Original Article

A Survey of Smartphone Addiction and its Relationship with Academic Performance among Saudi Undergraduate Dental Students

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ABSTRACT

Background: The relationship between smartphone use and academic attainment is generally contradictory and hence it is imperative for more research on this subject matter. **Aim:** The aim of this present study is to assess smartphone use, the prevalence of smartphone addiction, factors related to its addiction, and determine the relationship of smartphone addiction on academic accomplishment among male dental students in King Khalid University (KKU) Abha, Saudi Arabia. **Methods:** A Cross-sectional study was conducted among male dental students at KKU, Abha, Saudi Arabia. A validated Smartphone Addiction Scale Short-version (SAS-SV) questionnaire was adopted for this research. Statistical significance level for all tests set at P value < 0.05 at 95% confidence interval. Pearson's correlation was used to examine the strength of the relationship between academic performance and smartphone addiction, Multiple logistic regression analysis to determine the association and predictors of smartphone addiction with GPA among the study population. **Results:** One hundred and sixty-eight (168) respondents participated in the study. Social networking (35.7%) was the main purpose for smartphone usage. Also, 9.5% of respondents used smartphones for educational purposes. The prevalence of students who were addicted was 78.0%. Pearson's correlation showed a significantly negative weak correlation (df = 166, r = −0.35, P = 0.0001*). The age of first use of smartphones was statistically significantly weak and correlated negatively to smartphone addiction (df = 166, r = −0.19, P = 0.014*). **Conclusion:** The study revealed a high prevalence of smartphone addiction among the study population and the use of smartphones for educational purposes was found to be low. Furthermore, the study shows a statistically significant negative association between smartphone addiction and GPA.

KEYWORDS: *Academic performance, dental students, information communication technology, smartphone addiction*

INTRODUCTION

The developing improvement of the cellular phone has become the smartphone, which has changed into one of the technological tools that is mostly used by people globally. This is discovered in the fact that there are presently 3.5 billion service users all over the world who make use of smartphones, and this number is predicted to keep rising successively year-wise, getting to a total of just about 4 billion.[1] A smartphone is "a mobile phone that performs many of the functions of a computer, typically having a touch screen interface, internet access, and an operating system capable of running downloaded applications."[2] Smartphones have several advantages to service users, particularly students and teenagers. It has become a route for maintaining social connections and networking, making friends and

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meeting people, as well as getting facts around the globe. Nevertheless, the latest studies have shown too much dependency on smartphones as well as the adverse effects of their usage.[3,4] The difficult use of mobile information and communication technologies (ICTs) that once led to significant and tenacious functional impairments and distress may also constitute behavioral addiction.[5]

Smartphone addiction, also known as problematic smartphone use (PSU), is defined "as an overdependence on smartphones and the inability to regulate its use, despite experiencing ill effects and unwelcome consequences in daily living."[6,7] Aljomaa *et al*. 2016,[8] described smartphone addiction as an individual who continually checks his/her phone from time to time and always has the desire to look at the mobile phones turn out to be so strong that he/she cannot rest even if he/she wishes to and so emotionally involved to their smartphones that they feel they cannot function without it and their use, and obsession with the smartphone results in the inattention of other assignments and tasks.[8]

An evolving study has found that smartphone addiction use of mobile phones is related to several health risks, stretching from psychosocial disorders such as anxiety and depression[9] to probably serious injuries from road traffic accidents where mobile phone use was a causal factor. It is far noteworthy that the emerging scholarly interest in smartphone dependency among people, especially students, children, and young persons is largely attributable to the recent clinical research that has linked excessive smartphone use to certain disorders. In addition, smartphone addiction could negatively affect the eardrum, wrists, neck, and joints. It has also been linked to fatigue and general body weakness. Likewise, Ng *et al*. 2020,[10] found a positive correlation between smartphone addiction and anxiety, whereas too much smartphone use is negatively related to self-esteem.[11]

The results of some studies investigating the relationship between smartphone use and academic attainment are generally self-contradictory. Junco (2012)[12] and Foen Ng *et al*. (2017)[13] reported a negative association between smartphone utilization and academic accomplishment among university students. In addition, Ishii (2010)[14] revealed that the problematic use of smartphones could have an unfavorable effect on the academic achievement of students. A similar study, conducted by Lepp *et al*. (2015)[15] stated that the overuse of smartphones could negatively affect academic performance, mental health, and subjective well-being of happiness for smartphone users.

In contrast, Shakoor *et al*. (2021)[16] Ahmed *et al*. (2020),[17] and Tao *et al*. (2018)[18] reported that the use of smartphones improves students' academic performance. However, some research found that there is no relationship between smartphone use and academic attainment.[19]

Consequent to these contradictory findings, therefore, it is imperative for researchers to carry out more studies on this subject matter. Although the spate of smartphone addiction in developed countries has been well documented, such may not be said of Saudi Arabia. Most existing works on smartphone culture in Saudi Arabia are largely on its use, with limited attention on its addiction. Again, previous smartphone addiction studies concentrated on medical students, whereas little is known as regard among undergraduate dental students. A large number of dental students in the study population in the Aseer region of Saudi Arabia use smartphones and to the best of our knowledge, this is the first study conducted in this study population. Furthermore, little is known regarding its consequences among undergraduate dental students. Additionally, cultural practices among the medical and dental undergraduates regarding the use of smartphones in this region necessitate this study.

Therefore, the objectives of this present study are to assess smartphone use, the prevalence of smartphone addiction, factors related to its addiction, and determine the relationship between smartphone addiction on academic accomplishment among male dental students at King Khalid University Abha, Saudi Arabia.

Materials and Methods

Study setting, participants, and design

The cross-sectional study was conducted among male dental students at KKU, Abha, Saudi Arabia. Assuming the prevalence study of smartphone addiction was 30% with an absolute precision level of 7% and a confidence level of 95%, the minimum required sample size for this study population was projected to be 165 participants using Scalex and ScalaR calculators.[20] The sampling frame included all the male dental undergraduate students who were attending KKU (N = 220) at the time the present study was conducted. A sample size of 168 students participated in the study. All dental male undergraduate students in that academic year were included in the study and 11 questionnaires were canceled due to errors in filling out the questionnaires and 41 students did not participate. This resulted in a 76% response rate being recorded. The year-one dental students were recruited as part of the pre-testing of the measuring instrument and internship students (intern doctors) were excluded from the study. Ethical approval was obtained from the Institutional Review Board. The objectives and procedures for data collection

were communicated to the participants and those who accepted to participate in the study signed the informed consent forms in advance of the commencement of the study. There was no financial incentive given to the participants.

Study tool for data collection

A validated SAS-SV questionnaire as established by Kwon *et al*. (2013)[21] was adopted for this research. The questionnaire was drafted in Arabic language and consisted of two parts. The first part elicited data on the participants' socio-demographics, smartphone use, and academic performance, whereas the second part consisted of the SAS-SV. Some information contained in the first section included the age of the participants, smartphone use, the first age of usage of smartphone, average time spent per day on smartphone, years in using smartphone, year of study level, purpose of smartphone usage, and most frequently used applications among students. The academic attainment of participants' academic attainment was obtained from the academic records of students from the university. Cumulative Grade Point Average (CGPA) is a measure of a student's academic accomplishment at the university; it is obtained on a 4-point scoring scale by division of the total number of grade points scored by the total number of credits, 4 being the highest score and 0 being the lowest score.

The level of smartphone addiction was measured using the SAS-SV among the students and it consisted of 10 items structured questions on a 6-point Likert scale with one showing lesser agreement and six showing higher agreement: (1) very strongly disagree, (2) strongly disagree; (3) disagree, (4) neither agree nor disagree, (5) agree, (6) strongly agree. Smartphone addiction score level ranges from 10 to 60. In accordance with Kwon *et al*. (2013)[21] Lopez-Fernandez (2017)[22] and Alhassan AA *et al*. (2018).[23] Any score that is greater than or equal to 31 shows smartphone addiction in males, whereas any score that is less than 31 shows no smartphone addiction.

Questionnaire validity assessment and translation

The measuring instruments otherwise known as the questionnaire were translated from English to Arabic versions by two independent indigenous Arabic speakers who are professionals and the Arabic form was translated back to English form by an expert in the English language who was also a native Arabic speaker. The two authors who are Arabic speakers looked at the face validity of the questionnaire for any discrepancies. A feasibility (pre-testing) study was conducted on 25 students (N = 25) to determine the questionnaire's reliability and feasibility. These students were excluded from the full-scale study. The pretesting of the questionnaire design helped researchers to determine whether the statement sequence was logical, the questionnaire instructions were easy to understand and follow, and the language and wording were understandable. Internal consistency that was found to be 0.71 was assessed using Cronbach's α (≤0.50 = low reliability, ≤0.70–0.50 = moderate reliability, ≤0.90–0.70 = high reliability, and ≥ 0.90 was regarded to be excellent reliability).[24]

Statistical analysis

Statistical Package for Social Sciences (SPSS) Version 25, Chicago, IL, USA for Windows was used to analyze the data after checking for completeness and consistency of data. Statistical significance levels for all tests were set at P value ≤ 0.05. Karl Pearson's correlation was used to examine the strength of the relationship between academic performance and smartphone addiction and multiple logistic regression analysis (MLR) was also used to determine the association and predictors of smartphone addiction with GPA among the study population.

Results

The total number (N = 220) of male dental students at King Khalid University were recruited for this present study. Of these, 168 respondents completed the questionnaire correctly. This gave a response

Table 1: Sociodemographic profile of study participants

Demographic profile	No. of respondents	% of respondents
Years of study		
Year 2	27	16.1
Year 3	16	9.5
Year 4	32	19.1
Year 5	33	19.6
Year 6	60	35.7
Age in years		
Mean±SD	22.90±2.11	
GPA		
2.0-2.99	9	5.36
>=3.0	159	94.64
Mean±SD	4.00±0.56	
Age of first		
Mean±SD	13.08±2.23	
Years of using SMT		
≤9 y	91	54.17
≥10 y	77	45.83
Mean±SD	9.18±2.76	
Average time for use		
<5 h	33	19.64
≥5 h	135	80.36
Mean±SD	6.04±2.08	
Total	168	100.00

rate of 76%. The participants' ages ranged from 19 to 26 years, 22.90 ± 2.11 years being the mean and standard deviation of study participants. Students from higher levels constitute the majority of the participants, year 6 (35.71%), year 5 (19.64%), and year 4 (19.05%), respectively. The majority of students had a GPA ≥ 3.0 (94.6%), whereas 5.4% of the participants had a GPA of between 2.0 and 2.99 with a mean GPA of 4.00 ± 0.56. The mean age of smartphone first use, duration in years of using smartphone, and average time of using smartphone were 13.08 ± 2.23, 9.18 ± 2.76, and 6.04 ± 2.08, respectively [Table 1].

The number of students who were addicted to the use of smartphones recorded in this study was 131 (78.0%) The mean addiction score was 0.78 [Table 2]. Figure 1 shows the purpose of smartphone use among the respondents. Social networking (35.71%) was the main purpose for the use of smartphones. Other purposes included fun (19.64%), entertainment (19.05%), and education 9.52%. The most frequently used phone application recorded in this study was Snapchat (44.05%). Other phone applications used were Whatsapp (27.98%) and TikTok (15.48%) [Figure 2].

Tables 3 and 4 show the connection between smartphone addiction and academic accomplishment. It also displays other variables related to smartphone addiction. Smartphone addiction and academic accomplishment (GPA) show a significant negatively weak correlation (df = 166, r = –0.35, P = 0.0001*). Furthermore, the age of the first use of a smartphone was statistically significantly weak and correlated negatively to smartphone addiction (df = 166, r = –0.19, P = 0.014*), the year of study was significantly, moderately negatively correlated to smartphone addiction (df = 166, r =–0.52, P = 0.0001*). Table 5 shows an association between GPA and total (SPAI) smartphone phone addiction inventory score otherwise

Table 2: Prevalence and mean addiction score of respondents

SAS-SV Score	Frequency	Percentage	Mean score
SAS-SV Score ≤31	37	22.0	0.22
SAS-SV Score >31	131	78.0	0.78
Total	168	100	1.0

Table 3: Correlation between GPA with SAS-SV scores by Karl Pearson's correlation coefficient

	Variables	Correlation between GPA with		
		r	*t*	*P*
Year 2	SAS	0.19	0.99	0.3339
Year 3	SAS	-0.15	-0.58	0.5686
Year 4	SAS	-0.09	-0.48	0.6381
Year 5	SAS	-0.08	-0.46	0.6467
Year 6	SAS	-0.52	-4.68	0.0001*
Age of first		-0.19	-2.48	0.0141*
Years of using SMT		-0.09	-1.19	0.24
Average time weekly (in h)		0.02	0.22	0.83
Total	SAS-SV	-0.35	-4.85	0.0001*

*P<0.05

Table 4: Association between levels of smartphone addiction with years of study

Years	SAS-SV (≤31)	%	SAS-SV (>31)	%	Total
Year 2	6	22.22	21	77.78	27
Year 3	8	50.00	8	50.00	16
Year 4	10	31.25	22	68.75	32
Year 5	6	18.18	27	81.82	33
Year 6	7	11.67	53	88.33	60
Total	37	22.02	131	77.98	168

Chi-square=12.9100, P=0.0120*, at P<0.05

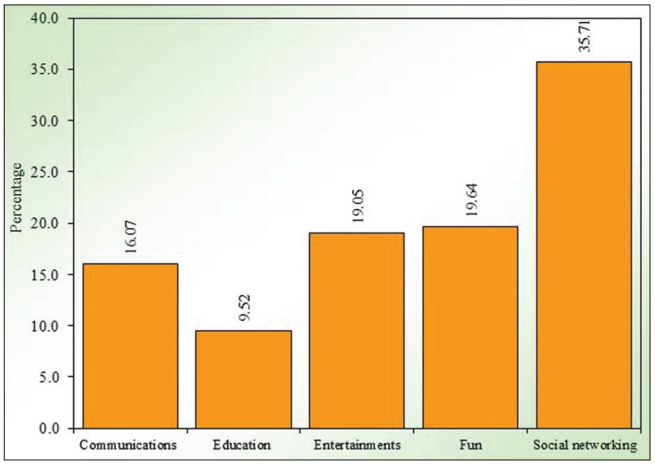

Figure 1: The purpose of using smartphones among the respondents

Table 5: Association between GPA and total SPAI score by multiple logistic regression

Variables	Unadjusted OR	95% CI for OR		*P*	Adjusted OR	95% CI for OR		*P*
		Lower	Upper			Lower	Upper	
Age in yrs	0.65	0.43	0.99	0.0450*	0.77	0.43	1.37	0.3680
Age of first	0.69	0.47	1.02	0.0620	0.76	0.45	1.28	0.3060
Years of using SMT	1.01	0.79	1.29	0.9400	0.97	0.63	1.50	0.9010
Average time weekly	1.04	0.74	1.47	0.8240	1.15	0.67	1.95	0.6150
SAS-SV	0.85	0.76	0.95	0.0050*	0.87	0.77	0.99	0.0310*

*P<0.05

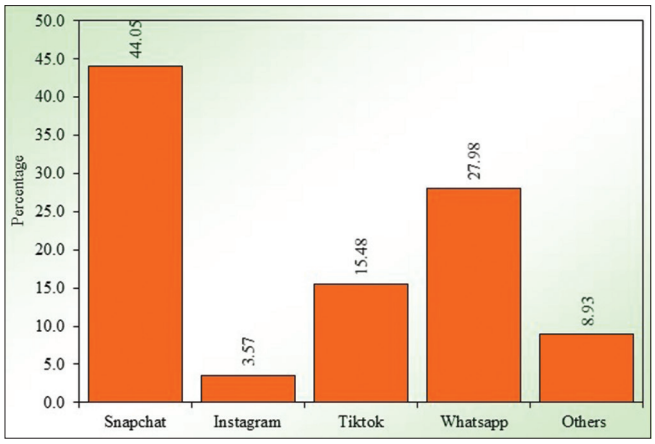

Figure 2: Phone applications used by the respondents

known as smartphone addiction level as assessed by multiple logistic regression (MLR) analysis to help predict the likelihood of influence and association with other variables such as age in years, age of first use, duration in years of using smartphone and average time of weekly use of smartphone in addition to GPA. The result shows a statistically significant association between GPA, age in years ($P = 0.0120$*), and smartphone addiction score ($P = 0.0310$*) ($P < 0.05$).

Discussion

The aim of this present research is to examine the relationship between smartphone addiction and academic performance among dental students at King Khalid University, Saudi Arabia. The results of this present study indicated that there was a statistically significant negative association between smartphone addiction and academic achievement among the study population, the problematic use of smartphones and smartphone addiction was high with a prevalence of 78.0% in study participants, and the students used smartphones for other purposes rather than for educational purpose.

Some studies show a negative association between academic performance and smartphone addiction and these studies indicated that as the level of smartphone addiction increases, academic achievement decreases and *vice versa*.[25-27] The results of this present study are consistent with other similar studies above that evaluated smartphone addiction and academic performance. In addition, Roberts *et al*. (2014)[27] reported that problematic smartphone use can negatively impact academic accomplishment as students' attention in the lecture hall is interrupted as a result of smartphone use, and such interruption can disturb their studies even outside the lecture hall. Similarly, another study conducted by Bugela, 2007[28] also found an excessive use of smartphones has been negatively correlated significantly with the interference of study in the classroom. Froese *et al*. (2012)[29] reveal that texting during class produces substantial negative impacts on students' academic attainment. This negative association between smartphone addiction and academic accomplishment could probably be explained that very few students actually used smartphones for academic purposes as observed in the present study.

Many studies have investigated the negative consequences of smartphone use such as poor sleep quality resulting from the problematic use of mobile phones and they found a significant association,[30-32] whereas others investigated attention deficit and academic procrastination[33,34] and they also found a statistically significant negative association with academic performance.

Similarly, a research study was investigated by Rozgonjuk *et al*. (2019)[35] and this study exposed the serious concerns that problematic smartphone device use can have on students' ability to concentrate, accomplish tasks, rest time, and health which consequently affects student academic performance.

Smartphone has numerous advantages for users, especially students and youths. The use of smartphones has become an avenue for maintaining social contact, and networking, in addition to getting information around the world. Despite the problematic use of smartphone addiction, studies have looked at the educational gains of using mobile phones such as for learning purposes, self-reported learning, personalized instructions, classroom engagement, and second language learning.[36-40] This study's findings spotlighted the educational gains to include decreasing the digital gap in concluding their assignments at home, collaborating with their co-students, speedy access to information, and vocabulary improvement.

However, a comparable study was conducted by Boumosleh *et al*. (2017),[41] which investigated the Lebanon undergraduate students recruited from Liberal Arts courses in seven faculties and found no correlation or relationship between problematic smartphone use and students' academic achievement. The probable explanation could be that this study is a self-reported study carried out online. Another study conducted by Lee (2015)[42] also found no association between smartphone addictions with students' CGPAs.

Another study by Mafla *et al*. (2021)[43] also examined smartphone addiction among 374 dental students at Colombia University School of Dentistry and a very low smartphone addiction prevalence was found to be as low as 4.8%, which is contrary to this present study

with very high smartphone addictive prevalence and smartphone usage. This study also found a positive significant association with academic performance, which was not consistent with this present study.

Aljomaa *et al*. (2016)[8] conducted a related study among undergraduate students at a Saudi University, and the results of the study showed smartphone addiction prevalence to be 48%, which is comparable to this present study that found smartphone addiction prevalence to be as high as 78% and the probable explanation to the high prevalence of our study is the conservative socio-cultural way of life and the high frequency of use and ownership of smartphones of the people living in this region known as Aseer province. Similar research was also conducted at a Saudi University among undergraduate students by Alotaibi *et al*. (2022)[44] and they found the prevalence of smartphone addiction to be as high as 67%, in this study, the majority of the students used their smartphones for social networking rather than for educational purposes, which is consistent with the result of the present study. Further research was also undertaken by Nasser *et al*. (2020)[45] among undergraduates at a Malaysian University, and they established the preferred smartphone application used was Whatsapp application, whereas, in the present study, we found the preferred smartphone application was Snapchat followed by Whatsapp application. In addition, Alotaibi *et al*. (2022)[44] and Nasser *et al*.[45] (2020) study's results showed that the main reason for using a smartphone was social networking and both research findings showed a statistically significant association between the age of first use of a smartphone and years of using a smartphone and their findings are also consistent with this present study.

Notwithstanding the valuable data collected, this present study has some limitations. This prospective cross-sectional study did not explore the causal consequences of smartphone addiction on academic achievement, it only examined the association and its pattern of usage among the students.

Another limitation is the likelihood of reporting recall bias because it is a self-reported data collection and if it were primary data collection, it would provide us with actual patterns and more robust data on patterns of usage among dental undergraduate students.

Furthermore, due to the ubiquity of smartphones and addictive use, there is every need for the development of psychometric standardized tools to measure smartphone addiction levels.

In addition, the participants were recruited from a single large population of male dental undergraduate public University, the only public institution in the entire Aseer region in Abha, Saudi Arabia because of cultural and religious reasons in getting access to the female study population group as at the time of conduct of the study. Therefore, the results from this present study cannot be generalized to the entire Saudi population.

The study makes numerous significant contributions to the existing scientific literature, the study is first to the best of the authors' knowledge in the Aseer region, Abha, Saudi Arabia to use a complete or holistic SAS-SV in examining the association between smartphone addiction level and CGPA.

The smartphone represents a new technological device that has a great sociocultural on impact people's daily living; however, there is a dearth of studies that have explored the impacts of smartphone addiction on academic accomplishment or CGPA; therefore, more study is further required to focus on the effects and implications of smartphone use on students' academic achievement in this region while providing intervention strategies to improve the negative impact experienced by the students.

Conclusions

The study revealed a high prevalence of smartphone addiction among the study population. Furthermore, the study shows a statistically significant negative association between smartphone addiction use and GPA. The main purpose of smartphone usage among the study population was social networking with very few respondents using it for educational purposes.

This study recommends that the government through the Ministry of Education should develop and adopt policies that would lessen the use of smartphones among students in school settings and educate students on the adverse effects of smartphone use through mass, print, and social media. Smartphone rules could further be added to the school syllabus. Further research should explore smartphone addiction and its effects on mental health and study achievement with implications for learning and teaching practices. Also, the development of educational policies should be encouraged using experimental studies to predict GPA achievement.

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Conflicts of interest

There are no conflicts of interest.

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