Original Research Article

Smartphone usage and addiction among undergraduate dental students in Malaysia: A cross-sectional study

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Abstract:

BACKGROUND: Behavioral addiction to smartphones is a common phenomenon in the present digital age, wherein indulgence in these devices is compulsive and impacts physical, social, and psychological health of the population. The smartphones effect on a dental student's life is detrimental to their academics, health, and efficiency in providing clinical patient care. To assess use and addiction of smartphones among dental students under six major domains and to compare this based on their gender, ethnicity, and year of study.

MATERIALS AND METHODS: A cross-sectional study using a validated questionnaire, Smartphone addiction scale was conducted among 349 undergraduate students ($N = 349$) at a private dental school in Malaysia.

RESULTS: Overall results are presented as mean scores under six domains with total score as 142.40 (33.65). The total scores compared between two genders did not show statistical difference, however on comparing individual domains, females (25.25) had higher mean score for daily life disturbance ($P = 0.013$) and males (30.17) for cyberspace-oriented relationship ($P = 0.001$). Chinese students had higher scores with respect to withdrawal (32.45) and cyberspace-oriented relationship (29.48) as compared to other ethnicities. Year 4 students show higher scores than other years in daily life disturbance (27.44), tolerance (16.81), and overuse (16.51).

CONCLUSION: Our research presents the extent and pattern of smartphone of usage and addiction among the undergraduate students at a dental school in Malaysia. The indicators of addiction highlighted in the study are pivotal in spreading awareness regarding this overuse and addiction as well as planning further research in this area.

Keywords:

Addiction, dental students, internet addiction disorder, mobile phones, smartphone

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Introduction

American Society of Addiction Medicine defines, "Addiction" as a treatable, chronic medical disease involving complex interactions among brain circuits, genetics, the environment, and an individual's life experiences. People with addiction use substances or engage in behaviors that become compulsive and often continue despite harmful consequences.[1] They key element in the definition of "addiction" is indulgence in "behaviors" that may manifest as tolerance, dependence, and may even express clinically as withdrawal symptoms or sign, the terms that were traditionally associated with substance abuse or drugs.[2]

Department of statistics Malaysia[3] reported a whopping 91% of Malaysians have access to smartphones and 97.9% use information and communications technology services on their smartphones. Smartphones have far exceeded functionalities compared to featured phones' purpose of serving as communication device.[4]

As per the survey, social networking is the most popular activity among Malaysian internet users followed by activities like downloading audio-visual media, playing games, surfing information about goods or services, Internet calling, and downloading software or applications.[3]

Despite opening the world of information and entertainment in the palms of a user, and making the tasks easier with multitude of applications, smartphones have immense propensity to makes users indulgent in them. This has range of negative effects on physical and psychological health, as well as personal and social relationships.[5,6] On one hand, it impacts students' academic performance, deteriorate their interpersonal skills, and on the other, it may lead them to anxiety, depression, low self-esteem, and loneliness.[5-8] Literature has even shown, smartphones becoming causative agents of physical pains and discomforts such as pain in wrists, neck, and eyes.[8,9] Hence, it is the need of the hour to find out the status and degree of this addiction in different sections of society engaging in different walks of life, so that interventions can be planned before it gets too late, and we hit the stage of smartphones and electronic gadgets mastering over human race than we being their masters to harness our work efficiently.[7]

With this background, our study will implore the impact of smartphones on undergraduate students of dentistry course. Smartphone usage and addiction among dental students is also described as an essential component for the assessment of curriculum and their everyday life.[8,9] This survey will provide a clear idea on the knowledge and attitude of dental students toward smartphone usage and addiction.

Materials and Methods

Study design and population
A cross-sectional study was done among 349 dental students of Manipal University College Malaysia (MUCM) using universal sampling. The inclusion criteria for participation were all students enrolled at Faculty of dentistry from year 1 to year 5 during the academic year 2019–2020, and those who gave written consent for participation in this research. The exclusion criteria for participation is those students who identified themselves under psychological disease or on medication for the same.

Survey instrument and data analysis
A validated questionnaire-Smartphone addiction scale (SAS) developed by Kwon *et al*.[4] was used. It consists of 48 question items divided into six domains namely daily life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse,

and tolerance. These domains were rated on the 6-point Likert scale. Descriptive statistics are used to describe the data; categorical data are expressed as numbers with percentages and continuous data as mean ± standard deviation The results of SAS are presented as mean scores for the individual domains and total scores where higher the score represents greater addiction toward smartphones. Data were analyzed using Epi Info Version 7.2. Centers for Disease Control and Prevention (CDC). Atlanta, Georgia. USA.

Independent *t*-test was used to compare the smart phone addition between genders. One-way analysis of variance (ANOVA) and Tukey test of *post hoc* comparison were used to compare between different ethnicity and academic years. We checked the assumption of homogeneity of variance when we calculated one-way ANOVA. If the homogeneity of assumption was not met, we used Welch's statistics and Games-Howell for *post hoc* comparison. The level of 0.05 was the cutoff point for statistical significance with a confidence level of 95%.

Ethical approval
This study was approved by Research Ethics Committee, Faculty of Dentistry, MUCM, MMMC/FOD/AR/B6/EC 2019 (20). Written informed consent was collected from particpants before data collection. Individual data were completely anonymized after data collection.

Results

Table 1 presents the sociodemographics of the study participants. In our study population, 70.5% were female and 45.9% represented Chinese ethnicity. Students were almost equitably representing academic years 2, 3, 4, and 5. Year 1 and 2 cumulatively represented preclinical years and likewise Year 3, 4, and 5 represented clinical years.

Table 1: Demographic characteristics of study sample (*n*=349)

Variable	*n* (%)
Gender	
Male	103 (29.5)
Female	246 (70.5)
Ethnicity	
Malay	103 (29.5)
Chinese	160 (45.9)
Indian	67 (19.2)
Others	19 (5.4)
Academic year	
Year-1	56 (16.0)
Year-2	73 (20.9)
Year-3	77 (22.1)
Year-4	70 (20.1)
Year-5	73 (20.9)

Overall results for smart-phone addiction as per the SAS scale for our study population is presented as mean scores for the individual domains where higher the score represents greater addiction towards smartphones [Table 2]. The total scores compared between two genders did not show statistical difference; however, there were statistical differences when individual domains were compared. Females (mean 25.25) had significantly higher mean score for daily life disturbance than males (P = 0.013) and males (mean 30.17) had significantly higher score in cyberspace-oriented relationship than females (P = 0.001) [Table 3]. Table 4 shows that there were statistically significant difference of withdrawal and cyberspace-oriented relationship between different ethnicities. *Post hoc* comparison showed that Chinese students had significantly higher scores for the domains of withdrawal (mean 32.45) than others ethnicity and had significantly higher cyberspace-oriented relationship (mean 29.48) than Indian students [Table 5]. Table 6 shows that there was significant difference of daily life disturbance, overuse,

tolerance, and total score between different academic years. *Post hoc* comparison of the academic years shows that Year 4 students had significantly higher scores compare to year 2, 3, and 5 in daily life disturbance (mean 27.44), had higher tolerance (mean 16.81) than year 2 and 5, and had higher overuse than year 1 students (mean 16.51). Moreover, year 4 students had significantly higher total score than year 2, 3 and 5 [Table 7].

Discussion

Smartphones, one of the omnipresent gadgets in today's world have been increasingly identified as a cause of behavioral addiction in the recent decade.[2,4-17] However, there is sparsity of literature on its impact on dental university students, especially in the Malaysian context. This study brings into light usage pattern and addiction levels of these gadgets by undergraduate students at a private dental school in Malaysia.

Association between gender and smartphone usage and addiction

From the data collected in our study, the results showed no significant gender differences in the prevalence of smartphone usage and addiction in male (49.76) and female (49.30) where P > 0.05. This is similar to the results of previous studies conducted in by Baghianimoghadam *et al*.[10] in Iran and like the result obtained by Chen *et al*.[11] among medical students in China.

However, under domain daily life disturbance, our study show female students (25.25) have higher mean score as compared to male students (23.17). Females experienced

Table 2: Mean and standard deviation of six domains of smartphone addiction scale (*n*=349)

Domains (score range)	Mean±SD
(a) Daily life disturbance (8-48)	24.64±7.17
(b) Positive anticipation (9-54)	29.13±7.80
(c) Withdrawal (11-66)	30.97±9.94
(d) Cyberspace-oriented relationship (11-66)	27.48±9.60
(e) Overuse (4-24)	15.15±4.29
(f) Tolerance (5-30)	15.03±4.83
Total score (48-288)	142.40±33.65

SD=Standard deviation

Table 3: The association between gender and smartphone addiction (*n*=349)

Domain	Mean±SD		Mean difference (95% CI)	P[a]
	Male	Female		
Daily life disturbance	23.19±6.98	25.25±7.17	2.08 (0.44-3.72)	0.013
Positive anticipation	29.03±8.14	29.17±7.91	0.14 (−1.70-1.98)	0.883
Withdrawal	31.50±9.15	30.74±10.26	−0.76 (−3.06-1.54)	0.515
Cyberspace-oriented relationship	30.17±8.60	26.35±9.78	−3.81 (−5.99-−1.63)	0.001
Overuse	15.07±3.89	15.19±4.46	0.12 (−0.87-1.12)	0.807
Tolerance	14.49±4.20	15.26±5.06	0.78 (−0.34-1.89)	0.170
Total score	143.43±30.62	141.97±34.89	−1.46 (−9.23-6.32)	0.713

[a]Unpaired *t*-test. *P*<0.05 is significant. 95% CI=95% confidence interval, SD=Standard deviation

Table 4: The association between ethnicity and smartphone addiction (*n*=349)

Domain	Mean±SD				P[b]
	Chinese	Malay	Indian	Others	
Daily life disturbance	24.99±6.75	23.72±7.24	24.51±7.77	25.63±7.11	0.594
Positive anticipation	29.79±8.29	29.39±7.33	28.26±8.02	27.26±6.81	0.329
Withdrawal	32.45±9.39	30.51±8.75	29.89±11.41	25.95±7.73	0.007
Cyberspace oriented relationship	29.48±9.68	26.37±8.73	25.81±9.82	23.63±7.30	0.003
Overuse	15.47±3.76	14.97±3.95	14.84±5.15	14.84±4.73	0.659
Tolerance	15.26±4.50	14.69±4.40	14.76±5.71	15.84±3.82	0.606
Total score	147.44±31.99	139.64±29.53	138.07±38.92	133.16±24.77	0.066

[b]ANOVA; *P*<0.05 is significant. SD=Standard deviation

pain in the wrist or at the back of the neck while using a smartphone. This is supported by the study done by Parasuraman *et al*.[12] which stated that female students miss their planned work and feel pain on their hand and neck.

Besides, male students (30.17) show higher mean score than female (26.35) in domain of cyberspace-oriented relationship. For example, male students indulged in checking their social networking services like Instagram or Facebook right after waking up. Saheer *et al*.[9] in their research also presented findings on similar lines that male students get angry when someone interrupts them while using smartphone. This study also gave an interesting term called "Nomophobia"–to highlight a "feeling of fear of missing out" in the absence of smartphones amongst students.

Association between ethnicity and smartphone usage and addiction

There are no significant ethnicity differences in the prevalence of smartphone usage and addiction where $P = 0.066$. This is like the results presented by Yang *et al*.[13] which showed no significant ethnicity differences in the prevalence of smartphone addiction in Chinese and British, ($P > 0.05$) undergraduates at a university in northern England.

However, when withdrawal domain was compared, Chinese students in our study population showed greater withdrawal compared to other ethnicities with $P = 0.0042$. Most of them responded as "not being able

to stand not having a smartphone." Recent literature on Chinese population have found college students' smartphones use to be associated with low psychological well-being, anxiety, and loneliness.[14]

Besides, there are significant ethnicity differences in smartphone usage and addiction under cyberspace-oriented relationships between Chinese and Indians with $P = 0.0042$. Most of the students' survey response elicited they are "not able to keep appointment due to excessive smartphone use." A similar interesting finding is presented in the study by Tang *et al*.[15] on the addiction pattern among students in the United States, China, and Singapore, where students from China and Singapore were more addicted to Internet and Social networking and less for Games when compared to the students from United States.

Association between year of study and smartphone usage and addiction

From the data collected in our study, the results showed no significant year of study differences in the prevalence of smartphone usage and addiction in all the academic year where $P = 0.066$. This is like the results obtained by Payne *et al*.[16] which displayed equal smartphone ownership within preclinical and clinical years (76% and 80%, respectively), with overall app usage as high as 83.3% (for educational purposes). In our study, most of the students used smartphone during lectures, classes, and meetings. Both preclinical and clinical students show similar pattern of usage of smartphone and its' addiction. However, year 4 students has higher mean score in daily life disturbance (27.44), tolerance (16.81) and overuse (16.51) compared to other academic year. They responded in the survey as "often feel tired and lack adequate sleep due to excessive smartphone use, conflict with family members due to smartphone use and their fully charged battery does not last for one whole day." In a study conducted in medical students at a college in East Malaysia, Hadi *et al*.[17] reported no significant differences in the prevalence of smartphone addiction in academic years 3,4, and 5. Furthermore, they also reported Year

Table 5: *Post hoc* comparison of ethnicity for withdrawal domain and cyberspaces-oriented relationship domain

Ethnicity comparison		P	
		Withdrawal	Cyberspace oriented relationship
Chinese	Malay	0.445	0.110
Chinese	Indian	0.232	0.012
Chinese	Others	0.012	0.054
Malay	Indian	0.979	0.981
Malay	Others	0.144	0.679
Indian	Others	0.255	0.793

P<0.05 is significant

Table 6: The association between year of study and smartphone addiction (*n*=349)

Domain	Mean±SD					Pb
	Year 1	Year 2	Year 3	Year 4	Year 5	
Daily life disturbance	25.75±7.38	24.18±5.81	24.06±6.50	27.44±7.56	22.16±7.62	<0.001
Positive anticipation	29.29±8.54	28.38±6.45	28.92±7.54	30.90±8.87	28.26±8.35	0.284
Withdrawal	29.89±9.36	30.12±9.08	30.88±9.59	33.24±10.77	30.55±10.64	0.290
Cyberspace oriented relationship	27.71±10.43	26.79±8.23	25.95±9.27	30.13±9.94	27.05±9.92	0.096
Overuse	14.38±3.70	15.48±4.27	14.65±4.65	16.51±4.14	14.66±4.27	0.022
Tolerance	15.79±4.47	13.62±4.46	15.00±4.87	16.81±4.76	14.21±4.97	0.001
Total score	142.80±34.66	138.58±26.18	139.47±32.09	155.04±36.24	136.89±36.23	0.009

bANOVA; *P*<0.05 is significant. SD=Standard deviation

Table 7: *Post hoc* comparison of academic years for daily life disturbance domain, tolerance domain, overuse domain, and total score

Academic year comparison		*P*			
		Daily life disturbance	Overuse	Tolerance	Total score
Year 1	Year 2	0.684	0.587	0.075	0.952
Year 1	Year 3	0.650	0.996	0.878	0.979
Year 1	Year 4	0.712	0.042	0.743	0.241
Year 1	Year 5	0.060	0.996	0.328	0.854
Year 2	Year 3	0.999	0.753	0.379	0.999
Year 2	Year 4	0.036	0.591	0.001	0.027
Year 2	Year 5	0.381	0.769	0.943	0.998
Year 3	Year 4	0.036	0.062	0.139	0.038
Year 3	Year 5	0.475	0.999	0.841	0.990
Year 4	Year 5	0.001	0.070	0.009	0.010

$P<0.05$ is significant

4 students experienced stress, anxiety, decreased sleep quality and problems in campus life and personal relationship. We hypothesize that, since Year 4 stands as mid milestone of clinical years between year 3 and year 5, where year 3 students are just exposed to clinical environments, and engagement has elements of novelty and excitement and year 5 on the other hand being the final lap of academic run keeps them on toes to complete all quotas and need strict deadlines. However, we recommend future research to explore into this finding of our results.

Ours was the first study to assess the smartphone addiction in undergraduate dental students of Malaysia. The patterns elicited in terms of gender, ethnicity, and years of study will be useful at the level of institution in channelizing the resources in apt manner to strengthen physical, emotional and psychological health of the students, namely arranging mental health workshops, counseling sessions, etc., Our study is limited to one school, and it was carried out in single point in time, hence results can not to be extrapolated to entire student population, nonetheless it can be used as an important reference literature of the student population studies. We recommend research with longitudinal follow-ups where same variables are measured at different time frames to get wholesome view of smartphone's addiction in the journey of dental students.

Conclusion

Our research presents the extent and pattern of smartphone of usage and addiction among the undergraduate students at a dental school in Malaysia. The indicators of addiction highlighted in the study are pivotal in spreading awareness regarding this overuse and addiction as well as planning further research in this area.

Conflicts of interest

There are no conflicts of interest.

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