

## The effect of wearing fitness trackers and increased physical activity in students of health colleges, Jeddah, Saudi Arabia



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**Abstract— Background:** Regular physical exercise is one of the most effective health-promoting activities, and devices such as activity trackers are normally worn on the wrist or waist to record physical activity. No data were found about the effect of physical exercise in medical students. **Aim:** In this study, we aim to measure the prevalence of using activity trackers in students at health colleges in Jeddah, Saudi Arabia and to compare the physical activity between the students who are wearing such these devices. **Method:** We performed a cross-sectional study among students who are enrolled in the academic year 2016–2020. We included all health collegestudents. Arab Teens Lifestyle Study questionnaire (ATLS) was used to assess the self-reported physical activity. **Results:** In total, 258 students with a mean age of  $23.36 \pm 1.77$  were included; 131 (50.8%) of them were male. Majority of students (172, 66.7 %) were studying medicine, and more than half of them (52.3%) are on their 6th year. As per our findings, 44.2% of the total participants do not engage in physical activity. The percentage of using fitness tracker was 32.6%; moreover, only 33 (51.5%) students reportedly use it for 24 hours. The average number of steps, distance, and time per day was  $5621.6 \pm 3623.72$ ,  $8.93 \pm 15.99$ , and  $6.59 \pm 9.82$ , respectively. According to gender, there was a significant difference in average time (hour) per day, showing higher time per day for female than male ( $8.97 \pm 11.81$  vs.  $4.46 \pm 6.97$ ,  $p = 0.019$ ). **Conclusions:** Our result showed that a third of the participants were using fitness trackers from both genders, and females were doing longer physical activity than males. Students' awareness on the importance of engaging in physical activity should be further promoted.

**Keywords:** Physical activity; Students; Arab Teens Lifestyle Questionnaire; Activity trackers; King Abdulaziz University; Saudi Arabia.

### Introduction

Regular physical exercise is one of the most effective health-promoting activities that physicians and other healthcare practitioners may prescribe to patients in various countries to help them improve their health (1). Physical activity should be increased in order to improve public health in various countries. Self-monitoring is a key component of behavior modification programs aimed at increasing and improving physical activity (2). The WHO recommends 150 min of moderate physical activity per week for adults and 60 min for children. However, 25% of adults and more than 80% of the adolescents do not reach these recommended targets (3).

Reduced or insufficient physical activity is now the world's fourth leading cause of death (4). The most popular tracker function of fitness tracker is the step count; this is often set to a default target of 10,000

steps per day, as recommended by the Physical Activity Guidelines. Many people use this to change their lifestyle, where they typically do more than the 7000 to 8000 steps per day (5).

Activity trackers are normally worn on the wrist or waist, and they are typically less expensive than smart watches due to fewer sensors (6). Wearable devices that record physical activity, such as activity trackers, aid in self-monitoring and quantify activity such as steps, calories, and heart rate more accurately than arbitrary estimates (7).

For the past 5 years, fitness trackers have become commercially available to consumers as a tool for increasing physical activity. In a previous study, the participants recorded and calculated their daily step counts using activity trackers, wherein they found an increase in the achieved activity by pedometers in groups of sedentary adults that were about 2000 steps per day (7). Many trackers use the Internet or a smartphone application to keep track of their targets. This enables the use of behavioral modification strategies, the achievement of goals, and the monitoring of success with the least amount of money (8). In 2015, a study in San Francisco found that using trackers increased the number of steps taken by +1266 per week over the average (9).

A systematic review reported that using fitness trackers with supportive daily feedback combined with the setting of step goals is an effective intervention for increasing and improving activity in healthy youth (10, 11).

In 2014, a study was conducted at King Khalid University in Saudi Arabia to assess the pattern of physical activity, predictors of physical inactivity, and perceived barriers to physical activity among health college students. Overall, 58.0 % of students were found to be physically inactive, according to the report (12). Another study was done in 2018 to determine the prevalence and effect of exercise on the academic performance of healthcare students. The study showed that a significant positive effect of exercise was found on two domains of academic performance, namely, better concentration in classes and punctuality in attending lectures (13). In 2019, a study was conducted to assess the pattern of students' physical activity activities in the Kingdom of Saudi Arabia prior to and during their college attendance. According to the report, people who exercise regularly during their college years are less likely to do so than those who exercise regularly during their high school years (14).

According to a thorough literature review, no medical research on this issue has been conducted in Jeddah, which is the subject of our report. Thus, this study aims to measure the prevalence of using activity trackers in students at health colleges and determine if activity trackers can motivate the students to engage in physical activity and improve their lifestyle. We also compared the physical activity between the students who are wearing these devices and those who are not at King Abdulaziz University in Jeddah, Saudi Arabia's health colleges.

## **Methods**

**Study setting:** King Abdulaziz University, Jeddah, Saudi Arabia. Both female and male sections of health colleges (medicine, dentistry, pharmacy, nursing, and laboratory) were examined.

**Study participants:** All students of the studied colleges were included in this study. The inclusion criteria were as follows: both males and females, Saudi students, and only undergraduate students of the health colleges in King Abdulaziz University, Jeddah, Saudi Arabia. Meanwhile, the exclusion criteria were as follows: students of other colleges, and students of non-Saudi nationality.

**Sample size:** The total number of students registered in the three colleges in the academic year 2016–2020 was obtained from the office of student affairs. All students were contacted in their classes.

**Sampling technique:** A total coverage was carried out to contact all students of the three colleges.

**Data collection methods:** An online survey using a predesigned questionnaire was conducted. A predesigned questionnaire was sent to all students at the health colleges at King Abdulaziz University through Google Forms, Microsoft Excel Self health reported. The questionnaire included items as regards sociodemographic data and anthropometric measures such as height, weight, environmental, and cultural factors. The Arab Teens Lifestyle Study (ATLS) questionnaire (15, 16) was used to assess the self-reported Physical Activities (PA). The PA questionnaires were used for youths aged 15–25 years old and showed a high reliability (intraclass correlation = 0.85; 95% CI: 0.70–0.93) and an acceptable validity ( $r = 0.30$ ;  $p < 0.05$ ) (15, 16). In a recent validity study, its applicability has been confirmed for Arabic youth ( $r = 0.37$ ,  $p < 0.001$ ) (17, 18). The questionnaire included items on the participants' demographic data such as age, gender, marital status, place of residence, academic year, and weight and height. Participants using activity fitness tracker were asked about the tracker's type, read results, application, time of use whether day or night, steps, distance/time, calories, and heart rate. Activity trackers include Apple Watch, Basis Health Tracker, BodyMedia Fit, DirectLife, Fitbit Flex, Fitbit One, Fitbit Zip, Garmin Vivofit, Jawbone UP, Misfit Shine, Nike FuelBand, Polar Loop, Withings Pulse O2, and others that have accuracies similar to that of research-grade physical activity monitors for measuring steps.

**Ethical considerations:** Written and verbal consents were obtained from the students before participating in the study. Data were stored in the principal investigator office, where access for review was only given to the authors of this research. An ethical approval was obtained from the research ethics committee of King Abdulaziz University.

**Data analysis:** Data were analyzed using SPSS version 26. Qualitative data was expressed as numbers and percentages, and Chi-squared test ( $\chi^2$ ) was used to assess the relationship between variables. Quantitative data was expressed as mean and standard deviation (mean  $\pm$  SD), where independent sample t-test and one-way ANOVA tests were applied for parametric variables and Mann–Whitney and Kruskal–Wallis tests were used for non-parametric variables. A p-value of  $<0.05$  was considered as statistically significant.

## Results

Table 1 shows that the mean age of students was  $23.36 \pm 1.77$  years, 50.8% were males, and 1.6% were married. Most of the students (66.7%) were medical students, and 52.3% were in their 6th academic year. Half of the students had normal weight, 15.1% were obese, and 9.3%, 5%, and 2.7% had asthma, hypertension (HTN), and diabetes mellitus (DM), respectively. Of the student participants, 17.8% were smokers, and 55.8% were engaged in physical activities, of which 32.9% were practicing for better health status.

Table 1. Distribution of studied students according to their characters, spatiality, academic year, BMI, chronic disease, smoking, and physical activity (No.: 258)

Variable	No. (%)
Age	23.36 ± 1.77
Gender	
Female	127 (49.2)
Male	131 (50.8)
Marital status	
Married	4 (1.6)
Single	254 (98.4)
Spatiality	
Dentist	4 (1.6)
Laboratory	1 (0.4)
Medicine	172 (66.7)
Nursing	66 (25.6)
Pharmacy	13 (5)
Radiology	2 (0.8)
Academic year	
2nd	54 (20.9)
3rd	28 (10.9)
4th	14 (5.4)
5th	27 (10.5)
6th	135 (52.3)
BMI categories	
Underweight	38(14.7)
Normal weight	129 (50)
Overweight	52 (20.2)
Obese	39 (15.1)
BMI	24.32 ±.15

Chronic diseases	
HTN	13 (5)
DM	7 (2.7)
Asthma	24 (9.3)
Allergic rhinitis	2(0.8)
Anemia	2 (0.8)
Cardiac	1 (0.4)
Celiac	1 (0.4)
GERD	1 (0.4)
Hypothyroidism	1 (0.4)
IBD	1 (0.4)
Iron deficiency anemia	1 (0.4)
Migraine	1 (0.4)
Smoking	
No	212 (82.2)
Yes	46 (17.8)
How many days per week do you engage in physical activity?	
Four times a week or more	33 (12.8)
None	114 (44.2)
Once a day	15 (5.2)
Thrice a week	52 (20.2)
Twice a week	44 (17.1)
What is your goal from practicing physical activity?	
For health	85 (32.9)
I am not practicing physical activity	114 (44.2)
To have fun	26 (10.1)
To lose weight	32 (12.4)
To lose weight and have fun	1 (0.4)

Figure 1 shows that 84 (32.6%) of the student participants currently/previous used fitness tracker. Table 2 shows that of students who were currently and previously used fitness trackers, 63% used it for personal interest, 66.6% bought it for themselves, and 92.9% recommended it to friends and thought that it will help motivate them to engage in physical activity. Of them, 76.5% were currently using a fitness tracker. For those who stopped using it, 25% reported that it got lost, 20% did not like it, 60% were using an Apple Watch, and 65% had no complaints, and 60% used it for less than 6 months. Most of students of previous usage (50%) reported that they somewhat agree that fitness tracker use was a positive experience.

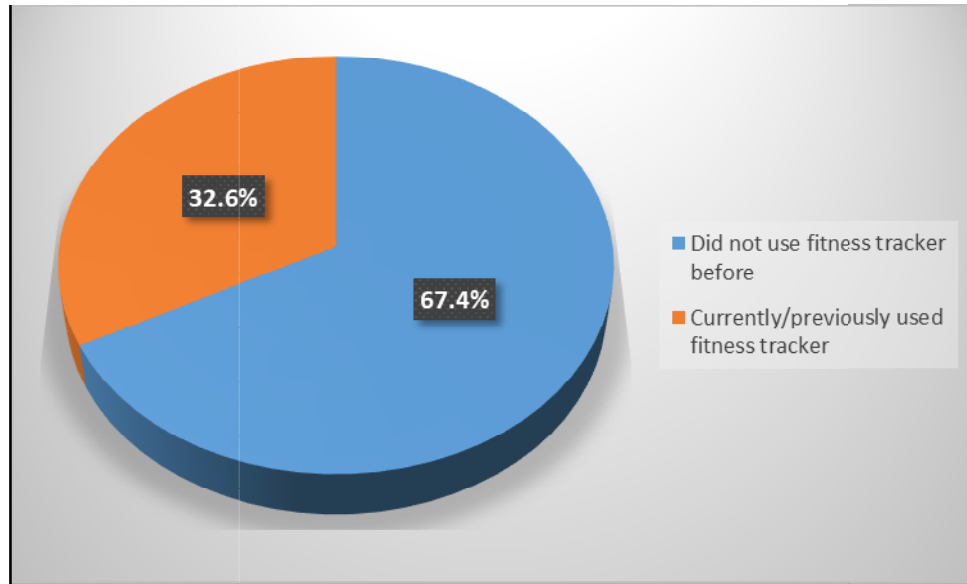


Figure 1. Percentage distribution of the participants according to using fitness tracker

Table 2. Distribution of students who currently and previously used fitness trackers according to the following characteristics: source of hearing about it, recommending it to others, where they get it, if it motivates them to practice physical activity, and trackers information (No.: 84)

Variable	No. (%)
How did you hear about fitness trackers? (No.: 84)	
Friend recommended	20 (23.8)
Personal interest	53 (63)
Through advertising	11 (13.2)
Would you recommend fitness tracker device to a friend?	
No	6 (7.1)
Yes	78 (92.9)
How did you get your fitness tracker?	
Gift from friend/family	26(31)
I bought it for myself	56 (66.6)
My phone	1 (1.2)
Provided by health insurance	1 (1.2)
Do you think fitness trackers help motivate you to engage in physical activity?	
No	6 (7.1)
Yes	78 (92.9)

Are you currently using a fitness tracker?	
No, I previously used a fitness tracker	20 (23.8)
Yes, I am currently using a fitness tracker	64 (76.2)
<b>For those who previously used a fitness tracker (No.:20)</b>	
What is the reason you stopped using your fitness tracker?(No.:20)	
Got lost	5 (25)
I did not like it	4 (20)
I learned everything I could from it	3 (15)
I stopped working out this year	1 (5)
I was experiencing negative psychological impacts	1 (5)
It broke	3 (15)
It was not helping with my goals	2 (10)
Technical difficulties	1 (5)
Which fitness tracker did you use?	
Apple Watch	12(60)
Fitbit	2 (10)
Garmin	2 (10)
Huawei G	1 (5)
XIAOMI MI BAND	3 (15)
Did you have any complaints with your fitness tracker?	
General wear and tear	2 (10)
It does not fit	1 (5)
Lost it	1 (5)
Low battery life	3 (15)
None	13 (65)
How long did you use your fitness tracker (in months)?	
between 13 and 24 months	2 (10)
between 6 and 12 months	5 (25)
less than 6 months	12 (60)
more than 24 months	1 (5)
Overall, I had a positive experience using my fitness tracker	
Strongly agree	3 (15)
Neutral	5 (25)
Somewhat agree	10 (50)
Somewhat disagree	2 (10)

Table 3 shows that for students currently using fitness trackers, 51.5% are using it for 24 hours, 65.7% had a daily goal, and for 40.4% of them, their goal was active minutes. About 32 (32.8%) were using fitness tracker for less than 6 months, 68.9% had no complaint, and for 83.5% of them used their smartphone to track their physical activities. The most common reported motivation for using fitness tracker were to improve fitness (81.2%) and improve health (65.6%), and 50% were using the Apple Watch fitness tracker. Only 19% of them were sharing their activity data, and the most common cause of sharing was to compete with friends (83.3%). The mean daily average number of steps, average distance (km), average time (hour), average number of calories, and the mean times a day they checked their progress were 5621.6-3623.72 steps, 8.93-15.99 km, 6.59-9.82 hours, 691.06-762 17 calories, and 3.69-4.22 checking times.

Table 4 shows that of the studied students, 59%, 54.6%, and 26.5% strongly agreed that fitness tracker was easy to use in active minutes, steps, stairs, and sleep, respectively. Of them, 53.1%, 43.7%, 51.5%, and 21.8% found it easy in heart rate, energy burned, connection to other devices, and sharing their data, respectively. Students who strongly agreed that fitness tracker were useful in active minutes, steps, stairs, sleep, heart rate, and energy burned represented 46.8%, 50%, 23.4%, 32.8%, 48.4%, and 40.6%, respectively. Students who strongly agreed that fitness tracker were accurate in active minutes, steps, stairs, sleep, heart rate, and energy burned represented 37.5%, 39%, 17.1%, 32.8%, and 15.6%, respectively. About 10 (10.9%), 36%, and 7.5% of students strongly agreed that since they started using fitness tracker, they eat healthier, incorporate more activity in their day, and sleep more now. Only 3% and 6% of students strongly agreed that they feel guilty and anxious when using fitness tracker, while 14%, 37.5%, 21.8%, 31.2%, and 1.5% were feeling empowered, motivated, accountable, and self-conscious when using the fitness tracker, respectively. When not using/forgot/cannot use their fitness tracker, 4.5%, 12.5%, 6%, and 3% of students strongly agreed that they felt guilty, frustrated, anxious, and liberated, respectively. Most students (79.7%) agreed that they had an overall positive experience using their fitness tracker.

Table 3. Distribution of students currently using fitness trackers according to circumstances related to its use (No.: 64)

<b>For those currently using a fitness tracker (No.:64)</b>	No. (%)
Time of use	
24 hours	33 (51.5)
Day	27 (42.1)
Night	4 (6.4)
Do you have a daily goal?	
No	22 (34.3)
Yes	42 (65.7)

Please specify your daily goal (No.42)	
Active minutes	17 (40.4)
Energy burned	16 (38)
Sleep	6 (14.2)
Steps	12 (28.5)
Hydration level	1 (2.3)
How long have you been using your fitness tracker in (months)?	
between 13 and 24 months	7 (11)
between 6 and 12 months	16 (25)
less than 6 months	21 (32.8)
more than 24 months	20 (31.2)
Do you have any complaints with your fitness tracker?	
Inaccurate at recording data	1 (1.5)
Low battery life	18 (28.1)
None	44 (68.9)
Problems uploading the data to supporting software	1(1.5)
What is the main device you use to track your activity?	
Band itself	1 (1.5)
Smartphone	53 (83.5)
Smartphone;Apple Watch	2 (3)
Tablet	5 (7.5)
Watch	3 (4.5)
What is your main motivation for using your fitness tracker?	
Fun	2 (3)
To improve fitness	52 (81.2)
To improve appearance	21 (32.8)
To monitor activities	21 (32.8)
To lose weight	24 (37.5)
To improve health	42 (65.6)
To keep up with new technology	7 (10.9)
To find out how many kcal I lost in my duty so I can plan for my diet	1 (1.5)

Which fitness tracker do you use?	
Apple Watch	32 (50)
Fitbit	5 (7.8)
Galaxy Watch	1 (1.5)
Huawei Health	6 (9)
Mi Band	6 (9)
Nothing	5 (7.5)
Paid application	1 (1.5)
Samsung Galaxy Watch Active 2	2 (3)
Whoop	1 (1.5)
Xiaomi Mi band	4 (6)
Where do you share your activity data?	
I do not share my activity data	52 (81)
Snapchat	8 (12.4)
Wearable's software	2 (3.6)
Twitter	2 (3)
Why do you share your activity on social networks? (multiple answers are allowed) (No.:12)	
To compete with friends	10 (83.3)
To get encouragement from others	6 (50)
To motivate others	6 (50)
To share progress	9 (75)
Average number of steps per day	5621.6 ± 3623.72
Average distance (km) per day	8.93 ± 15.99
Average time (hour) per day	6.59 ± 9.82
Average number of calories per day	691.06 ± 762.17
How many times a day do you check your progress?	3.69 ± 4.22

Table 4. Distribution of students currently using fitness trackers according to circumstances related to its use according to opinion about it (No.: 64)

Variable	Somewhat agree	Strongly agree	Neutral	Somewhat disagree	Strongly disagree
<b>I find the following features on my fitness tracker easy to use</b>					
Active minutes	10 (15.6)	38 (59.3)	14 (21.8)	1 (1.5)	1 (1.5)

Steps	14 (21.8)	35 (54.6)	9 (14)	6 (9.3)	0 (0.0)
Stairs	8 (12.5)	17 (26.5)	30 (46.8)	7 (10.9)	2 (3)
Sleep	11 (17.1)	17(26.5)	21 (32.8)	7 (10.9)	8 (12.5)
Heart rate	14 (21.8)	34 (53.1)	10 (15.6)	6 (9)	0 (0.0)
Energy burned	11 (17.1)	28 (43.7)	23 (36)	2 (3)	0 (0.0)
Connection to other devices,e.g., tablet or mobile phone	8 (12.5)	33 (51.5)	18 (28.1)	5 (7.5)	0 (0.0)
Sharing the data,e.g., on social media	11 (17.1)	14 (21.8)	24 (37.5)	11 (17.1)	4(6)
<b>I find the following features on my fitness tracker useful</b>					
Active minutes	10 (15.6)	30 (46.8)	23 (36)	0 (0.0)	1 (1.5)
Steps	6 (9)	32 (50)	17 (26.5)	8 (12.5)	11 (17.1)
Stairs	1 (1.5)	15 (23.4)	32 (50)	3 (4.5)	3 (4.5)
Sleep	8 (12.5)	21 (32.8)	25 (39)	5 (7.5)	5 (7.5)
<b>Heart rate</b>	10 (15.6)	31 (48.4)	15 (23.4)	7 (10.9)	1(1.5)
Energy burned	10 (15.6)	26 (40.6)	20 (31.5)	6 (9)	2 (3)
<b>I find the following features on my fitness tracker accurate</b>					
Active minutes	15 (23.4)	24 (37.5)	15 (23.4)	9 (13.5)	1 (1.5)
Steps	17 (26.5)	25 (39)	18 (28.1)	4 (6)	0 (0.0)
Stairs	7 (10.9)	11 (17.1)	35 (54.6)	6 (9)	5 (7.5)
Sleep	14 (21.8)	11 (17.1)	28 (43.7)	10 (15.6)	1 (1.5)
Heart rate	25 (39)	21 (32.8)	12 (18.7)	6 (9)	0 (0.0)
Energy burned	25 (39)	10 (15.6)	21 (32.8)	6 (9)	2 (3)
<b>Since I started using my fitness tracker, I now:</b>					
Eat healthier	10 (15.6)	7 (10.9)	25 (39)	15 (23.4)	7 (10.9)
Incorporate more activity in my day	11 (17.1)	23 (36)	21 (32.8)	4(6)	5 (7.5)

Sleep more	10 (15.6)	5 (7.5)	28 (43.7)	12 (18.7)	9 (14)
<b>When I am using my fitness tracker, it makes me feel:</b>					
Guilty	9 (14)	2 (3)	20 (31.2)	7 (10.9)	26 (40.6)
Empowered	14 (21.8)	9 (14)	19 (29.6)	15 (23.4)	7 (10.9)
Motivated	19 (29.6)	24 (37.5)	15 (23.4)	5 (7.5)	1 (1.5)
<b>Accountable</b>	20 (31.2)	14 (21.8)	18 (28.1)	2 (3)	4 (6)
<b>Self-conscious</b>	14 (21.8)	20 (31.2)	24 (37.5)	2 (3)	4 (6)
Anxious	4 (6)	1 (1.5)	21 (32.8)	14 (21.8)	24 (37.5)
<b>When I am not using/forget/cannot use my fitness tracker, it makes me feel:</b>					
Guilty	10 (15.6)	3 (4.5)	23 (36)	11 (17.1)	17 (26.5)
Frustrated	11 (17.1)	8 (12.5)	17 (26.5)	13 (20.3)	25
Anxious	9 (14)	4 (6)	13 (20.3)	19 (29.6)	23 (36)
Liberated	7 (10.9)	2 (3)	13 (20.3)	19 (29.6)	23 (36)
Overall, I have had a positive experience using my fitness tracker	23 (36)	28 (43.7)	13 (20.3)	0 (0.0)	0 (0.0)

(Figure 2) shows that students who used fitness trackers had a significant higher percent of practicing physical activity for three and four times daily ( $p < 0.05$ ).

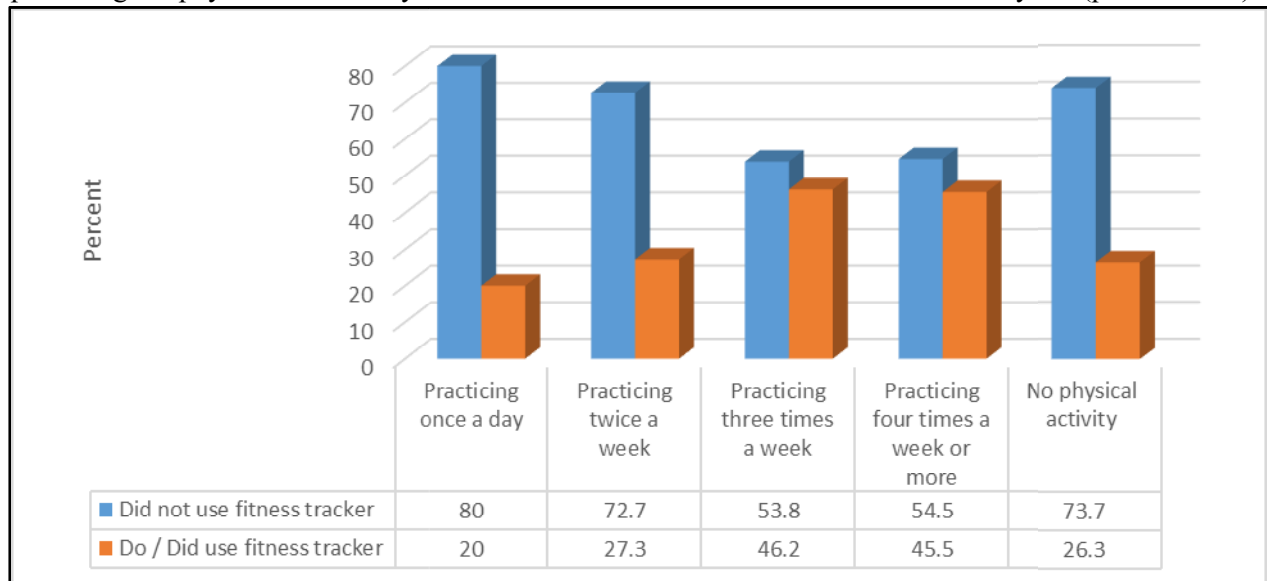


Figure 2. Relationship between practicing physical activity and ever using fitness trackers

N.B.: ( $\chi^2=10.53$ , p-value= 0.032)

As shown in Table 5, it was determined that female students, singles, and those who recommended the fitness tracker device to a friend had a significant higher percent than those who thought that fitness trackers help motivate them to practice physical activity ( $p \leq 0.05$ ).

Table 6 shows that female and non-smoker students had a significant higher mean average time (hour) per day of using the fitness trackers compared to male students [(8.97  $\pm$ 11.81 hours vs.4.46  $\pm$ 6.97 hours) and (7.77  $\pm$ 10.7 hours vs. 2.15  $\pm$ 2.3 hours), respectively ( $p < 0.05$ )]. At the same time, students in their 5th academic year and obese students had a significant higher mean average distance (km) per day ( $p \leq 0.05$ ).

Table 5. Relationship between students' opinion if fitness trackers help motivate them to engage in physical activity and their characteristics, spatiality, academic year, BMI, chronic disease, smoking, and physical activity (No.: 84)

Variable	Do you think fitness trackers help motivate you to practice physical activity?		$\chi^2$	p-value
	No No. (%)	Yes No. (%)		
Age	22.83 $\pm$ 0.4	22.59 $\pm$ 1.65	0.02*	0.978
Gender				
Female	0 (0.0)	37 (100)	6.16	<b>0.013</b>
Male	6 (14)	41 (86)		
Marital status				
Married	1 (50)	1 (50)	5.67	<b>0.017</b>
Single	5 (6.1)	77 (93.9)		
Spatiality				
Dentist	0 (0.0)	3 (100)	2.89	0.575
Medicine	6 (10.3)	52 (89.7)		
Nursing	0 (0.0)	19 (100)		
Pharmacy	0 (0.0)	3 (100)		
Radiology	0 (0.0)	1 (100)		
Academic year				
2nd	0 (0.0)	13 (100)	4.39	0.355
3rd	0 (0.0)	5 (100)		
4th	0 (0.0)	5 (100)		
5th	0 (0.0)	11 (100)		
6th	6 (12)	44 (88)		

BMI categories				
Underweight	0 (0.0)	5 (100)	0.61	0.893
Normal weight	3 (6.5)	43 (93.5)		
Overweight	2 (9.5)	19 (90.5)		
Obese	1 (8.3)	11 (91.7)		
Smoking				
No	4 (6.1)	62 (93.9)	0.54	0.461
Yes	2 (11.1)	16 (88.9)		
Would you recommend a fitness tracker device to a friend?				
No	4 (66.7)	2 (33.3)	34.51	< <b>0.001</b>
Yes	2 (2.6)	76 (97.4)		

N.B.: \* Mann–Whitney test

Table 6. Relationship between characteristics of students currently using fitness trackers and daily average number of steps, average distance (km), average time (hour), average number of calories, and frequency of checking their progress (No.: 64)

Variable	Gender			
	Female (mean ± SD)	Male (mean ± SD)		
Average number of steps per day	5493.7 ± 3809.38	5741.5 ± 2497.62	0.26*	0.79
Average distance (km) per day	14.39 ± 21.7	3.81 ± 2.68	1.74**	0.082
Average time (hour) per day	8.97 ± 11.81	4.46 ± 6.97	2.35**	<b>0.019</b>
Average number of calories per day	455.47 ± 504.96	911.94 ± 894.68	1.81**	0.07
How many times a day do you check your progress?	3.53 ± 4.84	3.82 ± 3.65	1.22**	0.221
	Marital status			
	Married (mean ± SD)	Single (mean ± SD)		

Average number of steps per day	6500± 3451.6	5607.2 ± 365201	0.24*	0.809		
Average distance (km) per day	12 ± 9.13	8.88 ± 16.12	0.16**	0.226		
Average time (hour) per day	12 ± 7.89	6.5 ± 9.88	0.24**	0.355		
Average number of calories per day	356 ± 534.51	696.56 ± 767.25	0.88**	0.935		
How many times a day do you check your progress?	2 ± 2.65	3.71 ± 4.25	0.52**	0.656		
	Smoking					
	No (mean ± SD)	Yes (mean ± SD)				
Average number of steps per day	5687.88 ± 3764.68	5371.77 ± 3158.2	0.27*	0.782		
Average distance (km) per day	10.21 ± 17.76	4.11 ± 2.68	0.11**	0.91		
Average time (hour) per day	7.77 ± 10.7	2.15 ± 2.3	2.13**	<b>0.033</b>		
Average number of calories per day	722.16 ± 753.1	573.85 ± 815.74	0.75**	0.451		
How many times a day do you check your progress?	3.82 ± 4.68	3.21 ± 1.8	0.47**	0.636		
	Academic year					
	2nd	3rd	4th	5th		
Average number of steps per day	5573.14 ± 4350.87	2304 ± 3326.37	5750 ± 2629.95	8522.3 ±2811.7 3	1.7***	0.1
Average distance (km) per day	3.86 ± 1.6	12.62 ± 20.94	1.25 ± 0.5	27.61 ± 28.07	3****	<b>0.013</b>
Average time (hour) per day	2.64 ± 17.55	1.8 ± 1.3	15.5 ± 16.74	8.15 ± 4.55	3****	0.137

Average number of calories per day	523.71 ± 741.58	343.8 ± 214.09	525 ± 861.68	767.6±7 59.9	3****	0.572
How many times a day do you check your progress?	2.57 ± 1.51	6.8 ± 10.2	1.5 ± 1.91	3.4 ± 2.59	3****	0.536
	BMI category					
	1	2	3	4		
Average number of steps per day	2166.67 ± 288.67	5669.51 ± 3698.96	6436.5 ± 3986.91	5349.5 ± 3038.27	1.17***	0.327
Average distance (km) per day	1.17±± 0.28	2.84 ± 1.51	4.77 ± 2.36	13 ± 20.39	3****	<b>0.021</b>
Average time (hour) per day	1 ± 0.001	5.4 ± 7.56	7 ± 9.05	11.85 ± 16.51	3****	0.307
Average number of calories per day	613.33 ± 941.08	725.97 ± 789.1	600.5 ± 609.42	719 ± 911.71	3****	0.907
How many times a day do you check your progress?	1.33 ±0.57	3.09 ±1.88	4 ± 3.68	6 ± 8.9	3****	0.241

N.B.: \*Independent sample t-test, \*\* Mann–Whitney test, \*\*\* One-way ANOVA test, \*\*\*\* Kruskal–Wallis test

### Discussion

Regular physical exercise has been identified as one of the most effective health-promoting activities, and devices such as activity trackers are normally worn on the wrist or waist to record physical activity (1, 6). However, no data were found about the effect of physical exercise in medical students. In this study, we aim to measure the prevalence of using activity trackers among students at health colleges and to compare physical activity between the students who are wearing such these devices and those who are not at King Abdulaziz University in Jeddah, Saudi Arabia’s health colleges.

In total, 258 students were enrolled in this study, their mean age was 23.36 ±1.77 years, 50.8% were males, and 1.6% were married. Majority of students (66.7%) were medical students,of which 52.3% were in their 6th academic year.

Our study showed that nearly a third of the participants were using fitness tracker, and nearly half of them were using it for 24hours. Smartphones were the most common device to track fitness. Female students

were determined to be doing longer physical activity than male; moreover, non-smokers were doing longer physical activity than male.

Improving health is considered an important thing for students. Health status can be improved by regular physical exercise (1), and fitness trackers were considered a valuable device to measure steps, distance, and other physical activities (19).

More than half of the participating students were engaged in various physical activities to improve their health. Compared to other studies, there was a high prevalence of totally physically inactive individuals among medical students in Jeddah, reaching 53%, whereas some students were partially inactive (20). This is considered bad, as these could increase the risk of cardiovascular diseases. Also, other studies in Saudi Arabia showed high physical inactivity among college students (12, 21–23).

Regarding reasons for engaging and enrolling in physical activity, majority of the participants said they are doing it to improve their health and to lose weight. These reasons were similar to other studies because the main goals for physical activity are improving health and reducing weight (23).

In our study, nearly a third of the participants were using fitness tracker to measure their health records. This number is considered low among medical students. Students should increase the use of fitness trackers because school activity tracker was found to increase engagement in physical activities among school students in Texas (24), and this would make a similar effect on college students. Also, the smartphones were the most common devices for tracking health status in this study. As we know, a lot of people are using smartphones, and recent meta-analysis among adults found that using smartphone applications as trackers could improve one's physical activity (25); therefore, we should encourage students to use these apps to achieve a good health status.

During the COVID-19 pandemic, a recent study among university students found an improvement in duration and number of physical activities among them (26). Also in this study, the time and number of steps per week were high, and this is good for health status.

This study is considered the first in describing the physical exercise and usage of fitness tracker among students. It gives an informative data as regards physical activity and included a full coverage of students at King Abdulaziz University.

However, there are several limitations for this study. Firstly, it is a study done in one center and in one field of study; thus, we cannot generalize the data to all students in Saudi Arabia. Secondly, the type of exercise was not asked or defined by medical students to determine what types of physical exercise were done by students. Lastly, the sample size of included students was low in this study.

## **Conclusion**

This study showed that nearly a third of students were using fitness tracker and that female students were doing longer physical activity compared to male.

As per our findings, 44.2% were not engaging in physical activities; thus, students' awareness toward physical activity should be further increased. Also, further interventional studies and educational lectures as regards the importance of training should be done for college students.

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