https://doi.org/10.37723/jumdc.v14i2.765

J. Univ. Med. Dent. Coll.2023;Vol.14(2):606-611
ISSN (Print) 2221-7827, ISSN (Online) 2310-5542
https://www.jumdc.com

Original Article

Open Access

Effects of Smartphone on Physical Activity and Academic Performance of Medical Undergraduates of Islamabad: A cross-sectional Study

Amna Imran[a], Ayesha Fazal[b], Seemi Tanvir[c*], Sadia Zafar[d], Nadia Tariq[e], Sadaf Tariq[d]

[a]Demonstrator, Department of Community Medicine, Islamabad Medical and Dental College.
[b]Lecturer, Department of Medical Education, School of Dentistry, SZABMU/ PIMS.
[c]Assistant Professor, Department of Pathology, Margalla Institute of Health Sciences.
[d]Assistant Professor, Department of Community Medicine, Islamabad Medical and Dental College, Islamabad.
[e]Associate Professor, Department of Community Medicine, Islamabad Medical and Dental College, Islamabad.
Correspondence: * dr.seemi.salman@gmail.com*

ABSTRACT

BACKGROUND & OBJECTIVE: Smartphones have become an essential part of our life, serving multiple functions like messages, calls and navigation. Smartphone users will increase up to 7.5 billion by 2026. Overuse of smartphones not only causes time wastage and health hazards but also have effects on physical activity and academics. Evaluation of these effects was the need of time, so this study was conducted to assess duration of smartphone usage in undergraduate medical students, and their association with physical activity and academic performance was determined.

METHODOLOGY: A cross-sectional survey among 384 undergraduates was conducted from April to August 2019 in Islamabad Medical and Dental College, Islamabad. Convenient sampling technique was done. Structured questionnaire containing socio-demographic information along with a smartphone addiction scale was used. IPAQ long form was also used to determine physical activity among the participants. Academic performance was determined through marks percentage obtained in Annual Professional examination. Data was collected and analyzed by using SPSS 21. Frequencies and percentages were calculated and tests of significance were applied.

RESULTS: It was observed that smartphone addiction was more pronounced in male participants 112(64.4%) than in females 109(51.9%). Thus, more male participants were found overweight (16.6%) than females (13.8%). Excessive smartphone usage was found to be significantly associated with physical activity (p-value 0.03). However, excessive smartphone usage had insignificant association with academic performance (p-value=0.250).

CONCLUSION: A strong association between excess smartphone usage with reduced physical activity was found. However, smartphone usage had no association with the academic performance of students.

KEYWORDS: Smartphone, Physical activity, Academic performance, Medical students.

INTRODUCTION

In the current age of digital machinery, the rate of smartphone consumers has been increasing tremendously worldwide, and they have become part and parcel of our everyday life. The total number of smartphone users has increased from 2.1 billion to 6.5 billion from 2016 to 2020 and will cross 7.5 billion in 2026[1]. For most people, these gadgets are now their key source of communication and information. Along with text messages and call services, smartphones provide access to the internet, social media, e-mails, camera, video calls, e-shopping, navigation and entertainment[2].

Because of these tempting functions, ease to use and pocket-friendly size; users are obsessed with looking at their smartphones without self-regulation[3]. A person scrolls his screen more than two hundred times per day[4]. Unregulated smartphone usage is linked to various problems in an individual, which led scholars to invent the term "Problematic Mobile Phone Use" (PMPU) to label the lack of ability to balance and control one's use of the smartphone, which is linked to undesirable outcomes in daily life[5].

This term was introduced in the middle of the twentieth

How to cite this: *Imran A, Fazal A, Tanvir S, Zafar S, Tariq N, Tariq S. Effects of Smartphone on Physical Activity and Academic Performance of Medical Undergraduates of Islamabad: A cross-sectional Study. Journal of University Medical & Dental College. 2023;14(2):606-611.*

century due to the burgeoning use of smartphones in constructive as well as destructive means. Problematic smartphone use is associated with higher intensity of internet use and obsession with games[6]. Various mental health problems related to the unwarranted use of smartphones have been recognized, including symptoms of depression, anxiety, and low self-respect[7]. Irrational use of smartphones is linked with negative outcomes, and smartphone addicts are more prone to physical and mental health issues, such as headaches, wrist problems, dry eyes, anxiety, depression, low self-esteem and sadness than traditional smartphone users[8]. The young generation is more prone to these adverse effects[9]. Greater use of smartphones has an inverse relationship with engaging in physical activity[10]. Most of the students do not participate in games, and this trend is continuously declining over time[11].

This is a fact that medical professionals follow a very busy study schedule along with heavy clinical duty hours[12]. They understand mental and physical adverse effects of smartphones on human body better than non-medical personnel but still, they overuse smartphones[13]. So, in order to get a better statistical view of these effects, we planned our study to assess smartphone usage in medical undergraduates and determined the association of smartphone usage with physical activity and academic performance.

METHODOLOGY

It was a cross-sectional study conducted over four months between April to August 2019 at Islamabad Medical and Dental College, Islamabad. The study population was medical undergraduates of 2nd, 3rd, 4th and final years. An approval letter (No.17/IMDC/IRB-2019) was received from the principal of the concerned private medical college in Islamabad. A convenience sampling technique was used. The sample size was calculated by using open epi calculator as 384, taking prevalence as 50% at a 95% confidence interval. Medical university undergraduates who use smartphones and those who were willing to participate in the study were included. The exclusion criteria included students who were unwilling to participate and those who had a history of mental illness or emotional trauma (like death in a family) within the last year. Data was collected through structured questionnaires distributed among students by approaching them directly in the classrooms. A questionnaire consisting of three parts (socio-demographic and general profile, SAS-SV and IPAQ long form) was used. SAS-SV (Short Smartphone Addiction Scale) comprised ten- items, using a six-point Likert scale, with ten indicating the lowest score and 60 being the highest. As this scale was already being used and validated throughout the globe, the internal consistency for this scale was found to be excellent, with Cronbach's alpha value of 0.87. Cutoff values for addiction in males were considered to be 31, while 33 in females[14].

The extended version of IPAQ (International Physical Activity Questionnaires) consisted of five parts containing 27 questions in each domain regarding physical activity related to the job, transportation, housework and family care, recreation and sports, and time spent sitting. Each type of physical activity was expressed in three energy dimensions: vigorous, moderate, and walking. The total physical activity was calculated by estimating the data in MET-min./times in particular domains, multiplying the duration in minutes by the number of days and the corresponding intensity factor: "walking -3.3, moderate-4.0, vigorous-8.0". At the same time, "1 MET corresponds to the consumption of oxygen at rest and amounts to 3.5 ml 02/kg of body weight per minute"[15]. Academic performance was determined through marks percentage obtained in the Annual Professional examination. BMI is calculated by dividing a person's weight (kg) by their height (square)(m). Recommendations are in line with global WHO recommendations for adults ≥20 years of age, with BMI underweight <18.5, normal BMI 18.5-24.9, overweight 25.0-29.9, obesity ≥30, obesity class I range 30.0-34.9, obesity class II 35.0–39.9, and obesity class III ≥40.

The data was collected, and statistical tests were applied using the statistical package for social sciences Version 21.0. The main statistical tests applied were chi-squared tests. However, in the domain of physical activity. Mann-Whitney U test was applied, since the data was not normally distributed.

RESULTS

The data was collected from 404 students, out of which 20 incomplete questionnaires were discarded, and the final analysis was done on 384 subjects, making a turnover rate of 95% (Table-I).

Table-I: Socio-Demographic profile of study participants.

Variable	Frequency (n)=384
Male	174(45.3%)
Female	210(54.7%)
Age (in year's)	
20 and below	89(23.3%)
21-22	156(40.7%)
23-24	112(29.1%)
Year of Study	
2nd year	104(27.1%)
3rd year	111(28.9%)
4th year	83(21.6%)
5th year	86(22.4%)

Female students were more active on YouTube, and social media (Facebook/Instagram/Twitter) is the 2nd most used app among them, whereas males used gaming applications the most. Physical activity applications were the least used ones by both genders. Only the use of Gaming applications was found significant using the chi-squared test (p-value= 0.006) (Figure-I).

The majority of students (80%) are normal weight, 13% are overweight, 5% are underweight, and 2% are obese.

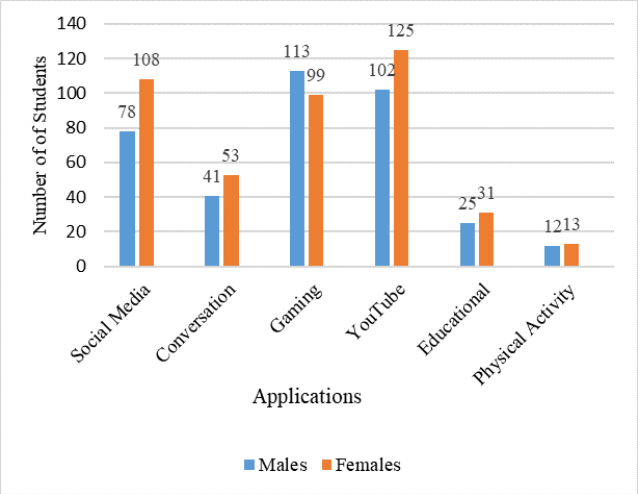

Figure-I: Applications used by students

Table-III compiles the results of the smartphone addiction scale short version. Chi-squared test was applied, and it showed that males are more addicted than females. Smartphone addiction is 58.15% in our study (64.4 % in males and 51.9% in females). The cutoff point is 31 for males and 33 for females. The p-value was found to be significant (p=0.014).

Table-II: Body Mass Index (BMI) in males and females.

BMI Index (Kg/m2)	Females n=210(%)	Males n=174(%)	Total	Mean± SD
Underweight (<18.5)	14(6.6%)	4(2.29%)	n=384(%)	
Normal (18.5-24.9)	167(79.5%)	141(81%)	18(4.7%)	21.94±1.648
Overweight (25.0-29.9)	25(11.9%)	27(15.5%)	308(80.2%)	
Obese (≥30)	4(1.9%)	2(1.1%)	52(13.5%) 6(1.5%)	

Table-III: Smartphone addiction in Students.

Gender	Non-Addict n (%)	Addict n (%)	p-value
Male	62 (35.6)	112(64.4)	0.014*
Female	101(48.1)	109(51.9)	
Total	163(42.44)	221(57.55)	

Males were more active than females in college and leisure time domains. There was an insignificant difference in physical activity related to transportation and housework between males and females (Table-IV).

Table-IV: Domains of Physical Activity.

Gender	Total Physical Activity (PA)	College related PA	Transport related PA	Housework PA	Leisure time PA
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Male	3697.80±1868.41	1656.35±1759.5	752.97±725.77	758.77±646.25	1586.32±1868.41
Female	2559.23±2360.90	1149.82±1175.55	794.86±828.37	874.36±762.74	1013.04±1226.91
p-value	**0.004**	**0.025**	**0.973**	**0.262**	**0.078**

p-value significant at <0.05

Table-V: Association between Smart Phone Addiction, Physical Activity, BMI and Marks Percentage.

Categories		Smart Phone Addiction		Total	p-value
		Non-Addict n(%)	Addict n(%)		
Physical Activity	Low	27 (39)	42 (60.90	69	*0.03
	Moderate	67 (37.2)	113 (62.8)	180	
	High	69 (51.1)	66 (48.9)	135	
BMI	Underweight	7 (38.9%)	11 (61.1)	18	0.889
	Normal	130 (42.2)	178 (57.8)	308	
	Overweight/ Obese	26 (44.8)	32 (55.2)	58	
Marks Percentage of Professional Exams	Below 60%	12(50)	12(50)	24	0.250
	60-79.99%	137 (40.9)	198 (59.1)	335	
	80% & above	14 (56)	11 (44)	25	

Pearson's chi-square test ***p-value significant at <0.05***

DISCUSSION

The present study sought to demonstrate the association between excessive smartphone usage and physical activity and academic performance. Above 50% of the total participants were categorized as problematic smartphone users. Previous studies used various tools for measuring smartphone addiction among university students, and the reported prevalence was 19.1% to 36.5%[16,17]. The smartphone addiction in this study (64.4% in males and 51.9 % in females), as measured with SAS-SV, came out to be much higher, as compared to other studies conducted previously. A study conducted on medical undergraduates of a university in Srinagar from October to December 2017 using the same scale demonstrates the prevalence of smartphone addiction in 34.4% of undergraduates[18].

In this study, the most used apps were different among the two genders. Females were more prone to YouTube, whereas males were more inclined to games, music and videos. In a study by James Robert et al., it was found that excessive text messages and voice calls are the major emerging problems in both females as well as males[19]. While contrary to that, it had been found that social networking was more common in females than in males, and gaming, along with social networking and music, were found to be more prevalent among males. All these factors leading to "excessive mobile phone usage" have also been supported by the results of the current study [20].

In the previous studies, on the other hand, the prevalence of "physical activity" was found to be more common in males as compared to that of females, and the same results had been deducted in our study. This does not support a healthy favorable environment for females, as these females are supposed to become mothers later in their lives. The restricted physical activity would have negative effects on their health, thus deteriorating the normal physiological phenomenon[21].

Previous evidence based data supports this fact that young adults, who are students, are more likely to be affected by this habit of excessive smart phone use[22]. Rapid growth in digital world is leading to reliance on digital sources more than the former. This rapidly extending trend of digital world needs to be addressed as this might have severe outcomes in the younger age people. One of the studies conducted in Australia summed up that no relation was found between smartphone overuse and the student's academic performance. It had also been concluded in this study that the academic performance of the students remained unaffected by smartphone overuse.

This indicated that students might be using their phones for constructive means contributing positively to their academic behavior. Another explanation for this odd behavior could be that students enrolled in the study are medical undergraduates who are more responsible towards their studies and comparatively work harder than students of other disciplines [23]. Our study showed that smartphone addicts were more inclined toward low and moderate physical activity as compared to non-addicts. This was in line with the fact that "use of smartphone" during physical activity would lead to decreased physical exertion, as one would be more concerned about using the phone even during the physical exercise session, hence halting the physical activity. This would also result in much time and energy wastage.

Thus, smartphones should not be used during physical activity sessions. Meta-analysis of related studies also showed no association between physical activity and academic performance[24]. However, one of the studies conducted in China supported that there had been some indirect relationship between physical activity and academic performance, which was also linked with psychological problems. The two most important psychological issues being addressed were depression and self-esteem, resulting in restricted physical movements and bad academic grades [25]. The level of weekly total physical activity in boys was 3697.80 MET and in girls 2559.23 MET.

Significantly higher physical activity in boys was also demonstrated in the college activity domain, i.e. 2,471 MET, with 1149.82 MET in girls. No significant variation was detected in other domains: leisure time-, transportation- and home-related activity. The findings in the study on physical activity in high school youth obtained with the extended version of IPAQ show higher values in boys than in girls in four Vise grad countries: the Czech Republic, Poland, Slovakia and Hungary 7291.0 and 6200 MET respectively[26].

CONCLUSION

There was a strong association between excess smartphone usage with reduced physical activity. The effective motivation of youngsters to adopt a healthy lifestyle can sort the issue to some extent. However, smartphone usage has no association with the academic performance of students.

LIMITATIONS:

There might be reporting bias about the mental illness of the students because no documentary record was taken as such. Participants recruited in the study were only from the health sciences. They might ignore the un-required use of cellular phones. The results may differ in students of other disciplines, i.e., among non-medical college and university students. We cannot be sure of the current use of smartphones by our participants, so it was also the limitation of our study.

RECOMMENDATIONS:

We would recommend conducting this research among non-medical students as well. Research on other causes of reduced physical activity should also be conducted in different age groups. Time management should be done while using smartphones to limit its overuse.

ACKNOWLEDGEMNET: None.

CONFLICT OF INTEREST: Manuscript has been extracted from the dissertation of the author (Amna Imran) that was submitted for the degree of Master of Science in

Public Health (2018-19) to Health Services Academy, Faculty of Medicine, Quaid-e-Azam University, Islamabad.
GRANT SUPPORT AND FINANCIAL DISCLOSURE: None.

REFERENCES

1. O'Dea S. Number of smartphone users worldwide from 2016 to 2026; 2021 [cited 2022 august 20]. Available from: Online, https://bit. ly/3fp82Ag, 2021.
2. Gromik N, Litz D. Study benefits of smartphones: perceptions of female emirati pre-service teacher undergraduates. Education Sciences. 2021;11(12):817. Doi:10.3390/educsci11120817
3. Rodríguez-Castelán C, Ochoa R, Lach S, Masaki T. Mobile Internet Adoption in West Africa. 2021. IZA discussion paper No 14151, Available at SSRN: https://ssrn.com/abstract=3798904 or http://dx.doi.org/10.2139/ssrn.3798904
4. Aktipis A, Whitaker R, Ayers JD. Do Smartphones Create a Coordination Problem for Face-to-Face Interaction? Leveraging Game Theory to Understand and Solve the Smartphone Dilemma. BioEssays. 2020;42(4):1800261. Doi:10.1002/bies.201800261
5. Eichenberg C, Schott M, Schroiff A. Problematic smartphone use—comparison of students with and without problematic smartphone use in light of personality. Frontiers in Psychiatry. 2021;11:599241. Doi: 10.3389/fpsyt.2020.599241
6. Sachu B, Joy E, Raj M. Internet Gaming Obsession: An Explorative Study of Connotation between Massively Multiplayer Online Role-Playing Games and Social Health. In 2022 International Conference for Advancement in Technology (ICONAT) IEEE. 2022:1-7. Doi: 10.1109/ICONAT53423.2022.9725987.
7. Tangmunkongvorakul A, Musumari PM, Thongpibul K, Srithanaviboonchai K, Techasrivichien T, Suguimoto SP, et al. Association of excessive smartphone use with psychological well-being among university students in Chiang Mai, Thailand. PloS One. 2019;14(1):e0210294. Doi:10.1371/journal.pone.0210294
8. Alhassan AA, Alqadhib EM, Taha NW, Alahmari RA, Salam M, Almutairi AF. The relationship between addiction to smartphone usage and depression among adults: a cross sectional study. BMC Psychiatry. 2018;18(1):1-8. Doi:10.1186/s12888-018-1745-4
9. Ting CH, Chen YY. Smartphone addiction. Adolescent Addiction (Second Edition), Academic Press. 2020: 215-240. Doi:10.1016/B978-0-12-818626-8.00008-6
10. Penglee N, Christiana RW, Battista RA, Rosenberg E. Smartphone use and physical activity among college students in health science-related majors in the United States and Thailand. International Journal of Environmental Research and Public Health. 2019;16(8):1315. Doi:10.3390/ijerph16081315
11. Farooq MA, Parkinson KN, Adamson AJ, Pearce MS, Reilly JK, Hughes AR, et al. Timing of the decline in physical activity in childhood and adolescence: Gateshead Millennium Cohort Study. British Journal of Sports Medicine. 2018;52(15):1002-1006. Doi:10.1136/bjsports-2016-096933
12. Barber S, Brettell R, Perera-Salazar R, Greenhalgh T, Harrington R. UK medical students' attitudes towards their future careers and general practice: a cross-sectional survey and qualitative analysis of an Oxford cohort. BMC Medical Education. 2018;18(1):1-9. Doi:10.1186/s12909-018-1197-z
13. Sohail M, Rauf H, Mirza TI, Ashfaq R, Aziz A, Ibrahim H. The problematic internet use among healthcare professionals: Emerging behavioral patterns in social networking sites addiction. Journal of University Medical & Dental College. 2020;11(1):15-22. Doi:10.37723/jumdc.v11i1.262
14. Kwon M, Lee JY, Won WY, Park JW, Min JA, Hahn C, et al. Development and validation of a smartphone addiction scale (SAS). PLOS ONE. 2013;8(2):e56936. Doi:10.1371/journal.pone.0056936
15. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Medicine & Science in Sports & Exercise. 2003 ;35(8):1381-1395. Doi: 10.1249/01.MSS.0000078924.61453.FB
16. Kim SG, Park J, Kim HT, Pan Z, Lee Y, McIntyre RS. The relationship between smartphone addiction and symptoms of depression, anxiety, and attention-deficit/hyperactivity in South Korean adolescents. Annals of General Psychiatry. 2019;18(1):1-8. Doi:10.1186/s12991-019-0224-8
17. Kim SE, Kim JW, Jee YS. Relationship between smartphone addiction and physical activity in Chinese international students in Korea. Journal of Behavioral Addictions. 2015;4(3):200-205. Doi:10.1556/2006.4.2015.028
18. Nowreen N, Ahad F. Effect of smartphone usage on quality of sleep-in medical students. National Journal of Physiology, Pharmacy and Pharmacology. 2018;8(9):1366. Doi: 10.5455/njppp.2018.8.0620009062018
19. James Robert S, Kadhiravan S. Internet Usage of Youth in relation to their sleep disorder and Somatic Symptoms. 2020;8(9): 1250-1269.
20. Rodríguez de Fonseca F, Rubio G. Cell-phone addiction: a review. Frontiers in Psychiatry. 2016;7:175-175. Doi:10.3389/fpsyt.2016.00175
21. Pelegrini A, Silva DA, Claumann GS, Cardoso TE, Silva JM, Petroski EL. Practice of walking, moderate and vigorous physical activity and associated factors in adolescents from a state capital of southern Brazil. Revista Brasileira de Cineantropometria & Desempenho Humano. 2015;17:11-20. Doi:10.5007/1980-0037.2015v17n1p11

22. Darko-Adjei N. The use and effect of smartphones in students' learning activities: Evidence from the University of Ghana, Legon.Library Philosophy and Practice. 2019:1-37.
23. Winskel H, Kim TH, Kardash L, Belic I. Smartphone use and study behavior: A Korean and Australian comparison. Heliyon. 2019;5(7):e02158. Doi:10.1016/j.heliyon.2019.e02158
24. Kates AW, Wu H, Coryn CL. The effects of mobile phone use on academic performance: A meta-analysis. Computers & Education. 2018;127:107-112. Doi:10.1016/j.compedu.2018.08.012
25. Kayani S, Kiyani T, Wang J, Zagalaz Sánchez ML, Kayani S, Qurban H, et al. Physical activity and academic performance: the mediating effect of self-esteem and depression. Sustainability. 2018;10(10):3633. Doi:10.3390/su10103633
26. Alhazmi AA, Alzahrani SH, Baig M, Salawati EM. Prevalence and factors associated with smartphone addiction among medical students at King Abdulaziz University, Jeddah. Pakistan Journal of Medical Sciences. 2018;34(4):984-988. Doi: 10.12669/pjms.344.15294

Author's Contribution:

Amna Imran: Substantial contributions to the conception or design of the work
Ayesha Fazal: Acquisition, analysis, or interpretation of data for the work
Seemi Tanvir: Manuscript writing, and final approval of the version to be published.
Sadia Zafar: Drafting the work or reviewing it critically for important intellectual content
Nadia Tariq: Final approval of the version to be published.
Sadaf Tariq: ***A***cquisition, analysis, or interpretation of data for the work

Submitted for publication: 22-09-2022
Accepted after revision: 13-0-2023