study participants. The advantage of this study is, it would help the government and other healthcare organizations to propose developing future interventions for improving the physical activity of children if there is high prevalence of physical inactivity.

**Ethical Consideration:** Data collection will start after approval from the Ethical Review Committee of AKUH. The proposed study will take into account all the possible ethical consideration which includes anonymity, confidentiality, informed consent and institution's permission.

Respected Sir, if you kindly give me permission to collect the data from the students of your school. Your permission is needed for the approval of this study by the Ethical review committee of Aga Khan university hospital Karachi. After the approval of this study, I will collect data from May 2023 to September 2023.

I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN  
MScN Student, AKUSONAM

Email: [imran.uddin@scholar.aku.edu](mailto:imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar  
Associate Professor & Head of Public  
Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)

**Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Muhammad Ibrahim, Principal of Al-Azhar Public School and College, Madyan, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.



Signature

01-02-2023

Date



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Muhammad Alam,  
Principal,  
Al-Qalam Education Academy,  
Madyan, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know, in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on a sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which, eventually leads to many health problems like diabetes mellitus, heart problems, and musculoskeletal problems.

**Procedure of data collection:** I will collect the data from school-age adolescents using an adopted "Physical activity questionnaire for older children (PAQ-C). I will select 2 to 4 schools in the urban area of Mingora city and 2 to 4 schools in the rural area of Tehsil Bahrain based on my sample size. Your permission is needed for the approval of this study by the Ethical review committee of Aga Khan University Hospital Karachi. After the approval of this study, I will collect data from May 2023 to September 2023.

Stadium Road, P. O. Box 3500, Karachi 74800, Pakistan  
Tel: +92 21 3493 0051 Ext. 5400; Direct: +92 21 3414 6880; Fax: +92 21 3493 4294, 3493 2095,  
sonam.pk@aku.edu; www.aku.edu





This study is only for academic purpose and no potential harm anticipated for study participants. The advantage of this study is, it would help the government and other healthcare organizations to propose developing future interventions for improving the physical activity of children if there is high prevalence of physical inactivity.

**Ethical Consideration:** Data collection will start after approval from the Ethical Review Committee of AKUH. The proposed study will take into account all the possible ethical consideration which includes anonymity, confidentiality, informed consent and institution's permission.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN  
MScN Student, AKUSONAM

Email: [Imran.uddin@scholar.aku.edu](mailto:Imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar  
Associate Professor & Head of Public  
Health Stream, AKUSONAM  
Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)


### **Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Muhammad Alam, Principal of Al-Qalam Education Academy, Madyan, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.

  
\_\_\_\_\_  
Signature **Principal**  
**Al-Qalam Education Academy**  
**- Madyan Swat.**

01-02-2023.

\_\_\_\_\_  
Date



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Bakht Biland,  
Incharge,  
Government High School,  
Tirat Dara, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know, in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on a sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which, eventually leads to many health problems like diabetes mellitus, heart problems, and musculoskeletal problems.

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sonam.pk@aku.edu; www.aku.edu



This study is only for academic purpose and no potential harm anticipated for study participants. The advantage of this study is, it would help the government and other healthcare organizations to propose developing future interventions for improving the physical activity of children if there is high prevalence of physical inactivity.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN

MScN Student, AKUSONAM

Email: [Imran.uddin@scholar.aku.edu](mailto:Imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar

Associate Professor & Head of Public  
Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)

**Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Bakht Biland, Incharge of Government High School, Tirat Dara, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.

  
Head Master  
GHS TIRAT DARA  
EMIS CODE: 33418

---

Signature

2/2/2023  
Date



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Sher Zada,  
Principal,  
Government Higher Secondary School,  
Madyan, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know, in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on a sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which, eventually leads to many health problems like diabetes mellitus, heart problems, and musculoskeletal problems.

**Procedure of data collection:** I will collect the data from school-age adolescents using an adopted "Physical activity questionnaire for older children (PAQ-C). I will select 2 to 4 schools in the urban area of Mingora city and 2 to 4 schools in the rural area of Tehsil Bahrain based on my sample size. Your permission is needed for the approval of this study by the Ethical review committee of Aga Khan University Hospital Karachi. After the approval of this study, I will collect data from May 2023 to September 2023.

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sonam.pk@aku.edu; www.aku.edu



This study is only for academic purpose and no potential harm anticipated for study participants. The advantage of this study is, it would help the government and other healthcare organizations to propose developing future interventions for improving the physical activity of children if there is high prevalence of physical inactivity.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN

MScN Student, AKUSONAM

Email: [imran.uddin@scholar.aku.edu](mailto:imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar

Associate Professor & Head of Public  
Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)

**Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Sher Zada, Principal of Government Higher Secondary School, Madyan, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.



Signature  
**PRINCIPAL,  
GHSS, Madyan,  
Distt; Swat,**

01-02-2023

Date





آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Ms. Huma Shakir,  
Principal,  
Khushal Public School,  
Gulkada, Mingora, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know, in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on a sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which, eventually leads to many health problems like diabetes mellitus, heart problems, and musculoskeletal problems.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN

MScN Student, AKUSONAM

Email: [Imran.uddin@scholar.aku.edu](mailto:Imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar

Associate Professor & Head of Public Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)

**Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Huma Shakir, Principal of Khushal Public School, Gulkada, Mingora, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.



For

*[Handwritten signature]*

Signature

01-02-2023

Date



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Attaullah,  
Principal,  
Dawn School & College Systems,  
College Colony, Saidu Sharif, Mingora, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

**Study Purpose:** The main purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents. As we know, in this modern era, the advancement in technology like mobile use and television has forced the newly growing population on a sedentary lifestyle. This sedentary lifestyle and inactivity lead to obesity which, eventually leads to many health problems like diabetes mellitus, heart problems, and musculoskeletal problems.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN  
MScN Student, AKUSONAM

Email: [Imran.uddin@scholar.aku.edu](mailto:Imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar  
Associate Professor & Head of Public  
Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)

**Title of the Research Study**

"A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan".

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Attaullah, Principal of Dawn School & College Systems, College Colony, Saidu Sharif, Mingora, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.

  
Signature  
Attaullah  
Principal  
Dawn School & College System  
Campus College Colony

01-02-2023

Date



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Israr ud Din,  
Principal,  
Government High School No.4,  
Mula Baba, Mingora, Swat, Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN  
MScN Student, AKUSONAM

Email: [Imran.uddin@scholar.aku.edu](mailto:Imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar  
Associate Professor & Head of Public  
Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)



**Title of the Research Study**

“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

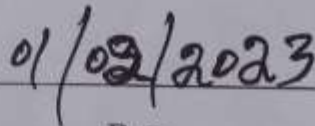
**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Israr ud Din, Principal of Government High School No.4, Mula Baba, Mingora, Swat, Pakistan, accept to access the students for data collection after seeking informed consent in the above study.



Signature

**Israrud Din**  
Head Master  
GHS No-4 Mingora Swat.



Date



آغا خان یونیورسٹی  
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences  
School of Nursing & Midwifery

January 31, 2023

To,  
Mr. Zahoor Ahmad,  
Principal,  
Government Centennial Model Higher Secondary School,  
Wadudia Saidu Sharif, Mingora, Swat Pakistan.

**Subject: Permission for data collection**

Respected Sir,

I am Imran Uddin student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study on the "Comparing the levels of physical activity among adolescents in rural and urban areas of district Swat, KPK, Pakistan" under the supervision of Dr. Saleema Gulzar, Associate Professor at AKU-SONAM.

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I request you to please sign the enclosed form. Looking forward to a positive response.

Sincerely,

---

IMRAN UDDIN  
MScN Student, AKUSONAM

Email: [Imran.uddin@scholar.aku.edu](mailto:Imran.uddin@scholar.aku.edu)

---

Dr. Saleema Gulzar  
Associate Professor & Head of Public  
Health Stream, AKUSONAM

Email: [saleema.gulzar@aku.edu](mailto:saleema.gulzar@aku.edu)


**Title of the Research Study**

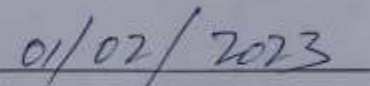
“A cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of district Swat KPK Pakistan”.

**Primary Investigator:** Imran Uddin  
MScN Student,  
Aga Khan University School of Nursing,  
Karachi.

**Thesis Supervisor:** Dr. Saleema Gulzar  
Assistant Professor,  
Aga Khan University School of Nursing,  
Karachi.

I, Zahoor Ahmad, Principal of Government Centennial Model Higher Secondary School, Wadudia Saidu Sharif, Mingora, Swat Pakistan, accept to access the students for data collection after seeking informed consent in the above study.

  
Signature  
**PRINCIPAL  
GCMHSS Wadudia  
Saidu Sharif Swat.**

  
Date

Appendices D Affidavit for Translations

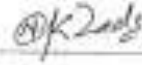
**AFFIDAVIT FOR TRANSLATION**

I, Naik Zada Mian fluent in English, Urdu and Pashto: do hereby certify to the best of my knowledge, the document(s) listed below and attached to this affidavit is true and accurate translations of the original document in English into Urdu and Pashto.

Name of Original Document in English	Version
To compare levels of physical activity among school-age adolescents in rural and urban areas of district Swat KPK Pakistan. (Parental consent form for children less than 18)	1
Assent form for children 8-14 years of age	1
Physical Activity Questionnaire for Older Children (PAQ-C)	1

Name of Translated Document in Urdu	Version
پاکستان کے ضلع سوات کے دیہی اور شہری علاقوں میں سکول حیائے والے نوجوانوں میں جسمانی سرگرمی کا موازنہ (18 سال سے کم عمر کے بچوں کے لیے والدین کی رضامندی کا شکریہ)	1
8-14 سال کی عمر کے بچوں کے لیے رضامندی کا شکریہ	1
بڑے بچوں کے لیے جسمانی سرگرمی کا موازنہ (PAQ-C)	1

Mr. Naik Zada Mian



10-05-2023

Printed name of Translator

Signature of Translator

Date

Mr. Inuran Uddin



10-05-2023


Printed Name of Investigator

Signature of Principal Investigator

Date



## Appendices E Approval of Data Collection Tool



**Request for approval of data collection tool** 📎 1 🔍 📧 📅

 297 KB

Dear Dr. Peter,  
Hope you are doing well. I am student of Master of Science (MScN) in nursing at Aga Khan University Karachi, Pakistan. I want to conduct " a cross-sectional study to compare levels of physical activity among adolescents in rural and urban areas of District Swat Pakistan " under the supervision of Dr. Saleema Gulzar. I would need your approval for your data collection tool (The Physical Activity Questionnaire for Older Children (PAQ-C) to utilize it in my study.  
I would be highly indebted if you could please provide me your tool.  
Note: The tool has been used in the attached article.  
Thanking You.  
Imran Uddin  
MScN year1  
Aga Khan University, Karachi.  
Pakistan

---

 Crocker, Peter <peter.crocker@ubc.ca>  😊 ↶ ↷ ↲ ⋮  
Sat 12/31/2022 10:38 PM

To:  Imran Uddin  
Cc:  Saleema Gulzar

no permission required.  
you are welcomed in use in your research.

Peter Crocker, PhD. FCPA  
Professor Emeriti  
School of Kinesiology  
UBC  
604-822-5580

**ASSENT FORM FOR CHILDREN 10-14 years of age**

Project Title: Comparison of physical activity levels among school-age adolescents in rural and urban areas of district Swat KPK Pakistan- An analytical cross-sectional study.	ERC Project No:8653
Principal Investigator: Dr. Saleema Gulzar	Organization: Aga Khan University, School of Nursing and Midwifery (AKU-SONAM) Karachi, Pakistan.
Co-Investigator: Imran Uddin	Organization: Aga Khan University, School of Nursing and Midwifery (AKU-SONAM) Karachi, Pakistan.
Committee member: Ms. Fauzia Basaria Hasnani	Department of Community Health Sciences and School of Nursing & Midwifery Aga Khan University Karachi.
Committee member: Dr. Sabeen Shah	Assistant Professor, Department of Family Medicine Aga Khan University Hospital (AKUH), Karachi

**Purpose of the Study**

The purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents in the district of Swat KPK Pakistan.

**What if I have questions?**

If you do not understand any part of the study, you can ask questions. If you have questions later that you haven't thought of yet, you can talk to me again.

Name: Imran Uddin

Contact Number: +923456043528

**If I am in the study what will happen to me?**

If you voluntarily participate in this study, the researcher will ask you to do the following:

Fill out a questionnaire “Physical Activity Questionnaire for Older Children (PAQ-C)”. The questionnaire will take a maximum of 30 minutes in filling.

**Benefits and risks involved in this study**

There is no risk involved in this study, and the participants will not receive any benefits directly at the time of data collection. Although, the findings of this study will identify the difference in the prevalence of physical activity among urban and rural areas children which will help the government and other healthcare organizations in the development of effective interventions for the reduction of obesity and for the improvement of physical activity in these age groups.

**Do I have to be in this study?**

You can choose to participate in this study or not. It is entirely up to you. If you say yes now, but change your mind later, that's okay too. All you have to do is tell us. No one will be offended or upset. If you decide not to take part in the study. We are discussing the study with your parents/guardians and you should talk to them about this too. Whatever you decide, we'll still take care of you.

**What happens after the study?**

When we have finished this study we will write a report about what was learned. This report will not include your name or that you were in the study.

**Signature Section for Assent:**

If you decide you want to be in this study, please sign and/or write your name below to affirm your decision to participate.

I, \_\_\_\_\_ (Print your name) would like to be in this research study.

Name of Assent: \_\_\_\_\_

Signature of Assent: \_\_\_\_\_ Date: \_\_\_\_\_

Name and Signature of Person Obtaining Consent: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_



## Appendices G Assent form Urdu

### 10-14 سال کی عمر کے بچوں کے لیے رضامندی فارم

#### پروجیکٹ کی معلومات

پروجیکٹ کا عنوان: پاکستان کے ضلع سوات کے دیہی اور شہری علاقوں میں سکول جانے والے نوجوانوں میں جسمانی سرگرمی کا موازنہ

معاونت کار: عمران الدین

مرکزی تحقیق کار: ڈاکٹر سلیمہ گلزار

ادارہ: آغا خان یونیورسٹی، اسکول آف نرسنگ اینڈ مٹوانفری (اے کے یو۔ سونم) کراچی پاکستان

#### **مطالعہ کا مقصد**

اس مطالعہ کا مقصد ضلع سوات کے پی کے پاکستان کے شہری اور دیہی علاقوں میں اسکول جانے والے نوجوانوں میں جسمانی سرگرمی کی سطح میں فرق کو تلاش کرنا ہے۔

#### **اگر میرے سوالات ہوں تو کیا ہوگا؟**

اگر آپ مطالعہ کے کسی حصے کو نہیں سمجھتے تو آپ سوالات پوچھ سکتے ہیں۔ اگر آپ کے بعد میں سوالات ہیں جن کے بارے میں آپ نے ابھی سوچا ہی نہیں تو آپ مجھ سے دوبارہ بات کر سکتے ہیں۔

نام: عمران الدین

رابطہ نمبر: + 923456043528

#### **اگر میں اس تحقیقی مطالعہ میں حصہ لیتا ہوں تو کیا ہوگا؟**

گر آپ رضاکارانہ طور پر اس مطالعہ میں حصہ لیتے ہیں تو، تحقیق کار آپ سے درج ذیل کام کرنے کو کہے گا:

آپ سے سوالنامہ پُر کرنے کے لیے کہا جائے گا "بڑے بچوں کے لیے جسمانی سرگرمی کا سوالنامہ (PAQ-C)"۔ سوالنامہ بھرنے میں زیادہ سے زیادہ 30 منٹ لگیں گے۔

#### **اس مطالعہ میں شامل فوائد اور خطرات**

اس مطالعہ میں کوئی خطرہ شامل نہیں ہے، اور شرکاء کو ڈیٹا اکٹھا کرنے کے وقت براہ راست کوئی فائدہ حاصل نہیں ہوں گے۔ اگرچہ، اس مطالعہ کے نتائج شہری اور دیہی علاقوں کے بچوں میں جسمانی سرگرمیوں کے پھیلاؤ میں فرق کی نشاندہی کریں گے جو حکومت اور دیگر صحت کی دیکھ بھال کرنے والی تنظیموں کو موٹاپے کے کمی کے لیے ایک مؤثر مداخلت کی ترقی میں مدد کرے گا اور ان عمر کے بچوں میں جسمانی سرگرمی کو بہتر بنانے کے لیے مدد کرے گا۔

#### **کیا مجھے اس مطالعہ میں شامل ہونا ہے؟**

آپ اس مطالعہ میں شامل ہونے یا نہ ہونے کا انتخاب کر سکتے ہیں۔ یہ مکمل طور پر آپ پر منحصر ہے۔ اگر آپ ابھی ہاں کہتے ہیں، لیکن بعد میں اپنا خیال بدلیں، یہ بھی ٹھیک ہے۔ آپ کو صرف ہمیں بتانا ہے۔ کوئی بھی ناراض یا پریشان نہیں ہوگا۔ اگر آپ مطالعہ میں شامل نہ ہونے کا فیصلہ کرتے ہیں، ہم آپ کے والدین/سرپرستوں کے ساتھ اس مطالعہ پر تبادلہ خیال کر رہے ہیں اور آپ کو اس کے بارے میں بھی ان سے بات کرنی چاہیے۔ آپ جو بھی فیصلہ کریں، ہم پھر بھی آپ کا خیال رکھیں گے۔

#### **مطالعہ کے بعد کیا ہوتا ہے؟**

جب ہم یہ مطالعہ مکمل کر لیں گے تو جو نتائج ہم اس مطالعہ میں حاصل کریں گے۔ اس کے بارے میں ایک رپورٹ لکھیں گے۔ اس رپورٹ میں آپ کا نام شامل نہیں ہوگا یا یہ کہ آپ مطالعہ میں شامل تھے۔

### منظوری کے لیے دستخط کا حصہ:

اگر آپ فیصلہ کرتے ہیں کہ آپ اس مطالعے میں شامل ہونا چاہتے ہیں تو، براہ کرم حصہ لینے کے اپنے فیصلے کی تصدیق کے لیے اپنا نام درج کریں یا لکھیں۔

میں، \_\_\_\_\_ اس تحقیقی مطالعے میں شامل ہونا چاہوں گا۔

رضامندی کا نام: \_\_\_\_\_

رضامندی کے دستخط: \_\_\_\_\_ تاریخ \_\_\_\_\_

رضامندی حاصل کرنے والے شخص کا نام اور دستخط: \_\_\_\_\_

تاریخ: \_\_\_\_\_

**PARENTAL CONSENT FORM FOR CHILDREN 0 <18**

**Project Information**

Project Title: “Comparison of physical activity levels among school-age adolescents in rural and urban areas of district Swat KPK Pakistan- An analytical cross-sectional study”	ERC Project No: 8653
Principal Investigator: Dr. Saleema Gulzar	Organization: Aga Khan University, School of Nursing and Midwifery (AKU-SONAM) Karachi, Pakistan.
Co-Investigator: Imran Uddin	Organization: Aga Khan University, School of Nursing and Midwifery (AKU-SONAM) Karachi, Pakistan.
Committee member: Ms. Fauzia Basaria Hasnani	Department of Community Health Sciences and School of Nursing & Midwifery Aga Khan University Karachi.
Committee member: Dr. Sabeen Shah	Assistant Professor, Department of Family Medicine Aga Khan University Hospital (AKUH), Karachi

**Introduction**

The purpose of this form is to provide you (as the parent of a prospective research study participant) with information that may affect your decision as to whether or not to let your child participate in this research study. The person performing the research will describe the study to you and answer all your questions. Read the information below and ask any questions you might have before deciding whether or not to give your permission for your child to take part. If you decide to let your child participate in this study, this form will be used to record your permission.

**Purpose of the Study**

If you agree, your child will be asked to participate in a research study “Comparison of physical activity levels among school-age adolescents in rural and urban areas of district Swat KPK Pakistan- An analytical cross-sectional study”. The purpose of this study is to find out the difference in the levels of physical activity among urban and rural school-age adolescents in the district of Swat KPK Pakistan. Physical

activity is very important in adolescents because the lack of physical activity can lead to obesity which ultimately increases the chances of non-communicable diseases like Diabetes and heart problems.

If you allow your child to participate in this study, s/he will be asked to fill out a questionnaire “Physical Activity Questionnaire for Older Children (PAQ-C)”. The questionnaire will take a maximum of 30 minutes in filling.

### **Benefits and risks involved in this study**

There is no risk involved in this study, and the participants will not receive any benefits directly at the time of data collection. Although, the findings of this study will identify the difference in the prevalence of physical activity among urban and rural areas children which will help the government and other healthcare organizations in the development of effective interventions for the reduction of obesity and for the improvement of physical activity in these age groups.

### **Does my child have to participate?**

No, your child’s participation in this study is voluntary. Your child may decline to participate or withdraw from participation at any time. Withdrawal or refusing to participate will not affect their treatment/procedure or relationship with Aga Khan University in any way. You can agree to allow your child to be in the study now and change your mind later without any penalty.

### **What if my child does not want to participate?**

In addition to your permission, your child must agree to participate in the study. If your child does not want to participate they will not be included in the study and there will be no penalty. If your child initially agrees to be in the study s/he can change their mind later without any penalty.

### **Will there be any compensation?**

Neither you nor your child will receive any type of payment for participating in this study.

### **Privacy and confidentiality**

The data of your child will be kept confidential. We will provide codes to the study participants instead of names.

### **Dissemination of Results**

The data resulting from your child's participation may be made available to other researchers in the future for research purposes without identification. In these cases, the data will contain no identifying information that could associate it with your child, or with your child's participation in any study.

### **Contact person**

Prior to, during, or after your participation, you can contact the researcher.

Name: Imran Uddin

Contact Number: +923456043528

### **Certificate of consent**

You are making a decision about allowing your child to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow them to participate in the study. If you later decide that you wish to withdraw your permission for your child to participate in the study you may discontinue his or her participation at any time. You will be given a copy of this consent form.

Child's Printed Name: \_\_\_\_\_

Printed Name of Parent(s) or Legal Guardian: \_\_\_\_\_

Signature of Parent(s) or Legal Guardian \_\_\_\_\_

Date: \_\_\_\_\_

Printed Name of Person Obtaining Consent: \_\_\_\_\_

Signature of Person Obtaining Consent: \_\_\_\_\_

Date: \_\_\_\_\_

***For Participants unable to read***

**Witness:**

I have witnessed the accurate reading of the consent form to the potential participants, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Witness Name: \_\_\_\_\_  
\_\_\_\_\_

Participant's Thumb Print:

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## 18 سال سے کم عمر کے بچوں کے لیے والدین کی رضامندی کا فارم

پروجیکٹ کا عنوان: پاکستان کے ضلع سوات کے دیہی اور شہری علاقوں میں سکول جانے والے نوجوانوں میں جسمانی سرگرمی کا موازنہ

معاونت کار: عمران الدین

مرکزی تحقیق کار: ڈاکٹر سلیمہ گلزار

ادارہ: آغا خان یونیورسٹی، اسکول آف نرسنگ اینڈ مڈوائفری (اے کے یو۔ سونم) کراچی پاکستان

### تعارف

اس فارم کا مقصد آپ کو (ممکنہ تحقیقی مطالعہ کے شرکاء کے والدین کی حیثیت سے) ایسی معلومات فراہم کرنا ہے جو آپ کے فیصلے پر اثر انداز ہو سکتی ہے کہ آپ کے بچے کو اس تحقیقی مطالعے میں حصہ لینے دیا جائے یا نہیں۔ تحقیق کار آپ کو مطالعہ کی وضاحت کرے گا اور آپ کے تمام سوالات کے جوابات دے گا۔ اپنے بچے کو حصہ لینے کی اجازت دینے یا نہ دینے کا فیصلہ کرنے سے پہلے نیچے دی گئی معلومات کو پڑھیں اور کوئی بھی سوال پوچھیں۔ اگر آپ اپنے بچے کو اس مطالعے میں حصہ دلانے کا فیصلہ کرتے ہیں تو یہ فارم آپ کی اجازت کو ریکارڈ کرنے کے لیے استعمال کیا جائے گا۔

### مطالعہ کا مقصد۔

اگر آپ رضامند ہیں تو، آپ کے بچے سے کہا جائے گا کہ وہ تحقیقی مطالعہ [پاکستان کے ضلع سوات کے دیہی اور شہری علاقوں میں سکول جانے والے نوجوانوں میں جسمانی سرگرمی کا موازنہ] میں حصہ لے۔

اس مطالعے کا مقصد: اس مطالعے کا مقصد ضلع سوات کے پی کے پاکستان کے شہری اور دیہی اسکول جانے والے نوجوانوں میں جسمانی سرگرمی کی سطح میں فرق کو تلاش کرنا ہے۔

نوعمر میں جسمانی سرگرمی بہت ضروری ہے کیونکہ جسمانی سرگرمی کی کمی موٹاپے کا باعث بنتی ہے جو بالآخر ذیابیطس اور دل کے مسائل جیسے غیر متعدی امراض کے امکانات کو بڑھا دیتی ہے۔

اگر آپ اپنے بچے کو اس مطالعے میں حصہ لینے کی اجازت دیتے ہیں تو، اس سے کہا جائے گا کہ "بڑے بچوں کے لیے جسمانی سرگرمی کا سوالنامہ (PAQ-C) کو پر کریں۔ سوالنامہ بھرنے میں زیادہ سے زیادہ 30 منٹ لگیں گے۔"

مطالعے کے متوقع خطرات اور فوائد

اس مطالعے میں کوئی ممکنہ خطرات شامل نہیں ہیں۔ شرکاء کو براہ راست کوئی فائدہ نہیں ملے گا۔

البتہ اس مطالعے کے نتائج شہری اور دیہی علاقوں کے نوجوانوں میں جسمانی سرگرمی کے پھیلاؤ میں فرق کی نشاندہی کریں گے جو حکومت اور دیگر صحت کی دیکھ بھال کرنے والی تنظیموں کو موٹاپے کے کمی اور جسمانی سرگرمیوں کو بہتر بنانے کے لیے ایک موثر مداخلت کی ترقی میں مدد فراہم کرے گا۔

### بچے کا حصہ لینا

اس مطالعے میں آپ کے بچے کی شرکت رضاکارانہ ہے۔ آپ کا بچہ شرکت کرنے سے منع کر سکتا ہے یا کسی بھی وقت شرکت سے دستبردار ہو سکتا ہے۔ دستبرداری یا حصہ لینے سے انکار ان کے علاج/طریقہ کار یا کسی بھی طرح آغا خان یونیورسٹی کے ساتھ تعلقات کو متاثر نہیں کرے گا۔ آپ اپنے بچے کو ابھی مطالعے میں آنے کی اجازت دینے پر راضی ہو سکتے ہیں اور بغیر کسی جرمانے کے اپنا خیال بعد میں تبدیل کر سکتے ہیں۔

### اگر آپ کا بچہ حصہ نہیں لینا چاہتا تو کیا ہوگا؟

آپ کی اجازت کے علاوہ، آپ کے بچے کو مطالعے میں حصہ لینے کے لیے رضامند ہونا چاہیے۔ اگر آپ کا بچہ حصہ نہیں لینا چاہتا تو وہ مطالعے میں شامل نہیں ہوگا اور نہ ہی کوئی جرمانہ ہوگا۔ اگر آپ کا بچہ ابتدائی طور پر مطالعے میں شامل ہونے سے اتفاق کرتا ہے تو وہ بغیر کسی جرمانے کے بعد میں اپنا خیال بدل سکتا ہے۔

### کیا کوئی معاوضہ ملے گا؟

نہ تو آپ اور نہ ہی آپ کا بچہ اس مطالعے میں حصہ لینے کے لیے کسی بھی قسم کی ادائیگی وصول کرے گا۔

### آپ کے بچے کی نجی زندگی اور رازداری

آپ کے بچے کی نجی زندگی اور اس کے ڈیٹا کی رازداری محفوظ رہے گی۔ ناموں کے بجائے شرکاء کے لیے کوڈز استعمال کیے جائیں گے۔

### نتائج کا اشتراک

آپ کے بچے کی شرکت سے حاصل ہونے والے معلومات مستقبل میں دیگر محققین کے لیے بغیر شناخت کے تحقیقی مقاصد کے لیے دستیاب کیا جا سکتا ہے۔ ان معاملات میں، ڈیٹا میں کوئی شناختی معلومات نہیں ہوگی جو اسے آپ کے بچے کے ساتھ، یا آپ کے بچے کی کسی مطالعے میں شرکت کے ساتھ جوڑ سکتی ہے۔

### مطالعہ کے بارے میں سوالات کے لیے رابطہ

پہلے، اپنی شرکت کے دوران یا بعد میں آپ تحقیق کار سے رابطہ کر سکتے ہیں۔

نام: عمران الدین



**رضامندی کا سرٹیفکیٹ**

آپ اپنے بچے کو اس مطالعے میں حصہ لینے کی اجازت دینے کے بارے میں فیصلہ کر رہے ہیں۔ ذیل میں آپ کے دستخط سے ظاہر ہوتا ہے کہ آپ نے اوپر دی گئی معلومات کو پڑھ لیا ہے اور فیصلہ کیا ہے کہ انہیں مطالعے میں حصہ لینے کی اجازت دی جائے۔ اگر آپ نے بعد میں فیصلہ کیا کہ آپ اپنے بچے کو مطالعے میں شرکت سے دستبردار کرانا چاہتے ہیں تو آپ کسی بھی وقت اس کی شرکت ختم کرسکتے ہیں۔ آپ کو اس رضامندی کے فارم کی ایک کاپی دی جائے گی۔

**بچے کا چھپا ہوا نام:**

**والدین یا قانونی سرپرست کا چھپا ہوا نام:**

**والدین کے یا قانونی سرپرست کے دستخط** \_\_\_\_\_

**تاریخ** \_\_\_\_\_ :

**رضامندی حاصل کرنے والے شخص کا چھپا ہوا نام:**

**رضامندی حاصل کرنے والے شخص کے دستخط:**

**تاریخ** \_\_\_\_\_ :

**شرکاء کے لیے جو پڑھنے سے قاصر ہیں۔**

**گواہ :**

میں نے ممکنہ شرکاء کو رضامندی کے فارم کے درست طور پر پڑھنے کا مشاہدہ کیا ہے ، اور فرد کو سوالات پوچھنے کا موقع ملا ہے۔ میں تصدیق کرتا ہوں کہ فرد نے آزادانہ طور پر رضامندی دی ہے

**گواہ کا نام:** \_\_\_\_\_ **شرکاء کے انگوٹھے کا نشان** \_\_\_\_\_ :

**دستخط** \_\_\_\_\_

**تاریخ** \_\_\_\_\_ :

**Physical Activity Questionnaire for Older Children (PAQ-C)**  
**(Elementary School)**

Name:(optional) \_\_\_\_\_ Age: \_\_\_\_\_ Sex: M \_\_\_\_\_ F \_\_\_\_\_

Grade: \_\_\_\_\_ Teacher: \_\_\_\_\_

We are trying to find out about your level of physical activity from the last 7 days (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right and wrong answers — this is not a test.
2. Please answer all the questions as honestly and accurately as you can — this is very important.

1. Physical activity in your spare time. Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

	No	1-2	3-4	5-6	7 times or more
Skipping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rowing/canoeing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OR Exercise like bending etc.					
In-line skating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OR Pashto game (Skhay)					
Tag or Aankh Micholi game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking for exercise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bicycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Jogging or running	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aerobics like hiking etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swimming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baseball, softball or Cricket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For dance (Kabadi)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For Football (Cheendro)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Badminton	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skateboarding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soccer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Street hockey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volleyball	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Floor hockey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basketball	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ice skating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OR tennis OR Kareem board					
Cross-country skiing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OR local slide game					
Ice hockey/ringette	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OR Pahto game (Gully Danda)					
Other:					
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

I don't do PE	<input type="checkbox"/>
Hardly ever	<input type="checkbox"/>
Sometimes	<input type="checkbox"/>
Quite often	<input type="checkbox"/>
Always	<input type="checkbox"/>

3. In the last 7 days, what did you do most of the time at recess? (Check one only.)

- Sat down (talking, reading, doing schoolwork)
- Stood around or walked around
- Ran or played a little bit
- Ran around and played quite a bit
- Ran and played hard most of the time

4. In the last 7 days, what did you normally do at lunch (besides eating lunch)? (Check one only.)

- Sat down (talking, reading, doing schoolwork)
- Stood around or walked around
- Ran or played a little bit
- Ran around and played quite a bit
- Ran and played hard most of the time

5. In the last 7 days, on how many days right after school, did you do sports, dance, or play games in which you were very active? (Check one only.)

- None
- 1-time last week
- 2 or 3 times last week
- 4 times last week
- 5 times last week

6. In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active? (Check one only.)

- None
- 1-time last week
- 2 or 3 times last week
- 4 or 5 last week

6 or 7 times last week

7. On the last weekend, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

None

1 time

2 — 3 times

4 — 5 times

6 or more times

8. Which one of the following describes you best for the last 7 days? Read all five statements before deciding on the one answer that describes you.

A. All or most of my free time was spent doing things that involve little physical effort

B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics)

C. I often (3 — 4 times last week) did physical things in my free time

D. I quite often (5 — 6 times last week) did physical things in my free time

E. I very often (7 or more times last week) did physical things in my free time

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very often
Monday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tuesday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wednesday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thursday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Saturday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sunday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes

No

If Yes, what prevented you? \_\_\_\_\_

Reference: Kowalski, K. C., Crocker, P. R., & Donen, R. M. (2004). The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. *College of kinesiology, university of saskatchewan*, 87(1), 1-38.

**بڑے بچوں کے لیے جسمانی سرگرمی کا سوالنامہ (PAQ-C)**

نام (اختیاری) : \_\_\_\_\_ عمر: \_\_\_\_\_ جنس: لڑکا \_\_\_\_\_  
 لڑکی: \_\_\_\_\_ گریڈ: \_\_\_\_\_ ٹیچر: \_\_\_\_\_

ہم پچھلے 7 دنوں میں (پچھلے ہفتے میں) آپ کی جسمانی سرگرمی کی سطح کے بارے میں جاننے کی کوشش کر رہے ہیں۔ اس میں وہ کھیل شامل ہیں جن سے آپ کو پسینہ آتا ہے یا آپ کی ٹانگوں کو تھکاوٹ کا احساس ہوتا ہے، یا وہ کھیل جو آپ کو سانس لینے میں دشواری کا باعث بنتے ہیں، جیسے ٹیگ کرنا، اچھالنا، دوڑنا، چڑھنا اور دیگر۔

**یاد رکھیں:**

- 1- اس میں کوئی صحیح اور غلط جواب نہیں ہیں - یہ کوئی امتحان نہیں ہے .
- 2- براہ کرم تمام سوالات کے جوابات ایمانداری سے اور درست طریقے سے دیں جتنی آپ کر سکتے ہیں — یہ بہت اہم ہے۔
- 1- اپنے فارغ وقت میں جسمانی سرگرمی: کیا آپ نے گزشتہ 7 دنوں (گزشتہ ہفتے) میں درج ذیل میں سے کوئی سرگرمی کی ہے؟ اگر ہاں تو کتنی بار؟ (فی قطار میں صرف ایک دائرے کو نشان زد کریں۔)

					1-1۔ اچھالنا :
					1 - 2
					3 - 4
					1-2۔ ورزش جیسے جسم کو موڑنا وغیرہ
					<input type="checkbox"/>
					1-3۔ ان لائن اسکیٹنگ یا پشتو گیم (سختی)
					<input type="checkbox"/>
					1-4۔ ٹیگ یا آنکھ مچولی گیم
					<input type="checkbox"/>
					(پٹ پٹونی، آنکھ مچولی)
					1-5۔ ورزش کے لیے پیدل چلنا
					<input type="checkbox"/>
					1-6۔ سائیکل چلانا
					<input type="checkbox"/>
					1-7۔ جاگنگ یا دوڑنا
					<input type="checkbox"/>
					1-8۔ ایروبکس جیسے پہاڑ پر پیدل سفر
					<input type="checkbox"/>

- 9-1- تیراکی
- 10-1 - بیس بال، سافٹ بال یا کرکٹ
- 11-1 - ڈانس یا کبڈی
- 12-1- فٹ بال یا پشتو گیم چیندرو
- 13-1- بیڈمنٹن
- 14-1- اسکیٹ تختہ
- 15-1- فٹ بال
- 1.16- اسٹریٹ ہاکی
- 17-1- والی بال
- 18-1- فلور ہاکی
- 19-1- باسکٹ بال
- 20-1- آئس سکیٹنگ یا ٹینس یا کریم بورڈ
- 21-1- کراس کنٹری اسکیٹنگ
- یا مقامی سلائیڈ گیم
- 22-1- آئس ہاکی/رنگیٹ یا پشتو گیم (گلی ڈنڈا)
- 23-1- دیگر: \_\_\_\_\_

2. پچھلے 7 دنوں میں، آپ کی فزیکل ایجوکیشن (PE) کلاسز کے دوران، آپ کتنی بار بہت متحرک تھے (سخت کھیلنا، دوڑنا، چھلانگ لگانا، پھینکنا)؟ (صرف ایک کو چیک کریں۔)

- میں PE نہیں کرتا .....
- شاید ہی کبھی .....
- کبھی کبھی .....
- اکثر و بیشتر .....
- ہمیشہ .....



3. پچھلے 7 دنوں میں، آپ نے زیادہ تر چھٹیوں میں کیا کیا؟ (صرف ایک کو چیک کریں۔)

بیٹھ گیا (بات کرنا، پڑھنا، اسکول کا کام کرنا).....

ارد گرد کھڑا تھا یا گھومتا تھا.....

بھاگا یا تھوڑا سا کھیلا.....

ادھر ادھر بھاگا اور کافی کھیلا.....

زیادہ تر وقت دوڑتا اور کھیلتا.....

4. پچھلے 7 دنوں میں، آپ نے عام طور پر دوپہر کے کھانے میں کیا کیا (دوپہر کا کھانا کھانے کے علاوہ)؟ (صرف ایک کو چیک کریں۔)

بیٹھ گیا (بات کرنا، پڑھنا، اسکول کا کام کرنا).....

ارد گرد کھڑا تھا یا گھومتا تھا.....

بھاگا یا تھوڑا سا کھیلا.....

ادھر ادھر بھاگا اور تھوڑا سا کھیلا.....

زیادہ تر وقت دوڑتا اور کھیلتا.....

5. پچھلے 7 دنوں میں، اسکول کے بعد کتنے دنوں میں، آپ نے کھیل، رقص، یا ایسے کھیل کھیلے جن میں آپ بہت متحرک تھے؟ (صرف ایک کو چیک کریں۔)

کوئی نہیں.....

گزشتہ ہفتے 1 بار.....

پچھلے ہفتے 2 یا 3 بار.....

پچھلے ہفتے 4 بار.....

پچھلے ہفتے 5 بار.....

6. پچھلے 7 دنوں میں، آپ نے کتنی شاموں کو کھیل، رقص، یا کھیل کھیلے جن میں آپ بہت متحرک تھے؟ (صرف ایک کو چیک کریں۔)

کوئی نہیں.....

گزشتہ ہفتے 1 بار.....

پچھلے ہفتے 2 یا 3 بار.....

گزشتہ ہفتے 4 یا 5.....

□ پچھلے ہفتے 6 یا 7 بار .....

7. گزشتہ ویک اینڈ (ہفتے کے آخر) پر، آپ نے کتنی بار کھیل، ڈانس، یا گیمز کھیلے جن میں آپ بہت متحرک تھے؟ (صرف ایک کو چیک کریں۔)

□ کوئی نہیں.....

□ 1 وقت.....

□ 2 - 3 بار.....

□ 4 - 5 بار.....

□ 6 یا اس سے زیادہ بار .....

8. مندرجہ ذیل میں سے کون آپ کو پچھلے 7 دنوں کے لیے بہترین بیان کرتا ہے؟ ایک جواب پر فیصلہ کرنے سے پہلے پانچوں بیانات پڑھیں جو آپ کو بیان کرتا ہے۔

A. میرا سارا یا زیادہ تر فارغ وقت ایسے کاموں میں صرف ہوتا تھا جن میں تھوڑی جسمانی محنت شامل ہوتی ہے..... □

B. میں نے کبھی کبھی (پچھلے ہفتے 1 - 2 بار) اپنے فارغ وقت میں جسمانی چیزیں کیں (مثلاً کھیل کھیلا، دوڑنا، تیراکی کرنا، موٹر سائیکل چلانا، ایروبکس کیا)..... □

C. میں نے اکثر (گزشتہ ہفتے 3 - 4 بار) اپنے فارغ وقت میں جسمانی چیزیں کیں..... □

D. میں نے اکثر (گزشتہ ہفتے 5 - 6 بار) اپنے فارغ وقت میں جسمانی چیزیں کیں..... □

E. میں نے اکثر (گزشتہ ہفتے 7 یا اس سے زیادہ بار) اپنے فارغ وقت میں جسمانی چیزیں کیں..... □

9. نشان زد کریں کہ آپ نے پچھلے ہفتے ہر دن کتنی بار جسمانی سرگرمی (جیسے کھیل کھیلنا، کھیلنا، رقص کرنا، یا کوئی دوسری جسمانی سرگرمی) کی۔

کوئی نہیں تھوڑا سا درمیانی اکثر اکثر

□ □ □ □ □ پیر.....

□ □ □ □ □ منگل.....

□ □

□ □ □ □ □ بدھ.....

□

جمعرات.....

جمعہ.....

ہفتہ.....

اتوار.....

10. کیا آپ پچھلے ہفتے بیمار تھے، یا کسی چیز نے آپ کو اپنی معمول کی جسمانی سرگرمیاں کرنے سے روکا؟ (ایک چیک کریں۔)

جی ہاں.....

نہیں.....

اگر ہاں، تو آپ کو کس چیز نے روکا؟  
\_\_\_\_\_

Appendices L Literature Review Synthesis Table

Author (s) Name	Year of publicatio n	Purpose of Study	Study Design	Sample Size	Key Findings
Arat & Wong	2017	“To measure and assess self-reported student health and risk behaviors, and potential protective factors such as dietary behaviors and mental health, among 11-17 year-old students solely in low- and middle-income countries”	cross-sectional study	23,372 school-going young adolescents in six Middle-income countries between the years of 2003 and 2009	This study suggested that physical activity has a positive impact on the mental health of young individuals. However, it also revealed that there was a low level of physical activity across different countries. Furthermore, the study indicated that the relationship between various types of physical activity and mental health outcomes varies among countries, resulting in mixed findings regarding depression, loneliness, anxiety, suicidal ideation, and suicide attempts.
Al-Hazaa, H. M., Alahmadi, M. A., Al- Sobayel, H. I., Abahussain, N. A.,	2014	This study aimed to examine patterns and determinants of PA among Saudi adolescents.	Cross-sectional study	Sample size 2866	Around 44% of men and 20% of women reported being active (at least 1 hour of physical activity daily). In contrast to girls,

Qahwaji, D. M., & Musaiger, A. O.					boys in public schools were more active than those in private schools. Males exercise in public locations, whereas females typically exercise at home.
Ali, S., Tariq, S., Junaid, N., Tayyab, M. A., & Abbasi, F.	2022	“To measure the physical activity and participation in sedentary behavior of adolescents and to measure the association of physical activity and socio-demographic variables”.	cross-sectional study	Sample size 456	A majority of adolescents, over 60%, had sedentary lifestyles, with more than 80% being physically inactive. Additionally, 63% of students were unaware of the benefits of physical activity, and 54% never participated in any form of physical activity.
Archer	2014	“Health Benefits of Physical Exercise for Children and Adolescents”	Review article	-----	Physical activity has a direct and indirect influence on cognitive, emotional, learning, and neurophysiological domains; as a result, it is essential that this noninvasive, non-pharmacological intervention be included in children's and adolescents'

					long-term health programs.
Barbosa, A., Whiting, S., Simmonds, P., Scotini Moreno, R., Mendes, R., & Breda, J.	2020	The purpose of this umbrella review was to describe the research on the correlation between physical exercise and academic achievement in school-aged children and adolescents found in systematic reviews and meta-analyses.	Umbrella review	41 studies were included in this review	Academic success in school-aged children and adolescents does not appear to be negatively impacted by physical activity, and may even be benefited.
de Lima, T. R., & Silva, D. A. S.	2018	“The aim of this study was to estimate the prevalence of low physical activity levels and to identify related factors (sociodemographic, lifestyle, and body weight status) in adolescents.”	Cross-sectional study	They selected 1103 students aged 14-19 years	The occurrence of inadequate physical activity levels was 77.2%. Older students and individuals with lower monthly family incomes exhibited a higher tendency for insufficient physical activity levels."
de Moraes, A. C. F., Guerra, P. H., & Menezes, P. R.	2013	“To perform a systematic review of cross-sectional studies on the prevalence of insufficient physical activity (IPA) based on a WHO-defined cutoff point (< 60 min/d of moderate and	Systematic review	15 studies were included in this review	the prevalence of sufficient physical activity was greater among girls than boys and the developing countries had a higher prevalence.

		vigorous physical activity).”			
Cooper et al	2015	“To describe the objectively-measured physical activity and sedentary time patterns in youth”.	Literature review. “The International Children’s Accelerometer Database (ICAD)”.	20 studies in ten countries. 27,637 participant	At all age levels, boys showed higher levels of physical activity and lower levels of sedentary behavior compared to girls. Physical activity showed a 7% decrease per year after reaching the age of 10. Additionally, starting at age 5, there was an annual decline of 4.2% in physical activity.
Eather, N., Morgan, P. J., & Lubans, D. R	2013	“The aim of this study was to explore potential mediators of physical activity in the Fit-4-Fun program for primary school children.”	Group randomized controlled trial.	213 children were included in the study	The study findings illustrated that classroom teachers exert a substantial influence in encouraging physical activity engagement among children.
Euler, R., Jimenez, E. Y., Sanders, S., Kuhlemeier, A., Van Horn, M. L., Cohen, D., . . . Kong, A. S.	2019	“The objective of this cross-sectional secondary analysis was to compare baseline dietary intake and physical activity of adolescents by rurality.”	Cross-sectional study	940 adolescents	Their findings showed that there was a greater level of moderate-to-vigorous physical activity and a reduced amount of sedentary time compared to the urban area.

Hamdani et al	2022	“The purpose of this study was to evaluate the cross-sectional connection between subjectively perceived physical activity and health-related physical fitness indicators among the School-going adolescents in South Punjab, Pakistan”	Cross-sectional study	2970 participants	They concluded that MVPA emerges as a dependable and efficacious predictor of health-related physical fitness in adolescents attending school."
Ishii, K., Shibata, A., Adachi, M., Nonoue, K., & Oka, K	2015	The aim of the study was to “examine gender and grade differences in objectively measured sedentary behavior, physical activity, and physical activity guideline attainment among Japanese children and adolescents”.	Cross-sectional study	691 students aged 3-15 years	Boys and students in lower grades were more active and more likely to meet the criteria than girls and students in higher grades.
Imtiaz, ulHaq,Afaq, & Gillani,	2020	“The purpose of this systematic review and meta-analysis was to determine the prevalence of PA among adolescents, to determine the proportion of adolescents having PA in	A systematic review and meta-analysis	15 articles were included for analysis. All studies were conducted in school setting, with a total	The review indicated that Pakistani adolescents have a low level of PA. The findings of this review also suggested that the PA-related behavior of



		compliance with WHO recommendations and establish different prevailing PA patterns in the target population.”		sample size of 10,651	Pakistani adolescents are not yet fully understood due to unsatisfactory research quality and inconclusive findings.
Jabeen, I., Zuberi, R., & Nanji, K	2018	“To determine physical activity level and its correlational factors among secondary school adolescents.”	Cross-sectional study	216 students	Among the students, physical inactivity was associated with private schools lacking playgrounds, female gender, and insufficient parental support for sports.
Karkera, A., Swaminathan, N., Pais, S. M., Vishal, K., & Rai B, S	2014	“To evaluate and compare physical activity and physical fitness among urban school children and their rural counterparts.”	Cross-sectional study	650 students	According to their results, the rural areas’ children revealed superior performance compared to their urban counterparts in assessments of flexibility and cardiovascular endurance.
(Kiyani et al.	2021	“To explore individual, interpersonal, and organizational factors that may influence the physical activity of adolescents (ages 10–14) in	Cross-sectional study	618 students aged 10-14 age	They identified different factors that influence the PA level of students. In Individual-level factors, such as self-efficacy, motivation, attitude, and socioeconomic

		Pakistani schools”.			status, are robust predictors of physical activity. At the interpersonal level, adolescents' perceptions of familial support can significantly influence their engagement in physical activity. Furthermore, the existence of physical activity facilities in schools showed a positive correlation with physical activity levels.
Liu, et al	2021	To investigate the prevalence and associated factors of childhood overweight/obesity in the Shunyi district of Beijing, China.	cross-sectional survey	10,855 children aged 6–18 years	The prevalence of overweight and obesity among children aged 6–18 years was high with 17.62% and 29.05% in boys, 17.57% and 18.04% in girls, respectively 2. Children aged 9–11 years had a higher prevalence of obesity, but a lower percentage of being physically active.
Laird, Y., Fawkner, S., Kelly, P.,	2016	“The Role of social support on physical activity	systematic review and	84 studies were	The findings of the meta-analysis revealed

McNamee, L., & Niven, A.		behavior in adolescent girls”.	meta-analysis	included in this review	that while parents and friends can contribute to enhancing physical activity in adolescents, social support does not strongly predict physical activity levels in teenage girls.
Liu, M., Cao, B., Liu, M., Liang, X., Wu, D., Li, W., . . . Gong, C.	2021	“To investigate the prevalence and associated factors of childhood overweight/obesity in the Shunyi district of Beijing, China.”	cross-sectional survey	10,855 children aged 6–18 years	Obesity rates in children between the ages of 9 and 11 were high but the levels of physical activity were low.
Liu, W., He, M. Z., Wang, Y., Wang, Y., Zhou, Y., Wu, M., . . . Cheskin, L. J.	2017	“To determine whether dietary behavior, physical activity, and screen time varied among students in different stages of their education.”	Survey	55,361 out of which 46,611 students returned the online questionnaire	As educational level rose, screen time saw a corresponding increase, while physical activity, moderate exercise, and nutritional habits exhibited a decline.
Mahaur, G., & Badiger, S.	2018	“To assess the knowledge and patterns of physical activity among school children.”	Cross-sectional study	1000 students	Children attending government schools were found more physically active than those attending private schools.
Malik, A. S., & Chatterjee, K.	2022	The primary objective of the present study was to estimate	cross-sectional study	416 adolescents	In contrast to the urban population, where 33.2

		the percentage of rural and urban adolescents from Western Maharashtra who were not achieving adequate PA levels according to the current WHO recommendations for adequate PA.			percent of adolescents did not meet the required criteria for adequate physical activity, only 16.8 percent of rural adolescents fell into this category.
Marques et al.	2020	“This study aimed to present the worldwide, regional, and national prevalence of PA participation according to its frequency in adolescents”	Cross-sectional surveys	558,443 adolescents from 105 countries	The prevalence of daily physical activity (PA) decreases with age among boys and girls, from 28.2% at age 11-12 to 21.2% at age 16-17 for boys, and from 19.4% for girls.
Müller, A. M., Khoo, S., & Lambert, R.	2013	“To compile a literature review to establish baseline information that can generate additional research initiatives and awareness in other sectors leading to the implementation of focused PA programs”.	Literature review	30 articles were included in this review	The analysis of the publications also showed that Physical activity declines with age, with younger adolescence participating in PA at higher rates than older youth. Additionally, female youth engage in less physical activity than male youth in every country.
Pate, R. R., Saunders, R. P., Taverno	2022	“The purposes of this study were: 1) To describe	A multi-level,	Children’s ages range between 10	According to the results, children's levels

Ross, S. E., & Dowda, M.		the patterns of age-related change in total physical activity and MVPA in children transitioning from elementary to high school, and 2) To determine if those patterns differed across groups created on the basis of sex, race/ethnicity, socioeconomic status, and urbanicity.”	longitudinal study	and 17 years. And students of grades 5, 6, 7, 9, and 11 were selected.	of physical activity drop dramatically when they transition from elementary to middle school. kids who live in rural regions and kids whose parents have college degrees are more likely to experience this tendency than other kids.
Rasmussen, M., & Laumann, K.	2013	“This review examines the psychological benefits exercise is connected to in healthy children and adolescents”.	Review article	-----	Exercise appears to have a positive effect on some aspects of cognition and self-esteem in healthy children and adolescents.
Regis, M. F., Oliveira, L. M. F. T. d., Santos, A. R. M. d., Leonidio, A. d. C. R., Diniz, P. R. B., & Freitas, C. M. S. M. d.	2016	“To analyze the levels of physical activity and sedentary behavior in adolescents living in urban and rural areas.”	cross-section study	6,234 students	Rural youth were less exposed to sedentary behaviors and engaged in higher levels of physical activity.
Saleema Gulzar	2021	“This study aimed to provide an understanding of PA experiences of young adolescent	A sequential explanatory mixed methods design	671 students	Girls in higher grades participated in less moderate physical activity than younger girls.

		students and their influencing factors through the lens of students, PE teachers, and parents in Karachi, Pakistan.”			
Song, M., Carroll, D. D., & Fulton, J. E.	2013	“To examine the prevalence at which U.S. adolescents aged 12-17 years meet the 2008 Guidelines, and whether demographic and BMI variables influence that prevalence.”	Survey	6547 U.S. adolescents aged 12–17 years	Less than 20% of adolescents reported doing the required amounts of aerobic and muscle-building exercises.
Wilk, P., Clark, A. F., Maltby, A., Tucker, P., & Gilliland, J. A.	2018	“The purpose of this study was to test a conceptual model linking parental support and parental physical activity (PA), with children's perception of parental support and children's PA.”	Cross-sectional study	99 children from elementary schools	Parents' involvement is essential in shaping their children's healthy lifestyle habits.
Yelizarova et al.	2022	“To determine the level of physical activity among school-age children, and the impact of external and internal factors on their physical activity during the lockdown”.	Survey	1091 children 6–18 years old	There was a significant decrease in Moderate to Vigorous Physical Activity (MVPA) by 12.7% in 2021 compared to 2020. The study also found that

					female gender, chronic diseases, being overweight or obese, not participating in prearranged activities, and changes in temperature were factors that prevented students from achieving 60 minutes of MVPA per day.
Zhu, Z., Tang, Y., Zhuang, J., Liu, Y., Wu, X., Cai, Y., . . . Chen, P.	2019	The purpose of this study was “to provide updated estimates on the prevalence of meeting moderate-vigorous physical activity (MVPA) and screen viewing time guidelines, and overweight and obesity among Chinese school-aged children and adolescents, with a secondary aim examining variations in prevalence by sex, grade groupings, and residential location.”	cross-sectional	131,859 children (aged 7 to 19 years)	Overweight and obesity are still common among Chinese school-aged children and adolescents, and most do not meet the suggested levels of physical activity.