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Returning to school: An overview of physical activity behaviors among adolescents during Coronavirus pandemic: A cross-sectional survey pilot study

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A self-report questionnaire was employed in this pilot study to visualize PA behaviors among adolescent males and females after the reopening of schools during the COVID-19 pandemic living in an urban city. A total of 124 adolescents, 13 to18 years old, from various secondary and high schools, participated in this cross-sectional study. The participants completed the questionnaire remotely using a digital platform self-administered questionnaire, the PAQ-A, to assess their PA over the last week. The high score of PAQ indicates higher levels of PA, and we calculated the mean score of all items for the analysis. We used an independent t-test to compare gender by using SPSS Statistics Software version 25.0 and set the p-value cutoff of ≤0.05 for the level of significance. Females were more physically active than males, and there were significant differences in the cumulative (P-value: 0.018) and mean score (P-value: 0.018) between females and males. Physical activities such as walking, Jogging, Tag, and in-line skating activities were significantly higher in females with mean 3.71±1.39, 2.90±1.44, 2.68±1.36 and 1.51±1.08, respectively as compared to males with mean 2.58±1.17, 2.03±1.07, 1.60±0.74 and 1.13±0.40 (P<0.05). In addition, the overall physical activity of the female study participants in their spare time was significantly higher than males, with mean scores of 1.79±0.71 and 1.39±0.28, respectively (P<0.01). The study findings showed that the overall physical activity of the entire sample significantly declined as a result of the COVID-19 pandemic. However, the females were found to be more active than males.

Keywords: Physical Activity; adolescents; COVID-19; returning to school; school activities; Saudi Arabia

INTRODUCTION

An individual needs to remain physically active, and it is even more crucial for adolescents to be active as they are in the growing phase of human development (Margaritis et al. 2020). During this phase, multiple psychological and social changes occur, shaping an individual's body and influencing their health in adulthood (Margaritis et al. 2020). Therefore, the World Health Organization (WHO) recommends that an individual of 5 to 17 years of age should perform moderate to vigorous physical activity (MVPA) for ≥ 60 minutes each day (Shahidi, Stewart Williams, and Hassani, 2020; "World Health Organization. Global Action Plan on Physical Activity 2018–2030: More Active People for a Healthier

World; World Health Organization: Geneva, Switzerland, 2018.,"). This will not only maintain the fitness of an individual but also help them prevent long-term illnesses such as cardiovascular diseases, obesity, and Diabetes Mellitus. Further, the studies show that the physical activity (PA) of young individuals during school time should include at least 50% of MVPA lesson time (Frömel, Svozil, Chmelík, Jakubec, and Groffik, 2016) and 50% of MVPA recesses time (Stratton and Mullan, 2005). According to a previous systematic review and meta-analytic studies, high school students should spend 35.9% of their school time in MVPA (Hollis et al. 2017). Unfortunately, over 81 percent of young aged 11–17 stated that they did not reach the standard PA guidelines of 60 minutes of MVPA per day (Guthold, Stevens, Riley, and Bull, 2020).

Despite PA's short-term and long-term benefits for adolescents, it has been found that adolescents remain physically inactive, and over the past few decades, the level of adolescents' PA has decreased dramatically (Guthold et al. 2020; Smith and Lim, 2020). According to the WHO, 75% of adolescents do not meet the recommended guidelines of PA (Konstabel et al. 2014; "World Health Organization. Global Action Plan on Physical Activity 2018–2030: More Active People for a Healthier

World; World Health Organization: Geneva, Switzerland, 2018.,"). Furthermore, the PA declines by roughly 7% per year in adolescents as they get older (Štefan et al. 2018). This issue of physical inactivity is

further worsened by the ongoing pandemic of COVID-19, which has affected human life due to lockdowns, social distancing, and other policies (Smith and Lim, 2020). One vulnerable group of the population, children, and adolescents, affected severely by this pandemic (Ammar et al. 2020). Schools were closed and confined to homes, which subsequently made them more inactive and pushed them to a sedentary lifestyle with harmful effects of physical inactivity (Margaritis et al. 2020; Stockwell et al. 2021). Thus, various government-imposed limitations such as banning school and sporting activities and other restrictions resulted in increased health-risk behaviors (López-Bueno, López-Sánchez, et al. 2021). These regulations may negatively affect populations' physical, mental, and social health and mainly among adolescents and children (Bann, Scholes, Fluharty, and Shure, 2019; Bucak, Almis, Tasar, Uygun, and Turgut, 2021; López-Bueno, Calatayud, et al. 2021; Maltoni et al. 2021; Panda et al. 2021). While after a period of strict restrictions and lockdowns, it appears that countries have attempted to reopen the institutions and have started reverting to in-person life gradually, it appears that the levels of physical activity may not have resumed back to normal (Sheikh, Sheikh, Sheikh, and Dhami, 2020). This could be potentially due to fear of being affected by the virus or becoming a victim of a new variant of the virus (Krok, Zarzycka, and Telka, 2021). However, before making any definitive conclusions about the levels of PA, it is important to assess such behaviors using validated and reliable tools.

Researchers in developed countries have made attempts to examine physical activity behaviors before and during pandemics using self-reported questionnaires (Lopez-Valenciano, Suarez-Iglesias, Sanchez-Lastra, and Ayan, 2020; Violant-Holz et al. 2020). The PA questionnaires and accelerometers have been frequently used to determine activity levels, with part of them assessing activity levels based on energy expenditure and others monitoring the activities (Andarge, Trevethan, and Fikadu, 2021; Bervoets et al. 2014; Kowalski, Crocker, and Donen, 2004; Voss, Dean, Gardner, Duncombe, and Harris, 2017). One of the prevalent self-reported instruments for evaluating PA in this population is the Physical Activity Questionnaire for Adolescents (Biddle, Gorely, Pearson, and Bull, 2011; Kowalski et al. 2004).

Despite worldwide predictions of a decline in PA among adolescents due to the COVID-19 epidemic and accompanying lockdowns, social distancing, and social isolation, studies investigating the PA after returning to school are limited in Saudi Arabia. Therefore, a self-report questionnaire was applied in this pilot study to visualize PA behaviors among urban adolescent males and females after the reopening of schools during the COVID-19 era. Without understanding such behaviors, it would be hard to devise some programs or strategies for adolescents to help them to remain physically active. To investigate such behaviors, we undertook this study to examine the extent of physical activity among adolescents in Saudi Arabia.

MATERIALS AND METHODS

Study Design and Participants

A cross-sectional survey pilot study was conducted among adolescents of Saudi Arabia by approaching study participants remotely. A total of 124 adolescents aged 13 to 18 years from various secondary and high schools participated in this cross-sectional study. All participants were healthy, without any musculoskeletal pain or neurological diseases, frequently took part in physical education, and participated in sports events. All study participants were well informed about the purpose and other details of the study in advance, and the consent and assent were sent to them electronically. The participants answered the PAQ-A once, and The Ethical Board approved the study.

Data Collection Tool

A self-administered questionnaire, the PAQ-A, was employed to evaluate the PA of the adolescents on the last 7-days. This questionnaire consists of nine items; the first seven items collected information about the participants' activities in different sports, activities while taking physical education classes, lunch, after school, evening, and weekend. Each item was scored 1 point as low PA (no PA) and 5 points as very high PA (7 times or more). The high score of PAQ indicates higher levels of PA. The ninth item was not used to calculate the activity score, as it asked the study participants if they were ill, which prohibited them from participating in any routine PA. The mean value of items 1-7 resulted in the summary score of the overall final PAQ activity. In addition, participants were asked for their physical activities in their spare time, and responses were recorded on a scale ranging from 1: No PA to 5: PA at least 7 times. Comparison of scores between males and females was done across various activities. We also assessed the PA such as playing sports, games, dancing, or any other PA of study participants for every day in the last seven days where they were asked to rate themselves on a scale ranging from 1: None to 5: Very often on the frequency of physical activities they did in the last one week.

Study Procedures

A self-administered questionnaire, the PAQ-A, was employed remotely through digital platform to evaluate the PA of the adolescents on the last 7-days. This questionnaire consists of nine items; the first seven items collected information about the participants' activities in different sports, activities while taking physical education classes, lunch, after school, evening, and weekend. Each item was scored 1 point as low PA (no PA) and 5 points as very high PA (7 times or more). The high score of PAQ indicates higher levels of PA. The ninth item was not used to calculate the activity score, as it asked the study

participants if they were ill, which prohibited them from participating in any routine PA. The mean value of items 1-7 resulted in the summary score of the overall final PAQ activity. Moreover, participants were asked for their physical activities in their spare time, and responses were recorded on a scale ranging from 1: No PA to 5: PA at least seven times. A comparison of scores between males and females was made across various activities. We also assessed the PA such as playing sports, games, dancing, or any other PA of study participants for every day in the last seven days where they were asked to rate themselves on a scale ranging from 1: None to 5: Very often on the frequency of physical activities they did in the last one week.

Data Analysis

Since this was a descriptive paper, we primarily focused on the descriptive analysis to investigate the physical activity behaviors among adolescents by using SPSS Statistics Software version 25.0. After checking the normality of the distribution for various types of PA scores, such as mean scores and cumulative scores, we used an independent t-test to make comparisons across gender. Next, we calculated means and standard deviations for numerical variables such as age and PA scores and proportions for gender. Independent t-tests were used to compare gender, males, and females in answering the questionnaire. A p-value of ≤0.05 was considered statistically significant.

RESULTS

Table 1 shows the age and gender distribution of the study participants. We were able to enroll 124 participants in this study, and the majority of them were females 84 (67.7%). The mean age of males and females was 13.40±2.43 and 15.58±1.89, respectively.

Table 1: Age and Gender distribution of study participants

Characteristics	Male	Female	Total
Gender (n, %)	40 (32.3%)	84 (67.7%)	124 (100%)
Age (Mean±SD)	13.40±2.43	15.58±1.89	14.88±2.31

Whereas table 2 demonstrates the differences in the cumulative and average physical activity scores by gender. The study findings revealed that females are more physically active than males, and there were significant differences in the Cumulated Score (P-value: 0.018) and mean score (P-value: 0.018) between females and males. However, no statistically significant difference was found in the weekly average score between the two. More precisely, physical activities such as walking, Jogging, Tag, and in-line skating activities were significantly higher in females with mean 3.71±1.39, 2.90±1.44, 2.68±1.36 and 1.51±1.08, respectively as compared to males with mean 2.58±1.17, 2.03±1.07, 1.60±0.74 and 1.13±0.40 (P<0.05). Besides, dancing activity was significantly higher in females than males, with a mean score of 3.51±1.45 and 1.23±0.62, respectively. Furthermore, street hockey and volleyball playing were seen considerably more in females than males (P<0.05). Additionally, the results demonstrated that the overall physical activity of the female study participants in their spare time was significantly higher than males with mean scores of 1.79±0.71 and 1.39±0.28, respectively (P<0.01).

Physical activities question during physical education classes, recess, lunch, right after school, evening, weekends demonstrate the physical activity of study participants during physical education (PE) classes, recess, lunch, PA after school ends, evening, or on weekends.

Table 2: Comparison of Cumulated scores, average scores of Physical activities in spare time and activities during each day last one week

Component	Gender	N	Mean	Std. Deviation	t-value*	P-value
Q1: Cumulated Score	Male	40	66.78	18.06	-2.388	0.018
	Female	84	77.82	26.44		
Q1: Mean Score	Male	40	1.80	0.49	-2.388	0.018
	Female	84	2.10	0.71		
Q8: 7 days Average	Male	40	2.45	1.10	-0.548	0.585
	Female	84	2.56	0.99		
	Total	124	2.52	1.02		

* Independent Sample t-test, Significant if P<0.05

Similar to overall higher physical activity in females, females were more active during lunchtime and right after school than males. However, we did not find any statistically significant differences in the activities during PE classes, recess, evening time, and weekends among the males and females.

The next question about how often they did the physical activity (like playing sports, games, dancing, or any other physical workout) daily for the last week shows the PA playing games and sports, dancing, or any other PAs every day last seven days. Again, we did not find any statistically significant difference across gender (P>0.05) for all types of physical activities performed every day over the last seven days.

While assessing the physical activity during spare time, it was found that the median score of females was higher (1.6) than males (1.3), as shown in figure 1. Likewise, the seven-day median score was also higher for females (2.57) than females, as shown in figure 2. Similarly, the cumulated median score for females was 74.50 versus 62.00 for males (Figure 3).

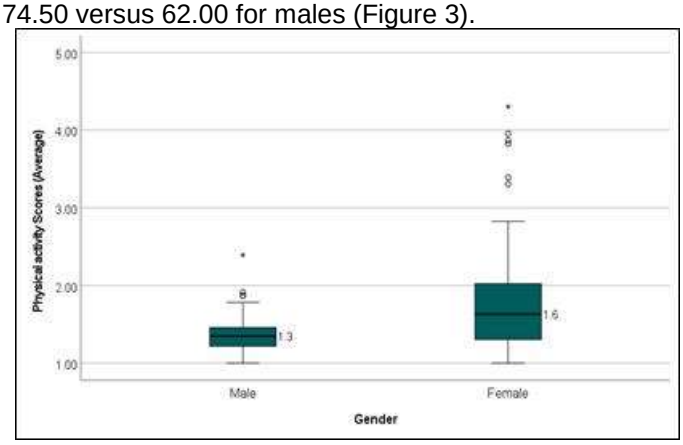

Figure 1: The physical activities (1-23) during spare time between the males and females in the past seven days

Physical activity Scores during the spare time (Average: Q1. Activities 1-23)

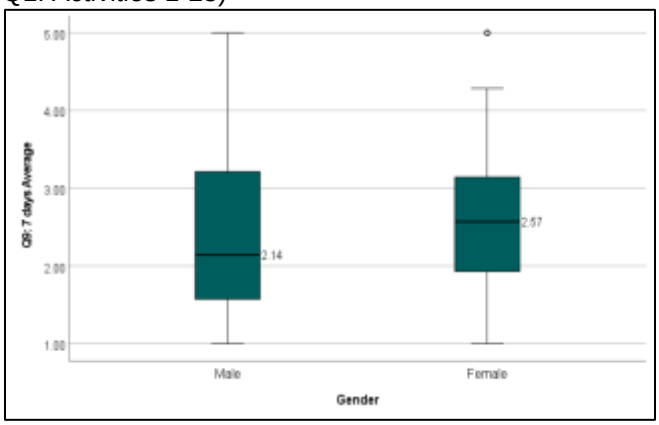

Figure 2: Seven-day median score of the males and the females of all the items

Q9: 7 days Average

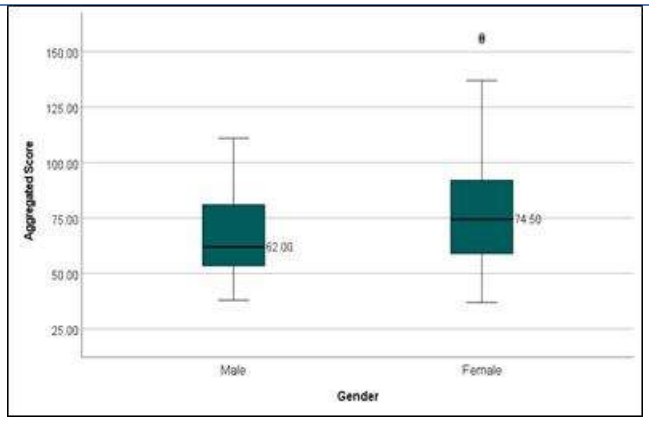

Figure 3: The final PAQ-A activity summary score for each of the eight items.

Cumulated Scores (All 3 items- Q1 to Q8)

DISCUSSION

The COVID-19 virus has impacted adolescents' physical activity, and they are perhaps affected more than any other age group. The current study aimed to assess the PA behaviors among adolescents aged between 13 and 18 years after returning to school during the COVID-19 era. This study reveals significant findings with meaningful implications. One hundred and twenty-four adolescents participated in this study, out of which 84 were females and 40 were males. The study findings showed that the overall physical activity of the entire sample significantly reduced due to the COVID-19 era. However, the females were found to be more active than males. For example, in sports activities overall, females were more physically active than males, and females were highly active during lunchtime and right after school compared to males. However, we did not observe any statistically significant differences in the activities during physical education classes, recess, evening time, and during the weekends.

The current study's findings are consistent with a study performed in Croatia to assess the differences in PA between urban and rural adolescents (Zenic et al. 2020). Overall, like the current study, a study conducted in Croatia showed decreased physical activity in the total study sample. However, this study did not assess the differences between females and males (Zenic et al. 2020). Similarly, studies conducted in the USA, Bosnia, and Herzegovina, and a multicounty study conducted in Europe and Latin America showed a decline in physical activity among adolescents due to COVID-19 (Bates et al. 2020; Gilic, Ostojic, Corluka, Volaric, and Sekulic, 2020; Ruíz-Roso et al. 2020). However, unlike the current study, the multicounty study found males to be more active than females before or during quarantine than females. Moreover, a study from Canada also reveals that males are more active than females during this pandemic (Guerrero et al. 2020). In contrast, another study conducted in Portugal revealed a low physical activity

among rural males than urban males, but the same findings were not confirmed among females (Machado-Rodrigues et al. 2014).

The similarities in decline in physical activity across most of the studies show that the overall COVID-19 crisis has affected the activity levels of adolescents. Similarly, a scoping review found that males are more likely to be physically active than their females' counterparts, which also contradicts our study findings (Rossi, Behme, and Breuer, 2021). These differences in the levels of physical activities between males and females with dissimilarities across different studies could be due to factors operating at the individual, environmental, social, or political levels. For example, males may not be more determined or have less will to perform physical activity than females, or females may be more cautious of maintaining their figure than males. In addition, another reason for the decline in physical activity in males could be the lack of physical activity replacement programs for organized activities. However, it would be worth exploring these differences in future studies to investigate why females are more active in Saudi Arabia than males. Without having robust evidence, it would be demanding to make a firm conclusion about these gender-related differences in the levels of PA.

Strengths and Limitations

Like other surveys, this current study has few strengths and limitations; therefore, study findings need to be interpreted cautiously. First, this study is the first of its kind that has attempted to determine physical activity behaviors among adolescents in Saudi Arabia concerning the period of the COVID-19 crisis. Thus, this study will be helpful to develop some programs or strategies to improve physical activity in adolescents overall and mainly for males. Second, we used a validated and reliable physical activity questionnaire that has been used in several previous studies during the era of pandemics (Aggio, Fairclough, Knowles, and Graves, 2016). Third, the overall response rate of the participants was good, with negligible missing information on any of the variables. Lastly, since we collected data from Riyadh, the capital city in Saudi Arabia, the study's findings could be generalized to Saudi Arabia and surrounding areas with similar characteristics of the study population and similar social and environmental factors.

However, our study findings should be interpreted with some limitations. First, since this was a cross-sectional study, we could not study the temporal relationship between various study factors and physical activity. Therefore, we propose to carry out large cohort studies in the future to study the temporality between all suitable domains and the outcome of interest to rule out the possibility of reverse causation. However, it is crucial to notice that cross-sectional studies have been conducted in the literature to examine this objective, and hence our results are worth contemplating. Second, our sample size was small, and we enrolled study subjects by convenience sampling rather than selecting them randomly, which may have prevented us from having a representative sample of physical therapists from Saudi Arabia. Besides, due to the small sample size, it is plausible that the study was not powered enough to essential differences between the males and females. Also, this study only collected data on gender and age, and data on important variables such as education, built-in environments, support groups, parent's support, and other important variables were not collected. Therefore, we propose to undertake more extensive studies in the future that should explore the determinants of physical activity among adolescents. This would help researchers identify and target the potential physical activity barriers both at individual and organizational levels.

Implications for Future

The current findings warrant devising some suitable preventive strategies such as exploring the reasons for low physical activity in general and particularly in males. Although further, it is acknowledged that one should maintain social distancing and take precautions during the pandemic, this should not prevent an individual from remaining active in life to prevent her or himself from a sedentary lifestyle. Once the reasons for such low physical activity are explored, it would be easy to develop some physical activity programs or awareness sessions among adolescents and provide them access to physical activity equipment or a conducive environment suitable for physical activity.

Adolescents should be physically active without being at the risk of getting infections to themselves or their peers. Physical activities can be planned at the individual level as COVID-19 may not prevent oneself from walking or dancing or performing stretching exercises at his or her own time and pace. Also, if planned wisely, one can plan group-level activities in schools or colleges where recommended social distance can be maintained, and small groups can be developed for some group-based physical activities. This will not only keep the adolescents active but also will keep them motivated as they can feel better and encouraged while being in the groups versus performing the activities separately.

This was the first study of that attempted to assess the physical activity behaviors among adolescents in Saudi Arabia after returning to school. There is a need to conduct further epidemiological studies to assess physical activity's determinants or facilitators and barriers. This will help researchers understand the behaviors of physical activity in a significant age group of the population and devise cost-effective and sustainable strategies to ensure a high level of physical activity among adolescents. This will, in turn, prevent them from developing obesity and other associated health problems such as cardiovascular diseases and diabetes mellitus later in adult life.

CONCLUSION

While it appears that overall physical activity has declined among adolescents, which may be due to the strong direct impact of the COVID-19 pandemic and restriction on adolescents' physical and emotional behaviors, however, the females were found to be more active than males during school days.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

The author, A.A., designed and performed the research study. A.A. collected, analyzed the data, and reviewed the manuscript. The author read and approved the final version.

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