ORIGINAL RESEARCH PAPER VOLUME-6 | ISSUE-8 | AUGUST - 2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

The Association Between Smartphone Use Pattern, Smartphone Addiction, and Depression Among Female Secondary School Students in Khobar, Saudi Arabia

Psychology

Dr Najla Abdulaziz Al-Dossary Ministry of Health, Family Medicine Post-Graduate Program in the Eastern Province of Saudi Arabia. Corresponding author

Dr Arij Abdullah Al-Thebaiti Ministry of Health, Family Medicine Post-Graduate Program in the Eastern Province of Saudi Arabia.

Dr Afnan Abdullah Al-Awwad Ministry of Health, Family Medicine Post-Graduate Program in the Eastern Province of Saudi Arabia.

Dr Reham Zabar Al-Anzi National Guard Health Affairs-Dammam, Family Medicine Post Graduate Program in the Eastern province in Saudi Arabia

Dr Tahani Mofareh Asseri National Guard Health Affairs-Dammam, Family Medicine Post Graduate Program in the Eastern province in Saudi Arabia

ABSTRACT

We investigated the association between smartphone use pattern, smartphone addiction, and depression among 493 female secondary school students in Khobar, Saudi Arabia. Participants were assessed using a self-administered questionnaire comprising four sections: a) sociodemographic questions, b) smartphone use pattern, c) the Smartphone Addiction Scale–short version, and d) the Beck Depression Inventory–Primary Care version. Over half showed smartphone addiction, which was positively associated with depression. A longer duration of smartphone ownership; longer duration spent using smartphones daily; and using smartphones for social networking, entertainment, and website surfing were positively associated with smartphone addiction. Using smartphones for entertainment was positively correlated with depression. Consequently, students displaying high smartphone addiction scores should be monitored for depression. Depression screening programmes should be implemented in schools. Parents and children should set limits on their own and others' smartphone use, and public awareness should be raised regarding the association between smartphone addiction and depression.

KEYWORDS:

Addiction; depression; education; smartphone.

Introduction

New generation mobile phones or 'smartphones' are devices capable of processing more information than other phones. They are Internet-based and characterized by high-speed data access via Wi-Fi and mobile broadband and include many features such as games, access to social networks, digital cameras, multimedia players, GPS-based navigation, and web browsers (Demirci, Akgönül, & Akpinar, 2015). Smartphones are also becoming a fundamental need in everyday life as they offer a substantial variety of mobile applications for communication, education, business, commerce, and entertainment (Haug, Castro, Kwon, Filler, Kowatsch, & Schaub, 2015). The high usage of smartphones and the fact that these devices have the above features has raised the concern of smartphone addiction (Kwon, Kim, Cho, & Yang, 2013).

Smartphone addiction is a form of technological addiction, which is defined by Griffiths as non-chemical behavioural addictions that involve human–machine interactions (Griffiths, 1996; Lin, Chang, Lee, Tseng, Kuo, & Chen, 2014). The key features of behavioural addiction include continued participation in behaviour despite its adverse effects, lose self-control over involvement in the behaviour, compulsive participation, and cravings that precede participation in the behaviour (Mok et al., 2014; Demirci et al., 2016). There is no official definition for smartphone addiction; however, based on the Internet-addiction definition, smartphone addiction is defined as the overuse of smartphones to the extent that it adversely affect users' daily lives (Demirci et al., 2016).

In recent years, numerous researchers have examined the adverse impact of smartphone addiction on users' physical health. It has been found that excessive smartphone use is associated with poor perceived health, including tiredness, headaches, neck stiffness, back pain, wrist pain, and blurred vision (Khan, 2008; Kwon et al., 2013). Moreover, various researchers have examined the effects of smartphone use on mental health. They showed that smartphone addiction was associated with concentration difficulties, poor sleep quality, and anxiety (Demirci et al., 2016; Khan, 2008). Recently, some researchers have associated smartphone addiction with depression, which is a common mental disorder that is characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration for at least two weeks ('Depression: definition', 2017).

Literature Review

Many studies have revealed that depression is higher in high-risk smartphone addiction groups than in their low-risk counterparts (Augner & Hacker, 2011; Demirci et al., 2016; Hwang, Yoo, & Cho, 2012; Ikeda & Nakamura, 2013; Sánchez-Martínez & Otero, 2009). One study showed that a high frequency of mobile phone use was a risk factor for mental health outcomes including depression at 1-year follow-up among young adults (Thomée, Härenstam, & Hagberg, 2011). Moreover, some studies demonstrated a relationship between depressive symptoms and the overuse of social networking sites (SNS) (Hanprathet, Manwong, Khumsri, Yingyeun, & Phanasathit, 2015; Pantic, Damjanovic, & Todorovic, 2012; Tamura, Nishida, Tsuji, & Sakakibara, 2017). Conversely, one study conducted in the US among a sample of adolescents reported that there was no relationship between SNS and depressive symptoms (Jelenchick, Eickhoff, & Moreno, 2013). Similarly, several studies have reported a significant association between Internet addiction and depression (Bahranian et al., 2014; Dalbudak, Evren, Aldemir, Coskun, Ugurlu, & Yildirim, 2013; Younes et al., 2016).

In Saudi Arabia, most of the studies regarding smartphone use have focused on its negative physical and cognitive consequences (Alghamdi & Taha, 2014; Al-Khlaiwi & Meo, 2004; Alosaimi, Alyahya, Alshahwan, Al Mahyijari, & Shaik, 2016; Jamal, Sedie, Haleem, & Hafiz, 2012; Khan, 2008; Meo & Al-Drees, 2005). However, we found one study conducted with medical students that showed an association between heavy mobile use and depression (Hegazy, Alkhail, Awadalla, Qadi, & Al-Ahmadi, 2016) and another study that showed an association between Internet addiction and depression (Alshehri, Azahrani, & Alotaibi, 2017).

Rationale & Objectives

To the best of our knowledge, no study has yet investigated the association between smartphone addiction and depression among secondary school students in Khobar, Saudi Arabia. This is notable because they are vulnerable to smartphone addiction, which has become a basic demand in their lives because of its advanced technological innovations that they are highly interested in (Kwon, Kim, Cho, & Yang, 2013). Consequently, we investigated the association between smartphone use pattern, smartphone addiction, and depression among secondary school female students in Khobar, Saudi Arabia.

Our specific objectives comprised the following:

1. To investigate the prevalence of Smartphone addiction among female secondary school students
2. To determine the association between Smartphone addiction and depression among female secondary school students
3. To study the relationship between smartphone use pattern and smartphone addiction among female secondary school students
4. To study the relationship between smartphone use pattern and depression among female secondary school students

Methods Participants and Procedure

The inclusion criteria included all female secondary school students, Saudis and non-Saudis, single and married, from public and private schools, in Khobar, Saudi Arabia. Students who were on sick leave at the time of the study, night-school students, and International school students were excluded from participation. Because of the single-sex educational system in Saudi Arabia, where male students are separated from female students, male secondary school students were not included in the study since accessibility was difficult.

Based on the school's list obtained from the Ministry of Education, 17 schools fit our inclusion criteria (6 private), which had a total population of 5100 students (4441 students from public schools and 659 students from private schools). The sample size was calculated using software (Raosoft.com). A sample size of 538 was determined by a 4% margin of error, 95% confidence interval, and 50% response distribution rate among the population of 5100 students.

It should be noted that there are there are three academic levels in "SECONDARY SCHOOLS OF " the Saudi educational systems first, second, and third levels correspond to 10^{th}, 11^{th}, and 12^{th} grades in North America. The number of classes in each level varies between schools and depends on each school's population, school size, and capacity.

Private school students comprised 13% of the total sample; therefore, using proportional allocation, 70 students were randomly selected from the private schools and the remaining 468 were randomly selected from public schools. Based on the list of female secondary schools that was obtained from the Ministry of Education, the number of private schools was listed from 1−6; randomly, we selected the even numbers (i.e. second, fourth, and sixth schools).

Using proportional allocation and according to the population in each school, we randomly selected 19 students from the second school: 6 from the 1st level, 7 from the 2nd level, and 6 from the 3rd level; 17 students from the fourth school: 6 from the 1st level, 5 from the 2nd level, and 6 from the 3rd level; and 34 students from the sixth school: 11 from the 1st level, 12 from the 2nd level, and 11 from the 3rd level.

In addition, the number of public schools was listed from 1-11; randomly, we selected the odd numbers (i.e. first, third, fifth, seventh, ninth, and eleventh schools). We tried to include a high number of schools in the study to ensure sociodemographic variety among the participants. Using proportional allocation, from the first school we randomly selected 121 students: 40 from the 1st level, 41 from the 2nd level, and 40 from the 3rd level; from the third school, we randomly selected 91 students: 30 from the 1st level, 31 from the 2nd level, and 30 from the 3rd level; from the fifth school, we randomly selected 122 students: 41 from the 1st level, 40 from the 2nd level, and 41 from the 3rd level; from the seventh school, we randomly selected 66 students: 22 students per level; from the ninth school, we randomly selected 43 students: 14 from the 1st level, 15 from the 2nd level, and 14 from the 3rd level; and from the eleventh school, we randomly selected 25 students: 8 from the 1st level, 9 from the 2nd level, and 8 from the 3rd level. Using equal allocation and according to the proportion of the number of classes of each level in each school, participants were randomly selected.

The study was conducted between December 2016 and January 2017. All participants were assessed using self-administered questionnaires that comprised four sections: a) sociodemographic questions, b) smartphone use pattern, c) Smartphone Addiction Scale–short version (SAS-SV), and the d) Beck Depression Inventory–Primary Care version (BDI-PC). The questionnaires were distributed manually to the participants by the researchers and collected after completion.

Measures

We assessed the following sociodemographic variables: age, nationality, marital status, academic level, school type, accommodation, monthly family income, and academic grade.

We assessed smartphone ownership using a single question to which they could respond 'yes' or 'no', ; if they responded 'no' they did not complete the rest of questionnaire

Smartphone use pattern was assessed by 4 questions concerning the following: a) duration of owning a smartphone in years ('less than 1 year', '1−3 years', '4−6 years', or 'more than 6 years'), b) duration of smartphone use on a typical day ('1−2 hours', '3−4 hours', '5−6 hours', or 'more than 6 hours'), c) duration until first smartphone use in the morning (other than using alarm function) ('within 5 minutes', 'within 6–30 minutes', 'within 31–60 minutes', or 'after more than 60 minutes'), and d) purposes of using smartphone ('calling', 'social networking', 'games', 'entertainment like watching videos or listening to music', 'performing school tasks', 'website surfing' and 'other').

The SAS-SV is a 10-item, six-point, Likert-type, self-rating scale. It is a short version the original SAS that was developed in 2013 based on the Internet Addiction Scale plus the features of smartphones (Kwon, 2013). It addresses the following 5 content areas: 1) 'daily life disturbances', 2) 'withdrawal', 3) 'cyberspace-oriented relationship', 4) 'overuse', and 5) 'tolerance'. The scale options range from 1 (strongly disagree) to 6 (strongly agree) for a total score range of 10 to 60. The Cronbach's alpha of the SAS-SV is 0.911 (Kwon, 2013). The cut-off value that indicates a higher risk of addiction differs between boys and girls: 31 in boys, with a sensitivity of 87% and a specificity of 89%; 33 in girls, with a sensitivity value of 88% and a specificity value of 89%.

The BDI-PC is a 7-item self-rating scale. It is a shorter version of the BDI-II, addressing the following items\symptoms: sadness, pessimism, past failure, loss of pleasure, self-dislike, self-criticalness, and suicidal ideation (Bellis, 1999). Each item is rated on a 4-point scale, ranging from 0 (symptom not present) to 3 (symptom highly present). The total score ranges from 0 to 21. The Cronbach's alpha of the BDI-PC is 0.88 (Winter, Steer, Jones-Hicks, & Beck, 1999). The cut-off score of four indicates a higher risk for depression with a sensitivity and specificity of 91% (Winter, Steer, Jones-Hicks, & Beck, 1999).

SAS-SV and BDI-PC were translated into Arabic from the English version by a linguistic specialist who is fluent in both English and Arabic. Then, another linguistic specialist performed a back translation into English. Both linguistic specialists were certified translators. Both the translated and back-translated versions were compared with the original version, and any differences were noted and resolved to get a final version.

The entire questionnaire was piloted using a small number of students, like our sample, from one of the female secondary schools in Dammam, Saudi Arabia (n = 30). Based on the feedback, the wording of some questions (in Arabic) was modified to ensure that participants understand the exact meaning in the original English version before being widely distributed.

Statistical Analysis

The data were analysed using SPSS 23.0 on a personal Mac pro. Of the 538 distributed questionnaires, 11 were excluded because of incomplete information (response rate = 97.95%). A further 34 questionnaires were excluded when it was determined that the participants were not smartphone users. To test the internal consistency of the Arabic version of the SAS-SV and BDI-PC, Cronbach's alpha correlation coefficients were calculated for each scale. Descriptive statistics (frequencies and percentages) were used to describe the categorical variables. A Chi square test was used to test the significance of the relationship between categorical variables. Lastly, Spearmen correlation coefficients were used to determine the strength of the association between the variables.

Ethical Considerations

The study was approved in writing by the programme director of family medicine residency and the Ministry of Education including school officials in Eastern Province, Saudi Arabia. All participants were informed about the study aim, and they were ensured about the anonymity and confidentiality of their information. They provided verbal and written consent before participation. They were free to withdraw from the study at any time.

Results

Internal consistency; measured using Cronbach's alpha, was .808 for the Arabic version of the SAS-SV, and .806 in the Arabic version of BDI-PC.

Sample Characteristics

The sample's Characteristics are presented in Table 1.

Table 1 ***Sample Characteristics (N = 493)***

Variables	n	%
Age		
15−16 years	208	42.2
17−18 years	271	55
> 18 years	14	2.8
Nationality		
Saudi	306	62.1
Non-Saudi	187	37.9
Marital status		
Single	489	99.2
Married	4	0.8
Accommodation		
Parents	452	91.7
Father only	13	2.6
Mother only	22	4.5
Husband	4	0.8
Other	2	0.4
Monthly family income		
Less than 5000 Saudi Riyal	39	7.9
5000−10000 Saudi Riyal	74	15.0
> 10000 Saudi Riyal	101	20.5
Unknown	279	56.6
Academic level		
First secondary grade	156	31.6
Second secondary grade	173	35.1
Third secondary grade	164	33.3
School type		
Public	424	86
Private	69	14
Academic grade		
Excellent	310	62.9
Very good	124	25.1
Good	57	11.6
Pass	2	0.4

Smartphone Use Pattern

Table 2 ***presents the smartphone use pattern of this study's sample.***

Table 2
Smartphone Use Pattern (N = 493)

Variables	n	%
Duration of smartphone use		
Less than one year	10	2.0
1−3 years	148	30.0
4−6 years	257	52.1
> 6 years	78	15.8
Number of hours spent using smartphones on a typical day		
1−2 hours	57	11.6
3−4 hours	103	20.9
5−6 hours	125	25.4
> 6 hours	208	42.2
Time until using smartphone in the morning (other than alarm function)		
Within 5 minutes	229	46.5
Within 6−30 minutes	163	33.1
Within 31−60 minutes	34	6.9
> 1 hour	67	13.6
Purposes of using smartphone*		
Calls	171	34.7
Social networking	433	87.8
Games	109	22.1
Entertainment	276	56.0
Performing school tasks	235	47.7
Websites surfing	194	39.4
Other: photography, alarm	5	1

Note: *Multiple responses

Smartphone addiction

The prevalence of smartphone addiction is shown in Table 3

Table 3 ***Smartphone Addiction (N = 493)***

Category	n	%
Low risk	207	42
High risk	286	58

The Association Between Smartphone Addiction and Depression

As shown in Table 4, the relationship between smartphone addiction and depression was significant and positively correlated.

Table 4
The Association Between Smartphone Addiction and Depression

	Low-risk smartphone addiction (n)	High-risk smartphone addiction (n)	p -value	r
Low risk of depression	153	166	< .001	.164
High risk of depression	54	120		

The Association Between Smartphone Addiction, Smartphone Use Pattern, and Sociodemographic Characteristics

SAS-SV was positively correlated with duration of smartphone ownership; number of hours spent using a smartphone on a typical day; and using a smartphone for social networking, entertainment, and website surfing. However, there was no significant relationship between time until first smartphone use in the morning (other than alarm function) and the SAS-SV (Table 5).

Table 5
The Association Between Smartphone Addiction, Smartphone Use Pattern, and Sociodemographic Characteristics

Variables	p-value	r
Age	.148	0.014
Nationality	.302	-0.046
Marital status	179	-0.060
Academic level	.579	-0.008
School type	.787	-0.012
Accommodation	.185	-0.002
Monthly family income	.737	-0.002
Academic grade	.071	0.112
Duration of smartphone ownership per years	< .001	0.235
Number of hours spent using smartphone on a typical day	< .001	0.334
Time until using smartphone in the morning (other than alarm function)	.185	0.014
Purposes of using smartphone		
Calls	.192	0.059
Social networking	.006	0.123
Games	.477	-0.032
Entertainment	< .001	0.198
Performing school tasks	.088	-0.077
Websites surfing	.032	0.096
Other: photography, alarm	.930	0.001

The Association Between Depression, Smartphone Use Pattern, and Sociodemographic Characteristics

As seen in Table 6, there was no significant correlation between depression and socio-demographics characteristics or smartphone use pattern, except using smartphones for entertainment, which was positively correlated with depression.

Table 6
The Association Between Depression, Smartphone Use Pattern, and Sociodemographic Characteristics

Variables	p -value	r
Age	.964	0.012
Nationality	.120	0.070
Marital status	.537	0.028
Academic level	.893	0.012
School type	.237	-0.053
Accommodation	.819	0.008
Monthly family income	.100	0.059
Academic grade	.620	0.059
Duration of smartphone ownership per years	.308	0.070
Number of hours spent using smartphone on a typical day	.197	0.039
Time until using smartphone in the morning (other than alarm function)	.627	0.023
Purposes of using smartphone		
Calls	.600	0.024
Social networking	.959	0.002
Games	.142	-0.066
Entertainment	< .001	0.193
Performing school tasks	.457	-0.033
Websites surfing	.768	0.013
Other: photography, alarm	.907	0.010

Discussion

There is a high usage of smartphones, which could lead to smartphone addiction; therefore, many studies have evaluated their physical and psychological effects on individuals' well-being.

Our study revealed 4 main findings: 1) a 58% prevalence of smartphone addiction in our target population; 2) depression was positively associated with smartphone addiction; 3) a longer duration of smartphone ownership, longer duration spent using smartphones per day, and using smartphones for social networking, entertainment, and website surfing were positively associated with smartphone addiction; and 4) using smartphones for entertainment purposes was positively correlated with depression.

The prevalence of smartphone addiction found in our study was much higher than that found in a Swiss study (16.9%) (Haug et al., 2015). Many studies evaluated the relationship between smartphones and depression, revealing that depression was higher in the high-risk smartphone addiction group among college students (Demirci et al., 2015; Hwang et al., 2012). A recent prospective study indicated that a high frequency of mobile phone use could be a risk factor for developing symptoms of depression in both the men and women at a 1-year follow-up (Tamura et al., 2017). Our study displayed a similar result: the high-risk smartphone addiction group had higher levels of depression compared to the low-risk smartphone addiction group.

It has been stated that when used moderately, a smartphone may improve emotional and psychological status (Demirci et al., 2015). Another reasonable justification for our findings is that spending time using the smartphone could be an escape from feelings of depression or may relieve stress (Demirci et al., 2015). Consistently, the significant association found in our study between depression and using the smartphone for entertainment purposes may support this hypothesis.

Regarding smartphone use, our study demonstrated that duration of ownership and duration of daily use were positively associated with smartphone addiction. Conversely, there was no significant relationship between time until using the smartphone in the morning and smartphone addiction, which contrasts Haug et al. (2015). However, the significant association found in our study between smartphone addiction and using the smartphone for social networking purposes was in line with previous studies (Alosaimi et al., 2016; Haug et al., 2015; Kwon et al., 2013).

Limitations

Several limitations of the present study should be considered. First, only including female, secondary school students from Khobar city inhibits generalization of the prevalence of smartphone addiction to the broader population in Saudi Arabia. Second, the cross-sectional design limits the results, as we cannot infer causality. Furthermore, the scales used were self-rated and may be subject to recall bias.

Recommendations

Consequently, future studies should 1) focus on the assessment of smartphone use and indicators of smartphone addiction in a representative sample that includes both men and women of different educations and ages, 2) include clinical interviews that can more correctly detect smartphone addiction and depression symptoms, and 3) include objectively recorded data regarding smartphone use via smartphone applications.

Conclusion

This study expanded the literature to include the association between smartphone addiction, smartphone use pattern, and depression among secondary school students in Saudi Arabia. Students displaying high smartphone addiction scores should be clinically evaluated for depression. Depression screening programmes should be implemented and frequently monitored in schools. Furthermore, public health prevention strategies should include information and advice that helps parents and children set limits for their own and others' smartphone use and that raise the public's awareness regarding the association between smartphone addiction and depression.

Availability of data and materials

The datasets used and analyzed in the current study are available from the corresponding author upon reasonable request.

Funding

Nil.

Authors' Contributions

Dr Najla Abdulaziz Al-Dossary is the corresponding author; Dr Arij Abdullah Al-Thebaiti is a co-author, contributed as a supervisor and participated in writing the methodology and data analysis; Dr Afnan Abdullah Al-Awwad, Dr Reham Zabar Al-Anzi, and Dr Tahani Mofareh Asseri are co-authors contributed in conduction of the study.

Acknowledgments

We would like to thank Dr Hasan Tawakul and Mr. Ibrahim Abduallah Elhassan Osman for their support of this work. We would like to thank the Ministry of Education office, Eastern Province in Saudi Arabia for their corporation. We would like to thank Editage (www.editage.com) for English language editing.

Abbreviations:

BDI-II	Beck Depression Inventory-II
BDI-PC	Beck Depression Inventory–Primary Care
SAS	Smartphone Addiction Scale
SAS-SV	Smartphone Addiction Scale-short version
SNS	Social networking sites

References

1. Alghamdi, Y., & Taha, A. (2014). Mobile phone related-symptoms among primary care attendees in Al-Khobar city, Eastern Saudi Arabia. International Journal of Medical Science and Public Health, 3(1), 53–57.
2. Al-Khlaiwi, T., & Meo, S. A. (2004). Association of mobile phone radiation with fatigue, headache, dizziness, tension and sleep disturbance in Saudi population. Saudi Medical Journal, 25, 732–736.
3. Alosaimi, F. D., Alyahya, H., Alshahwan, H., Al Mahyijari, N., & Shaik, S. A. (2016). Smartphone addiction among university students in Riyadh, Saudi Arabia. Saudi Medical Journal, 37(6), 675.
4. Alshehri, A., Azahrani, H., & Alotaibi, M. (2017). Internet addiction among Taif university students and its association with psychiatric co-morbidities. Merit Research Journal of Medicine and Medical Sciences, 3(12), 536–544.
5. Augner, C., & Hacker, G. W. (2012). Associations between problematic mobile phone use and psychological parameters in young adults. International Journal of Public Health, 57(2), 437–441.
6. Bahrainian, S. A., Alizadeh, K. H., Raeisoon, M. R., Gorji, O. H., & Khazaee, A. (2014). Relationship of Internet addiction with self-esteem and depression in university students. Journal of Preventive Medicine and Hygiene, 55(3), 86.
7. Bellis, C. (1999). The Beck Depression Inventory for Primary Care accurately screened

for major depressive disorders. Evidence-Based Nursing, 2(4), 126.
8. Dalbudak, E., Evren, C., Aldemir, S., Coskun, K. S., Ugurlu, H., & Yildirim, F. G. (2013). Relationship of Internet addiction severity with depression, anxiety, and alexithymia, temperament and character in university students. Cyberpsychology, Behavior, and Social Networking, 16(4), 272–278.
9. Demirci, K., Akgönül, M., & Akpinar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. Journal of Behavioral Addictions, 4(2), 85–92.
10. Griffiths, M. (1996). Gambling on the Internet: A brief note. Journal of Gambling Studies, 12(4), 471–473.
11. Hanprathet, N., Manwong, M., Khumsri, J., Yingyeun, R., & Phanasathit, M. (2015). Facebook addiction and its relationship with mental health among Thai high school students. Journal of the Medical Association of Thailand, 98, S81–90.
12. Haug, S., Castro, R. P., Kwon, M., Filler, A., Kowatsch, T., & Schaub, M. P. (2015). Smartphone use and smartphone addiction among young people in Switzerland. Journal of Behavioral Addictions, 4(4), 299–307.
13. Hegazy, A. A., Alkhail, B. A., Awadalla, N. J., Qadi, M., & Al-Ahmadi, J. (2016). Mobile phone use and risk of adverse health impacts among medical students in Jeddah, Saudi Arabia. British Journal of Medicine and Medical Research, 15(1), 1–11.
14. Hwang, K. H., Yoo, Y. S., & Cho, O. H. (2012). Smartphone overuse and upper extremity pain, anxiety, depression, and interpersonal relationships among college students. The Journal of the Korea Contents Association, 12(10), 365–375.
15. Ikeda, K., & Nakamura, K. (2014). Association between mobile phone use and depressed mood in Japanese adolescents: A cross-sectional study. Environmental Health and Preventive Medicine, 19(3), 187–193.
16. Jamal, A., Sedie, R., Haleem, K. A., & Hafiz, N. (2012). Patterns of use of 'smart phones' among female medical students and self-reported effects. Journal of Taibah University Medical Sciences, 7(1), 45–49.
17. Jelenchick, L. A., Eickhoff, J. C., & Moreno, M. A. (2013). "Facebook depression?" Social networking site use and depression in older adolescents. Journal of Adolescent Health, 52(1), 128–130.
18. Khan, M. (2008). Adverse effects of excessive mobile phone use. International Journal of Occupational Medicine and Environmental Health, 21(4), 289–293.
19. Kwon, M., Kim, D. J., Cho, H., & Yang, S. (2013). The smartphone addiction scale: Development and validation of a short version for adolescents. PloS One, 8(12), e83558.
20. Lin, Y. H., Chang, L. R., Lee, Y. H., Tseng, H. W., Kuo, T. B., & Chen, S. H. (2014). Development and validation of the Smartphone Addiction Inventory (SPAI). PloS One, 9(6), e98312.
21. Meo, S. A., & Al-Drees, A. M. (2005). Mobile phone related-hazards and subjective hearing and vision symptoms in the Saudi population. International Journal of Occupational Medicine and Environmental Health, 18(1), 53–57.
22. Mok, J. Y., Choi, S. W., Kim, D. J., Choi, J. S., Lee, J., Ahn, H., ... & Song, W. Y. (2014). Latent class analysis on internet and smartphone addiction in college students. Neuropsychiatric Disease and Treatment, 10, 817.
23. Pantic, I., Damjanovic, A., Todorovic, J., Topalovic, D., Bojovic-Jovic, D., Ristic, S., & Pantic, S. (2012). Association between online social networking and depression in high school students: Behavioral physiology viewpoint. Psychiatria Danubina, 24(1), 90–93.
24. Sánchez-Martínez, M., & Otero, A. (2009). Factors associated with cell phone use in adolescents in the community of Madrid (Spain). CyberPsychology & Behavior, 12(2), 131–137.
25. Tamura, H., Nishida, T., Tsuji, A., & Sakakibara, H. (2017). Association between excessive use of mobile phone and insomnia and depression among Japanese adolescents. International Journal of Environmental Research and Public Health, 14(7), 701.
26. Thomée, S., Härenstam, A., & Hagberg, M. (2011). Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults-a prospective cohort study. BMC Public Health, 11(1), 66.
27. Winter, L. B., Steer, R. A., Jones-Hicks, L., & Beck, A. T. (1999). Screening for major depression disorders in adolescent medical outpatients with the Beck Depression Inventory for Primary Care. Journal of Adolescent Health, 24(6), 389–394.
28. World Health Organization. (2017) Depression: definition. Retrieved 14 July 2017, from http://www.euro.who.int/en/health-topics/noncommunicable-diseases/pages/news/news/2012/10/depression-in-europe/depression-definition
29. Younes, F., Halawi, G., Jabbour, H., El Osta, N., Karam, L., Hajj, A., & Khabbaz, L. R. (2016). Internet addiction and relationships with insomnia, anxiety, depression, stress and self-esteem in university students: A cross-sectional designed study. PloS One, 11(9), e0161126.