Alarming Low Physical Activity in Pakistani College Students Compared to American College Students

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Abstract

There are no studies that have investigated the physical activity (PA) trends in Pakistan, the 5th most populated country in the world. Therefore, the aim of this study was to identify trends and differences in PA between intercollegiate students in Pakistan and the US. Three hundred (167 US; 133 Pakistani) intercollegiate students completed a cross-sectional survey used to gauge the PA levels, barriers, and literacy of intercollegiate students in both countries. American students are more likely ($t = 97.27$, p -value $< .001$) to be moderate to highly physically active in comparison to Pakistani students. American female students were more ($t = 97.27$, p -value $< .001$) active than female students in Pakistan. Independent t-test showed significantly more major barriers to PA in Pakistani intercollegiate students (6.860 ± 5.56) when compared to American intercollegiate students (3.78 ± 3.94). Out of all students 59.6%, regardless of nationality, correctly recounted the standard PA recommendations, with 1.2% of those students being Pakistani. Pakistani students were physically inactive, faced more barriers, and had lower literacy of PA. This is a novel yet extremely valuable data set for understanding the current trends in the PA status of college students in the fifth most-populated country, 60% of which is younger than 30 years of age.

Introduction

Lack of physical activity (PA) recently has emerged as a major risk factor for chronic diseases, such as cardiovascular diseases (including hypertension and stroke), hyperlipidemia, obesity, depression, and anxiety.¹ Approximately 60% to 85% of the world's population are unable to reach the minimum recommended daily amount of PA; this is a stark but insufficiently addressed problem.² It is estimated that 2 million people die each year due to physical inactivity.³ It has also been reported that South Asians get even less PA.⁴ Caperchione et al.⁴ showed lower levels of PA in Punjabis (a state in Pakistan and India) living in Canada.⁴ South Asian countries have also shown to be at a higher risk for developing obesity, diabetes, and cardiovascular diseases.⁵ This increased metabolic risk in South Asians is due to multiple factors, primarily unhealthy diet and lack of PA coupled with genetic predisposition for chronic diseases such as diabetes and hypertension.⁵

It was also reported that the desire to walk, cycle, and be actively involved in sport or recreational activities was lower in South Asians when compared with the general population in the United Kingdom.⁶ It is interesting to note that most of the data collected to understand PA trends in South Asian communities is in Western societies, such as the United Kingdom or Canada.^{4,6} There is a shortage of data from people residing in South Asia, such as India, Pakistan, or Bangladesh; that data could give a better picture of PA trends and barriers to PA in South Asian communities. Ranasinghe et al.⁷ did a systematic review on the patterns of physical inactivity in South Asian countries and found that the country with the least amount of data on PA levels was Pakistan. There is a void in the literature regarding PA levels and barriers to PA in different population segments in Pakistan. Pakistan is the second largest country in South Asia after India. According to the US Census Bureau, it is the fifth most

populous country, consisting of approximately 220 million people. Interestingly, 60% of the Pakistani population is younger than 30 years of age. There is no available data on PA trends in Pakistani college students.

The primary purpose of this study is to identify the perception of, level of, and barriers to PA in college students in Pakistan. College students from different countries have been reported to have poor PA habits, which could lead to unhealthy BMI and increase the risk of other health problems.⁸ This study will serve as a first step in identifying the perception of, barriers to, and level of PA in college students in developing countries, such as Pakistan, and compare it with college students in developed countries, such as the United States. This study will help us in understanding the disparities in PA levels between the two countries. It will also help examine cultural and social barriers, if any, to physical inactivity. We hypothesized that college students in the United States would be physically active compared to Pakistani college-going students. In addition, we also hypothesized that students in the United States face comparatively fewer barriers to physical activity compared to students in Pakistan.

Results

Descriptive Statistics

The breakdown comparison of matriculation and socioeconomic status can be found in Figure 1. Pakistani students with a low physical activity level accounted for 53.4% of that group. Pakistani students with moderate and high levels of physical activity made up 34.6% and 12%, respectively. American students with a low physical activity level comprised 5.4% of that group. American students with a moderate physical activity level made up 45.5% and the remaining 49.1% reported high levels of physical activity (Figure 2). Regardless of nationality, 59.2% of all respondents reported having knowledge of the standard physical activity recommendations, while 20.4% and 28% reported not being aware or not being sure of these recommendations, respectively. Within the Pakistani student population, 31.8% reported being aware of physical activity recommendations, compared to 80.8% of the American students. Out of the responses received, 59.6% of all students, regardless of nationality, correctly recounted the standard physical activity recommendations, with 1.2% of those students being Pakistani (Figure 3).

Group Comparisons

Chi squared analysis revealed a statistically significant association between nationality and physical activity level ($\chi^2=97.27$, $p\text{-value}<.001$). American students were more likely to be moderately to highly physically active in comparison to Pakistani students. Statistical significance was also maintained when biological sex was added to the analysis ($\chi^2=97.27$, $p\text{-value}<.001$). American female students were more likely to be moderately to highly physically active in comparison to Pakistani female students; the same was true for American and Pakistani male students. Within the Pakistani students, an association

was found between sex and physical activity, revealing that female students in that group were more likely to exhibit low to moderate levels of physical activity compared to their male counterparts ($\chi^2 = 6.99$, $p\text{-value} = .030$). In contrast, there was no association between sex and physical activity level within the American students; male and female students were statistically equally physically active. An association regarding nationality and knowledge of physical activity recommendations revealed American students were more likely to report knowledge of these recommendations compared to Pakistani students ($\chi^2 = 81.86$, $p\text{-value} < .001$).

Access and Barriers to Physical Activity

Chi squared analysis reveal a statistically significant association between nationality and access to adequate healthcare facilities ($\chi^2 = 53.171$, $p\text{-value} < .001$). American students were more likely to have access to adequate healthcare facilities. Within the American student group, 98.2% reported having access to healthcare facilities when needed, compared to 67.7% of Pakistani students. Independent t -tests revealed a significant difference between American and Pakistani students regarding the number of minor ($F = 12.28$, $p\text{-value} = .001$) and major ($F = 17.48$, $p\text{-value} = .001$) barriers to physical activity. American students reported 19.40 ± 5.55 of those barriers as minor or not a barrier and 3.78 ± 3.94 as major barriers. Pakistani students reported 12.53 ± 6.87 of those barriers as minor or not a barrier and 6.860 ± 5.56 as major barriers. No statistically significant difference was found between the sexes within the American and Pakistani groups related to the number of minor and major barriers reported. American males and females reported similar numbers of minor and major barriers; the same was shown for Pakistani male and female students. The top five barriers reported are shown in Table 1.

Table 1

Physical Activity Level Comparison

American Students	Pakistani Students
Lack of Time (60.5%)	Lack of Time (51.9%)
Other Priorities (53.9%)	Other Priorities (49.6%)
Lack of Energy (37.7%)	Lack of Motivation (48.9%)
Lack of Motivation (30.5%)	Lack of Access Opportunities Such as Nearby Facilities (39.1%)
Feeling Uncomfortable; Intimidated in Exercise Surroundings (18%)	Lack of Workout Partner (37.6%)

Discussion

This is a unique study in which the college-aged student populations of the United States and Pakistan were compared in terms of their PA levels and barriers to physical activity. There were significant differences found in the PA levels, barriers to physical activity, and knowledge of recommended levels of PA between the two groups, with Pakistani college students being physically inactive, facing more barriers, and having less knowledge of PA compared to their American counterparts. Individuals are physically inactive if they fail to meet the following criteria: 30 minutes of moderate intensity physical activity on at least five days every week, or 20 minutes of vigorous intensity physical activity at least three days a week.⁹ Our study showed that 53.40% of Pakistani college students were physically inactive compared to 5.40% of American college students. Physical inactivity and sedentary lifestyle can have negative implications for any society, creating health problems that can lead to greater economic burden and cognitive decline over time.

Physical inactivity is identified as the fourth major risk factor for global mortality, causing an estimated 3.3 million deaths globally (WHO, 2008).¹⁰ Moreover, it has been identified that physical inactivity can increase the risk of chronic illnesses, such as cardiovascular disease, breast and colon cancer, depression, diabetes, and respiratory illness; these conditions could be avoided with adequate exercise.^{11,12} It is certain that physical inactivity can result in enormous economic and health burdens for managing these chronic conditions.¹⁰ This study found that current PA trends in Pakistan are abysmal and demand closer attention. Health habits developed during young adulthood can spill over to the next decades of one's life and during old age and can affect life expectancy.^{11,13} In particular, college-aged adults PA behavior can be modulated to determine future health.¹³ This study provides an explanation for

higher obesity rates found in Pakistani adults in a recent study.¹⁴ Asif et al.¹⁴ showed that obesity rates in Pakistani adults were higher than in the United States and other countries. They indicated one reason for this could be physical inactivity but could provide no available data, noting it as one of the limitations of their study.¹⁴ The findings of this study could prove that the higher obesity rates found in the Pakistani population could be because of lower PA trends in college students. South Asian communities are already at higher risk of developing chronic diseases.¹⁵

South Asian immigrants from Bangladesh, Pakistan, and India in the United Kingdom have a 3- to 5-times higher risk of developing diabetes when compared with the white population.¹⁵ A large number of physically inactive college-going students should be a public health concern and may increase the burden of chronic diseases on the already overburdened Pakistani healthcare system in the next 10 to 20 years; this could be prevented by taking urgent measures to promote physical activity.¹⁰ Previous work has demonstrated a strong association between physical activity and improved cognition in children.¹⁶ Physical activity, especially aerobic training, can have many beneficial effects on the human brain. Evidence from animal studies suggests molecular and cellular changes due to PA may have a positive effect on cognition.¹⁷ Physical activity has been shown to improve angiogenesis and neurogenesis in rat brain, which may have beneficial effects on cognition.¹⁷ Both lower-duration or lower-intensity PA can result in cognitive decline.¹⁸ The findings of the current study are of great significance because they show that a large number of Pakistani college students are physically inactive. In addition, compared to U.S. college students, Pakistani college students have a sedentary lifestyle; only 1.2% of them knew the recommended levels of PA compared to 59.6% of American college students. Interestingly, 60% of the 220 million Pakistani population is younger than 30 years of age, comprising more than 120 million people. This puts developing countries, such as Pakistan, at significant risk; their citizens could be at a cognitive disadvantage when compared to college graduates in developed countries, such as the United States.

Of note in this study is the gender difference found in Pakistani college students: men are more physically active than women. Interestingly, these differences were not observed in American college students. Based on nationality, only 7% of Pakistani college female students were involved in high-intensity physical activity, compared to 22% of Pakistani male college students (Figure 5). In comparison, 52% of college-going U.S. female students were involved in high-intensity physical activity, compared to 41% of males. Stratifying among the female participants of this study, 88.7% of Pakistani college-going female students were physically inactive compared to only 11.30% of U.S. American college-going females (Figure 4). This difference shown between male and female college student in PA could be due to the structure of Pakistani society and culture. Apart from a generic lack of awareness regarding recommended PA levels, socio-cultural barriers may preclude women from regularly participating in PA. Pakistan is a Muslim society and the lack of separate fitness facilities or separate hours for women may be a major reason for the difference in PA. A potential solution could be the creation of safe exercise spaces where women can comfortably work out. Another unique aspect of this study was understanding the barriers to PA. We found that Pakistani college students reported significantly more major barriers to PA than American college students (Table 1). Pakistani college students reported lack of access to

opportunities, such as facilities being close to them, as one of the five top barriers; the U.S. students did not report the same barrier. This calls for embedding PA in health policy at the governmental level so that there are more opportunities and conducive environments are created for students to participate in PA.

Physical activity has become a part of national discourse at the governmental level and coalesced as an essential element of public health in healthcare policy in developed countries such as the United States.¹⁹ The Centers for Disease Control and Prevention in the United States have played an integral role in bringing evidence from science into policy and practice, resulting in improvement in PA and health.¹⁹ This may explain why college students in the United States are significantly more active than Pakistani college students, and are also more aware of PA recommendations when compared to their Pakistani counterparts. Moreover, the International Health, Racquet and Sports Club Association's 2019 global report showed that the number of health club consumers increased by 27% from 2010 to 2019 in the United States, which indicates the effectiveness of inculcating PA in healthcare policy at the governmental level. The number of healthcare club consumers soared from 58 million in 2010 to 73.6 million in 2019. A similar shift in the policy needs to be administered at the governmental level in Pakistan to avoid an enormous socioeconomic burden in the form of an impending healthcare disaster that could unfold in the next few decades.

Limitations:

Our study is not without limitations. First, this is a cross-sectional design that is, by default, limited to understanding the reasons that caused the behaviors favoring physical inactivity in Pakistani college students. Due to a general lack of data, we are unable to make comparisons to any previous data reported on the physical activity trends of Pakistani college students or adults, which makes it difficult to analyze when this shift to being more physically inactive happened in the Pakistani society.

Conclusion

In conclusion, this study presents a novel yet extremely valuable data set for understanding the current trends in the PA status of college students in the fifth most populated country, 60% of which is younger than 30 years of age. This study may serve as a first whistleblower for an impending public health disaster in next 20 to 30 years due to lack of PA in the Pakistani population, and may serve as a starter for further investigations and interventions to reduce sedentary behavior, spread awareness, and encourage PA in college students or youth in Pakistan. In addition, this study also helps to understand the disparities in global health research and science between developing and developed countries; there is a significant shortage of data and research happening in developing countries such as Pakistan to make informed clinical decisions. PA activity is of critical importance to improving lifelong health and reducing the risk of morbidity and mortality. However, a majority of Pakistani college students are physically inactive, lack awareness, and face more barriers to PA. This merits serious governmental attention at the policy level to take necessary steps to promote behaviors that can encourage PA in the country's youth.

Methods

This cross-sectional study was conducted from January 15, 2019, to March 30, 2019, simultaneously in the United States and Pakistan. A convenience sample was obtained from college students in both Pakistan and the United States. Participant eligibility was based on the on the following criteria: a) age (18-28 years), b) fluent in English, and c) No mental disorder. Institutional Review Board (IRB) approval was obtained from University XXX IRB and all participants provided informed online consent before filling out the survey and research were performed in accordance with relevant guidelines and regulations. There was no need to translate the survey in Urdu, the national language of Pakistan, because college-level education in Pakistan is delivered in English. College students from Pakistan and the United States participated in this study. The survey was fully confidential and anonymous and no identifiable information was collected. Participation was voluntary and only completed surveys were included for data analysis. In Pakistan, 290 college students attempted to fill out the survey; two did not give consent, 155 did not complete the survey, and 133 completed the survey (21.05 ± 2.09 years of age, 87 females). Participants were not provided compensation for completing the study. In the United States, 178 college students attempted to fill out the survey, and 167 completed it (20.37 ± 1.22 years of age, 128 females).

Instruments:

Data were collected using the electronic questionnaire on the Qualtrics Research Suite posted through social media, such as Whatsapp, and emails. Participants first provided demographic information (e.g., age, gender, major, marital status). After that, the International Physical Activity Questionnaire (IPAQ)²⁰ was used to gauge PA levels and trends in students from both countries. The IPAQ short form is a questionnaire developed to monitor the physical activity in adults. IPAQ is considered to be a reliable and valid instrument for PA surveillance; it was tested in 12 countries (14 sites) in 2000.²⁰ Findings suggest that IPAQ is an acceptable instrument used to gauge PA trends in many settings and different countries. The instrument consists primarily of seven items relaying information about sedentary, moderate, and vigorous PA levels during the last seven days. For sedentary behavior, participants were asked to report the average time spent sitting (sitting and lying down awake at work, at home, while doing course work, and during leisure time). Based on the IPAQ, moderate PA is categorized as activities (such as carrying loads, bicycling at a regular pace, badminton, tennis, etc.) that cause an increase in respiration rate, heart rate, and sweating for a minimum of 10 minutes, which is equivalent to three to six metabolic equivalents (MET).²¹ Similarly, vigorous PA comprises those activities (such as heavy lifting, digging, aerobics, or fast bicycling) that produce a vigorous increase in the respiratory rate, heart rate, and sweating for a minimum of 10 minutes, which is equivalent to six or more MET.²¹ IPAQ can inform about PA levels in students of two countries; however, it cannot determine the perceived barriers to PA for these students.

The Perceived Barriers to Physical Activity Questionnaire (BPAQ) was used to understand the different perceived barriers to PA in college students in the two countries.⁹ The BPAQ consists of 26 items; each item is a perceived internal barrier (e.g., lack of confidence, lack of a partner, lack of facilities etc.). Each

item is scored on a numerical scale from 1-10, with 1 representing *not a barrier* to 10 being a *major barrier*. Respondents addressed each barrier by rating them using the numerical scale.

In addition, participants were also asked whether they knew the recommended level of physical activity to gauge their literacy regarding weekly physical activity recommendations.

Statistical Analysis:

Descriptive statistics were calculated for the respondents' age, sex, matriculation information, and household income (frequency, mean, mode, and standard deviation). Chi-square analyses were performed to evaluate associations between the categorical variables. The categorical variables included in this analysis comprised of nationality, sex, physical activity level, and access to healthcare facilities. Independent *t*-tests were conducted to evaluate the mean difference between independent variables of nationality and sex regarding minor and major barriers to physical activity. Twenty-six common barriers to physical activity were listed for respondents to choose. Barriers were considered minor or not a barrier when given a score of 1 to 4 and major when given a score of 7 to 10 on a scale from 1 to 10. The number of minor and major barriers were calculated for each respondent to conduct pertinent *t*-tests. Alpha was set to a level of $p \leq 0.05$ for all analyses.

Declarations

Funding: There was no funding available for this study.

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Patient consent for participation: All subjects provided informed written consent before participating in this study.

Data availability statement: Data are available upon reasonable request from the corresponding author (Abbis Jaffri; abbis.haider@gmail.com)

Ethics approval: The study was approved by the University of Virginia Institutional Review Board ([UVA SBS-IRB # 2019-0012](#)).

Contributors: The first author, UAJ, completed all data collection and most of the writing of this manuscript. All coauthors contributed substantially to the conception and design of the study, provided important revisions, and approved the manuscript. All authors understand that they are responsible for all aspects of this work and ensure the accuracy and integrity of this manuscript.

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Figures

Figure 1

Student Matriculation Comparison

Figure 2

Physical Activity Level Comparison of College Students between the Two Countries.

Physical Activity Recommendations

Figure 3

Physical Activity Recommendations Awareness Reported by Respondents

Figure 4

Physical Activity Comparison within Gender between the Two Countries Based on Different Physical Activity Levels

Figure 5

Infographics