

Internet Addiction and Depression Among Postgraduate Residents

A cross-sectional survey

*Ameena M. Al Mukhaini,¹ Fakhriya A. Al Houqani,¹ Rahma M. Al Kindi²

ABSTRACT: Objectives: This study aimed to estimate the prevalence of social media usage and Internet addiction among Oman Medical Specialty Board (OMSB) residents and to determine associations between Internet addiction, sociodemographic characteristics and symptoms of depression. **Methods:** This cross-sectional study took place between January and March 2017. All 499 residents enrolled in OMSB training programmes during the 2016–2017 academic year were targeted. A self-administered questionnaire was distributed to collect information concerning sociodemographic characteristics. In addition, the Patient Health Questionnaire-9 and Internet Addiction Test were used to screen for depression and Internet addiction, respectively. **Results:** A total of 399 residents participated in the study (response rate: 80%). Overall, 115 residents (28.8%) had varying degrees of depression and 149 (37.3%) were addicted to the Internet; moreover, among those addicted, 54 (36.2%) had depression. While no significant associations were observed between Internet addiction and sociodemographic characteristics, the association between Internet addiction and depression was statistically significant ($P = 0.012$). **Conclusion:** Internet addiction was clearly detected among many OMSB residents, with a significant association observed between Internet addiction and depression. Although a causal link between these two variables cannot be established as depression is multifactorial in origin, the disadvantages and harmful effects of excessive Internet and social media usage need to be addressed. Further research on the consequences of Internet addiction and its effect on quality of life and academic achievement is recommended.

Keywords: Internet; Social Media; Social Networking; Addictive Behaviors; Depression; Medical Students; Oman.

ADVANCES IN KNOWLEDGE

- This study found a significant relationship between Internet addiction and depression among Oman Medical Specialty Board (OMSB) residents. However, further research is warranted to elaborate on this association and to identify associated risk factors.

APPLICATION TO PATIENT CARE

- Although a causal link between Internet addiction and depression cannot be established, as depression is multifactorial in origin, these findings should be disseminated to healthcare professionals to prompt early detection of these conditions and ensure the provision of appropriate support and treatment.
- Furthermore, public health education regarding these issues is necessary to mitigate any negative effects on the quality of life and academic performance of affected individuals.

THE ADVENT OF THE INTERNET HAS CAUSED major changes in the way individuals entertain themselves and interact with each other, with a myriad of social networking sites, such as Facebook (Facebook Inc., Menlo Park, California, USA), WhatsApp (Facebook Inc.), Instagram (Facebook Inc.), Snapchat (Snap Inc., Santa Monica, California, USA) and Twitter (Twitter Inc., San Francisco, California, USA) becoming increasingly popular.^{1,2} In the USA, research has shown that 82–89% of adults aged 18–49 years old use different social networking sites, with 52% of users reporting accessing several platforms in 2016 compared to 42% in the previous year, resulting in an unexpected annual increase of almost 10%.³

In Saudi Arabia, 42.4% of participants in a study admitted to spending more than four hours a day on social networking sites, with 60.9% believing that life was boring without such sites and 50.6% checking

their social media accounts as soon as they woke up.⁴ In Oman, a previous study involving university students revealed various degrees of social media addiction according to different criteria.⁵ Based on a set of criteria proposed by Lemmens *et al.*, 14.2% of the surveyed students were addicted to Facebook, 47.2% were addicted to YouTube (Google LLC, San Bruno, California, USA) and 33.3% were addicted to Twitter, although these percentages dropped to 6.3%, 13.8% and 12.8% respectively when criteria suggested by Andreassen *et al.* were applied.^{5–7} Nevertheless, high rates of social media usage and increasing exposure to social networking sites have led to concerns over whether excessive use of social media should be considered a distinct form of behavioural addiction.⁸

While social media addiction is not currently acknowledged in either the Diagnostic and Statistical Manual of Mental Disorders (DSM), fifth edition, or

¹Family Medicine, Primary Care, Ministry of Health, Muscat, Oman; ²Department of Family Medicine and Public Health, Sultan Qaboos University Hospital, Muscat, Oman

*Corresponding Author's e-mail: drameena88@gmail.com

the International Classification of Disease (ICD), 11th edition, the term is becoming more frequent following observations of its increasing impact.^{9,10} As such, some researchers have suggested that social media addiction constitutes an 'excessive use of social networking sites and the failure to control it which seriously harms a human's life.'⁴ In contrast, others have defined Internet addiction as 'a psychological dependence on the Internet characterised by (a) an increasing investment of resources on Internet-related activities, (b) unpleasant feelings such as anxiety, depression, and emptiness when offline, (c) an increasing tolerance to the effect of being online, and (d) denial of the problematic behaviors.'¹¹ However, caution is warranted before defining Internet addiction as a disorder, particularly as the diagnosis relies primarily on self-reported symptoms rather than direct clinical examination, with varying cut-off rates being utilised in the existing literature.⁸

Addictive online behaviours represent an important public health problem and have been linked to numerous adverse health outcomes, including increased levels of physical inactivity, vision and musculoskeletal problems, sleep deprivation and impaired psychosocial development and functioning.¹² In particular, various studies worldwide have reported a positive association between Internet addiction and depression.^{13–17} Moreover, multiple systematic reviews have shown that the prevalence of depression is greater among medical residents than in the general population; in one meta-analysis of 54 studies from around the world, the overall pooled prevalence of depression among medical residents was 28.8%, with a 15.8% increase in depressive symptoms during the first year of training regardless of choice of specialty or location of training.^{18–21} As such, the main objectives of this study were to quantify the prevalence of social media usage and Internet addiction among Oman Medical Specialty Board (OMSB) residents and to determine associations with sociodemographic characteristics and depression.

Methods

This cross-sectional study was carried out over a three-month period from January to March 2017 at the OMSB, the only recognised postgraduate medical training centre in Oman. All residents enrolled in OMSB training programmes during the 2016–2017 academic year were targeted. Overall, a total of 609 residents were registered under 18 different training programmes during the study period; however, 110 were excluded due to prolonged absence/leave or because they were studying abroad. As such, the

remaining 499 residents based in Oman and currently undergoing residency training were recruited for participation in the study.

A self-administered questionnaire was distributed to all residents during various mandatory release days and workshops organised by the OMSB. The questionnaire was divided into four sections. The first section collected sociodemographic information, including age, gender, marital status, living circumstances, average monthly income, chosen specialty, residency level, sleeping and exercise habits and history of smoking, alcohol and drug use. The second section explored online behaviours and practices, including method of access, duration of use, average daily time spent online and commonly accessed social networking sites. The third and fourth sections comprised the nine-item Patient Healthcare Questionnaire (PHQ-9) and the 20-item Internet Addiction Test (IAT) to screen for signs and symptoms of depression and Internet addiction, respectively.^{22,23} Overall, the survey took approximately 20 minutes to complete. Researchers were available on site to support residents in completing the questionnaire. In order to maintain privacy and avoid peer influence, respondents were asked not to discuss questions with each other.

The PHQ-9 is a self-administered version of the Primary Care Evaluation of Mental Disorders diagnostic instrument, which is used to screen for common mental disorders in primary care.²² It is a reliable and valid tool used for screening and monitoring depression of varying degrees of severity. The PHQ-9 has been studied in many different settings and populations and has been compared favourably to longer clinician-administered instruments.^{22,24} The tool assesses nine items, including loss of interest/pleasure, low mood/hopelessness, sleeping difficulties, loss of energy, changes in appetite, feelings of guilt/worthlessness, difficulties concentrating, feelings of being slow/restlessness and the presence of suicidal thoughts. The total score for each participant is then calculated, with participants considered to have depression if their PHQ-9 scores were ≥ 5 , with the severity of depressive symptoms classified as either minimal (scores of < 5 points), mild (scores of 5–9), moderate (scores of 10–14), moderately severe (scores of 15–19) or severe (scores of ≥ 20).²²

Based on the DSM-IV criteria for pathological gambling and alcoholism, the IAT is a popular psychological tool used to determine an individual's degree of addiction to the Internet and the impact of this addiction on their daily activities, social life, productivity, sleeping patterns and feelings.²³ The IAT includes 20 items rated on a five-point Likert scale from 1 (signifying 'not at all') to 5 (signifying

'always'). The overall score is then calculated and the degree of addiction is classified as either mild (scores of 20–49, representing the average online user with full control over their usage), moderate (scores of 50–79, suggesting excessive usage resulting in occasional or frequent difficulties) or severe (scores of 80–100, indicating that the level of Internet usage is a direct cause of substantial problems or difficulties).²³

Data entry and analysis were performed using EpiData Software (EpiData Association, Odense, Denmark) and the Statistical Package for the Social Sciences (SPSS), Version 22.0 (IBM Corp., Armonk, New York, USA), respectively. Descriptive statistics were calculated for sociodemographic characteristics. For categorical variables, frequencies and percentages were reported, while means and standard deviations were reported for continuous variables. Associations between independent and outcome variables were estimated using Pearson's Chi-squared (χ^2) test (or Fisher's exact test for cells <5). A multivariate binary logistic regression analysis was applied to identify independent predictors of Internet addiction. The level of two-tailed significance was set at $P \leq 0.050$.

Ethical approval for this study was granted by the OMSB Research Ethics Committee (#1582/2/5/2017). Written informed consent was received from all participants prior to completion of the questionnaire. All participants were informed about the objectives of the study, the voluntary and confidential nature of participation and their right to withdraw from the study at any time.

Results

A total of 399 residents submitted completed questionnaires (response rate: 80%). Of these, 241 (60.4%) were female and 158 (39.6%) were male. The mean age was 29.15 ± 1.95 years old (range: 25–31 years). Overall, 287 residents (71.9%) were married, 111 (27.8%) were single and one (0.2%) was divorced. More than half ($n = 236$; 59.1%) were in medical specialties, while 119 (29.8%) were in surgical specialties and 45 (11.3%) were in diagnostic specialties. Most of the residents ($n = 267$; 66.9%) lived with their families; the rest either lived with friends ($n = 73$; 18.3%), alone ($n = 48$; 12%) or did not respond to the question ($n = 11$; 2.8%). One-third ($n = 133$; 33.3%) took part in regular exercise and the average sleep duration was 6.63 ± 1.44 hours per day. Participants were almost equally divided between senior ($n = 200$; 50.1%) and junior ($n = 199$; 49.9%) resident levels. Only three residents (0.8%) were smokers and none admitted to a history of alcohol or drug consumption. Average monthly income ranged from 1,200–2,000 Omani Rials.

The vast majority of participants ($n = 391$; 98%) reported using smart phones to access social networking sites. Other methods of access included tablets ($n = 181$; 45.4%), laptops ($n = 148$; 37.1%) and desktop computers ($n = 27$; 6.8%). The average total lifetime duration of social media usage was 7.65 ± 2.89 years, while the average duration per day was 3.20 ± 2.43 hours. The most popular social networking site was WhatsApp ($n = 388$; 97.2%), followed by Instagram ($n = 255$; 63.9%), YouTube ($n = 187$; 46.9%), Facebook ($n = 135$; 33.8%), Twitter ($n = 127$; 31.8%) and Snapchat ($n = 117$; 29.3%). Participants were asked at what times they usually accessed social media sites, with the option of giving multiple responses. A total of 253 residents (63.4%) accessed social media after working hours, while 58 (14.5%) accessed these sites during working hours. Moreover, 44 residents (11%) accessed these sites almost all the time, while 193 (48.4%) accessed these sites before bedtime. The most frequently used network for accessing social networking sites was wireless ($n = 163$; 40.9%), followed by cellular data ($n = 110$, 27.6%), with 126 residents (31.6%) utilising both.

Table 1 presents the prevalence of depression and its varying degrees of severity according to selected sociodemographic characteristics. The mean total PHQ-9 score was 3.60 ± 3.95 . Overall, 115 residents (28.8%) had some form of depression (i.e., PHQ-9 scores of ≥ 5); of these, 36 (31.3%) were male and 79 (68.7%) were female. Among those who were depressed, 105 (91.3%) had mild-to-moderate depression, while 10 (8.7%) had moderately-severe to severe depression.

Table 2 shows the prevalence of Internet addiction and its varying degrees of severity according to selected sociodemographic characteristics. The mean total IAT score was 28.17 ± 11.72 . A total of 149 residents (37.3%) were addicted (i.e., IAT scores of ≥ 31); of these, 65 (43.6%) were male and 84 (56.4%) were female. Among those who were addicted, 132 (88.6%) were mildly addicted, 16 (10.7%) were moderately addicted and only one (0.7%) was severely addicted. There was no significant association between Internet addiction and various demographic characteristics such as age, gender, marital status, choice of specialty, level of residency, living circumstances and sleeping and exercise patterns ($P > 0.050$ each) [Table 3].

However, there was a statistically significant positive association between Internet addiction and depression ($P = 0.012$) [Table 4]. Out of the 149 residents who were addicted, 54 (36.2%) had some form of depression. In terms of addiction severity, 43 (32.6%) of those mildly addicted, 10 (62.5%) of those moderately addicted and the one resident (100%) who was severely addicted had depression. A

Table 1: Prevalence of depression* by severity according to sociodemographic characteristics among Oman Medical Specialty Board residents (N = 399)

Characteristic	Depression severity [†]				
	n (%)				
	Minimal	Mild	Moderate	Moderately severe/severe	Total
Gender					
Male	122 (77.2)	26 (16.5)	5 (3.2)	5 (3.2)	158 (39.6)
Female	162 (67.2)	59 (24.5)	15 (6.2)	5 (2.1)	241 (60.4)
Marital status					
Single	75 (68.2)	27 (24.5)	5 (4.5)	3 (2.7)	111 (27.8)
Married	206 (72.3)	57 (20)	15 (5.3)	7 (2.5)	287 (71.9)
Divorced	0 (0)	1 (100)	0 (0)	0 (0)	1 (0.2)
Choice of specialty					
Medical	169 (71.9)	47 (20)	12 (5.1)	7 (3)	235 (58.9)
Surgical	79 (66.4)	33 (27.7)	5 (4.2)	2 (1.7)	119 (29.8)
Diagnostic	36 (80)	5 (11.1)	3 (6.7)	1 (2.2)	45 (11.3)
Residency level					
Junior (R1–R2)	153 (76.9)	34 (17.1)	5 (2.5)	7 (3.5)	199 (49.9)
Senior (R3–R6)	131 (65.5)	51 (25.5)	15 (7.5)	3 (1.5)	200 (50.1)

*Assessed using the self-administered nine-item Patient Healthcare Questionnaire.²² †Depression severity was classified as either minimal (scores of <5), mild (scores of 5–9), moderate (scores of 10–14) or moderately severe/severe (scores of ≥15).

Table 2: Prevalence of Internet addiction* by severity according to sociodemographic characteristics among Oman Medical Specialty Board residents (N = 399)

Characteristic	Addiction severity [†]				Total
	n (%)				
	Normal	Mild	Moderate	Severe	
Gender					
Male	93 (58.9)	60 (38)	4 (2.5)	1 (0.6)	158 (39.6)
Female	157 (65.1)	72 (29.9)	12 (5)	0 (0)	241 (60.4)
Marital status					
Single	67 (60.9)	36 (32.7)	7 (6.4)	0 (0)	111 (27.8)
Married	180 (63.2)	96 (33.7)	8 (2.8)	1 (0.4)	287 (71.9)
Divorced	1 (100)	0 (0)	0 (0)	0 (0)	1 (0.2)
Choice of specialty					
Medical	145 (61.7)	74 (31.5)	15 (6.4)	1 (0.4)	235 (58.9)
Surgical	77 (64.7)	41 (34.5)	1 (0.8)	0 (0)	119 (29.8)
Diagnostic	28 (62.2)	17 (37.8)	0 (0)	0 (0)	45 (11.3)
Residency level					
Junior (R1–R2)	127 (63.8)	65 (32.7)	7 (3.5)	0 (0)	199 (49.9)
Senior (R3–R6)	123 (61.5)	67 (33.5)	9 (4.5)	1 (0.5)	200 (50.1)

*Assessed using the self-administered 20-item Internet Addiction Test.²³

†Addiction severity was classified as either normal (scores of ≤30), mild (scores of 31–49), moderate (scores of 50–79) or severe (scores of 80–100s).

Table 3: Association between Internet addiction* and sociodemographic characteristic among Oman Medical Specialty Board residents (N = 399)

Characteristic	n (%)		P value
	No	Yes	
Age, Mean ± SD	29.04 ± 1.92	29.33 ± 1.99	0.145
Gender			
Male	94 (59.5)	64 (40.5)	0.291
Female	157 (65.1)	84 (34.9)	
Marital Status			
Single	67 (60.9)	43 (39.1)	0.575
Married	180 (63.2)	105 (36.8)	
Divorced	1 (100)	0 (0)	
Choice of specialty			
Medical	146 (61.9)	90 (38.1)	0.869
Surgical	77 (64.7)	42 (35.3)	
Diagnostic	28 (62.2)	17 (37.8)	
Residency level			
Junior (R1–R2)	128 (64.0)	72 (36.0)	0.679
Senior (R3–R6)	123 (61.5)	77 (38.5)	
Living circumstances			
Family	166 (62.2)	101 (37.8)	0.595
Friends	50 (68.5)	23 (31.5)	
Alone	28 (58.3)	20 (41.7)	
Others	3 (50.0)	3 (50.0)	
Regular exercise			
No	161 (61.9)	99 (38.1)	0.659
Yes	86 (64.7)	47 (35.3)	
Sleep duration	6.64 ± 1.34	6.60 ± 1.60	0.769

*Assessed using the self-administered 20-item Internet Addiction Test.²³

Multivariate analysis revealed that the number of years of social media usage was positively associated with the likelihood of Internet addiction (odds ratio [OR]: 1.095, 95% confidence interval [CI]: 1.016–1.181; $P = 0.018$). In addition, residents with easy access to social networking sites at any time were almost twice as likely to become addicted (OR: 1.972, 95% CI: 1.027–3.786; $P = 0.041$) [Table 5].

Discussion

Existing research supports the theory that excessive use of the Internet and social media constitutes a distinct form of behavioural addiction, with this behaviour being linked to symptoms typically associated with

Table 4: Association between Internet addiction* and depression† among Oman Medical Specialty Board residents (N = 399)

Internet addiction	Depression		P value
	n (%)		
	No	Yes	
No	190 (75.7)	61 (24.3)	0.012
Yes	95 (63.8)	54 (36.2)	

*Assessed using the self-administered 20-item Internet Addiction Test.²³

†Assessed using the self-administered nine-item Patient Healthcare Questionnaire.²²

Table 5: Independent risk factors for Internet addiction among Oman Medical Specialty Board residents (N = 399)

Variable	B coefficient	P value	Adjusted OR (95% CI)
Total duration of social media usage in years	0.091	0.018	1.095 (1.016–1.181)
Average duration of daily social media usage in hours	0.082	0.070	1.085 (0.993–1.185)
Easy access to social media at any time	0.679	0.041	1.972 (1.027–3.786)

OR = odds ratio; CI = confidence interval.

substance use disorders, such as social anxiety and depressive symptoms.^{13–15} Overuse of the Internet has been classified alternatively as an impulse control disorder, an obsessive-compulsive disorder or as a type of behavioural addiction akin to video game addiction or gambling.⁸ However, few studies have investigated the most appropriate instrument for measuring social media addiction, although those affected clearly show various signs of behavioural addiction such as tolerance, withdrawal, conflict, salience, relapse and mood changes.^{3,25,26}

Varying rates of social media usage have been reported among postgraduate residents. Moubarak *et al.* reported that up to 73% of French medical residents and fellows had active Facebook profiles.²⁷ According to Irfan *et al.*, 95.4% of family physicians and family medicine residents in Saudi Arabia felt compelled to check their social media accounts at least once a day, with 51% checking them up to four times or more daily.²⁸ Another study of family medicine residents and family physicians found that residents used social media more frequently compared to senior physicians (90.2% versus 70.2%), with half of the residents visiting social networking sites on a daily basis.²⁹

While the overall prevalence of Internet addiction varies widely based on different study designs, assessment criteria and sampling methods, the prevalence

in the general population is estimated to be approximately 2%.⁸ In the current study, just over one-third (37.3%) of the OMSB residents were considered to have some form of Internet addiction, although the majority of cases were mild (88.6%), with 10.7% moderately addicted and 0.7% severely addicted. Similar findings have been reported in north India, in which 54% of medical residents were mildly addicted to the Internet, 8.24% were moderately addicted and there were no cases of severe addiction.³⁰ However, a study of junior doctors (including both postgraduate students and in-house surgeons) at a teaching hospital in southwestern India found the prevalence of moderate Internet addiction to be only 13%, with no cases of severe addiction.³¹ In addition, neither of these studies noted an association between Internet addiction and gender.^{30,31} A recent meta-analysis found the global prevalence of Internet addiction among medical students to be 30.1%; in addition, gender did not account for the high heterogeneity in prevalence rates.³²

In contrast, previous research has indicated that Internet addiction does follow a gender predilection, although reported findings are often contradictory. Irfan *et al.* observed a high level of social media usage for personal purposes among male residents and physicians; however, female physicians were statistically more likely to use social media sites for professional purposes.²⁸ Other studies have shown that addictive social media behaviours are more dominant among women.^{25,33} A large national survey in Norway reported that women had significantly higher scores when assessing addiction using the Bergen Social Media Addiction Scale.²⁶ Another large study of university students also found that there was a high positive correlation between being female and being addicted to social media.³ These differences in results could be attributed to various factors, including variable sample sizes, diverse research methodologies and differing measurement tools as well as cultural variations in Internet access, behaviours and practices.

The present study identified a significant positive relationship between Internet addiction and the total duration of social media use, with individuals who had used social media for a greater number of years being more likely to be addicted to it. Moreover, there was a strong association between Internet addiction and the average number of hours spent on social networking sites per day. These findings support the definition of addiction suggested by the IAT, wherein Internet addiction is linked to an average Internet usage of 39 hours per week.²³ The current study also identified several specific social networking sites as being most frequently used by OMSB residents, including

WhatsApp, Instagram and YouTube. In contrast, Irfan *et al.* reported that YouTube (68.2%) and Facebook (45.5%) were the most frequently used social media sites among family medicine residents and physicians in Saudi Arabia, with the median duration of use during a working day being 120 minutes.²⁸ Such findings correspond to the fact that the Internet has become an integral part of most people's lives and highlights the need for early and continuous educational initiatives that can be integrated into the curriculum at a young age to identify and prevent Internet Addiction.³⁴ This is composed of a wide variety of interventions aimed at reducing the incidence of the addiction and its disabilities, or slowing the progression and exacerbation, with health promotion serving as a component of prevention, examples of which includes student education and awareness raising, self-control training programmes and improving self-esteem and teachers and parents training. Therefore, there is a need to develop reliable, cost-effective and evidence-based health promotion prevention programmes for Internet addiction.

The current study revealed a significant association between Internet addiction and depression, with addiction associated with depressive symptoms. A significant association was similarly noted between Internet addiction and psychological distress among junior doctors in southwestern India.³¹ Moreover, Grover *et al.* reported that Internet addiction was associated with a higher level of depressive symptoms, perceived stress and burnout among medical residents in north India.³⁰ The relationship between these two variables could be because individuals who are heavily engaged with different social networking sites often neglect other, more constructive aspects of their lives, potentially contributing to depression. Indeed, people who are very involved in online activities often demonstrate less face-to-face social interaction, decreased levels of physical activity and poor sleeping habits, all of which are conducive to the development of depressive symptoms.^{35,36} On the other hand, those experiencing depressive symptoms may equally be more prone to becoming addicted to the Internet.³⁷ It is apparent that the association between Internet addiction and depressive symptoms is bidirectional in nature, with both conditions influencing and contributing to an increase in the other.³⁸ However, additional research is warranted to further elaborate on this association using a more complex longitudinal study design.

Previous research indicates that the rate of depression is higher among both medical students and postgraduate residents in comparison to their age- and gender-matched peers.^{19,20} As such, further research is

recommended to compare overall rates of depression among postgraduate medical residents in Oman with those of an age-matched cohort in another profession to assess possible causes of depression in this specific group and determine whether OMSB residents are at a greater likelihood of demonstrating depressive symptoms compared to their counterparts in different occupations or fields of study. This is particularly important as high rates of depression among medical residents have been linked to increased rates of medication errors, career dissatisfaction and suicide.²⁰ In the meantime, measures should be implemented to counteract the apparently high rate of depressive symptoms among OMSB residents, such as therapeutic counselling, stress management seminars and peer-led support groups.²⁰

There are several limitations to this study that need to be addressed. Although the version of the IAT used in this study is one of the most commonly used tools, a newer, updated version is available, which may deliver more accurate results; moreover, the IAT scores were not verified by psychiatric assessment to confirm whether the residents were truly addicted. In addition, the data gathered in this study were collected using self-reported tools, potentially resulting in recall bias and the underreporting of relevant symptoms. Moreover, the study was conducted on a small sample of medical residents; as such, the results cannot be generalised to the entire population of Oman. This limitation can be overcome in future studies by involving a larger sample comprising of other population groups. Finally, even though the data is from 2017, the findings are still relevant and an important addition to the existing literature, as it forms a baseline for further research and possible future interventions.

Notably, the findings of this study do not support a causal link between Internet addiction and depression due to the complex aetiology of the latter condition. For instance, the contribution of other factors that can lead to depression was not evaluated (i.e., chronic diseases, major life events, anxiety and comorbid personality disorders); in addition, while the PHQ-9 is a well-known and validated screening tool, it cannot be used alone for diagnosing depression.²² Moreover, it was not confirmed whether any of the OMSB residents, particularly those with moderate-to-severe depression, were currently taking any antidepressants, a factor that could have affected the results. Finally, the reported Internet addiction might be overestimated as the questionnaire used in the study did not distinguish between different reasons for social media use, such as work- or academic-related activities.

Conclusion

Both depression and Internet addiction were clearly detected among OMSB residents. In particular, the study found that the longer the total duration of social media usage and average number of hours spent daily on social networking sites, the more likely participants were to become addicted. Although a causal link between these factors cannot be established, health education initiatives are recommended to address the potential harmful effects and disadvantages of excessive Internet usage. Moreover, further research on the consequences of Internet addiction and its effect on the quality of life and academic performance is needed.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

FUNDING

No funding was received for this study.

AUTHORS' CONTRIBUTION

AM, FH, and RK conceived the presented research idea and went through literature review. AM and FH, under the supervision of RK, designed the research methodology and the questionnaire format. AM and FH were involved in data collection and data entry. AM, FH and RK analysed and interpreted the results. AM was a major contributor in writing the manuscript in consultation with FH and RK. RK was the research supervisor who guided AM and FH throughout the project. All authors read and approved the final version of the manuscript.

References

1. Allen KA, Ryan T, Gray DL, McInerney DM, Waters L. Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *Educ Develop Psychol* 2014; 31:18–31. <https://doi.org/10.1017/edp.2014.2>.
2. Ryan T, Chester A, Reece J, Xenos S. The uses and abuses of Facebook: A review of Facebook addiction. *J Behav Addict* 2014; 3:133–48. <https://doi.org/10.1556/JBA.3.2014.016>.
3. Hawi NS, Samaha M. The relations among social media addiction, self-esteem, and life satisfaction in university students. *Soc Sci Comput Rev* 2017; 35:576–86. <https://doi.org/10.1177/0894439316660340>.
4. Khormi SM, Ageel MA, Otayf SY, Al-Shafai HA, Majrashi SM, Hakami NM. Addiction to social media among students at Jazan University. *Int J Acad Sci Res* 2016; 4:176–80.
5. Masters K. Social networking addiction among health sciences students in Oman. *Sultan Qaboos Univ Med J* 2015; 15:e357–63. <https://doi.org/10.18295/squmj.2015.15.03.009>.

6. Lemmens JS, Valkenburg PM, Peter J. Development and validation of a game addiction scale for adolescents. *Media Psych* 2009; 12:77–95. <https://doi.org/10.1080/15213260802669458>.
7. Andreassen CS, Torsheim T, Brunborg GS, Pallesen S. Development of a Facebook addiction scale. *Psychol Rep* 2012; 110:501–17. <https://doi.org/10.2466/02.09.18.PR0.110.2.501-517>.
8. Poli R. Internet addiction update: Diagnostic criteria, assessment and prevalence. *Neuropsychiatry (London)* 2017; 7:04–08. <https://doi.org/10.4172/Neuropsychiatry.1000171>.
9. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. Washington D.C., USA: American Psychiatric Association Publishing, 2013. <https://doi.org/10.1176/appi.books.9780890425596>.
10. World Health Organization. ICD-11: International classification of diseases 11th revision - The global standard for diagnostic health information. From: <https://icd.who.int/en> Accessed: Jul 2020.
11. Kandell JJ. Internet addiction on campus: The vulnerability of college students. *Cyberpsychol Behav* 1998; 1:11–17. <https://doi.org/10.1089/cpb.1998.1.11>.
12. World Health Organization. Public health implications of excessive use of the internet, computers, smartphones and similar electronic devices: Meeting report. From: <https://apps.who.int/iris/rest/bitstreams/826746/retrieve> Accessed: Jul 2020.
13. Bányai F, Zsila Á, Király O, Maraz A, Elekes Z, Griffiths MD, et al. Problematic social media use: Results from a large-scale nationally representative adolescent sample. *PLoS One* 2017; 12:e0169839. <https://doi.org/10.1371/journal.pone.0169839>.
14. van Rooij AJ, Ferguson CJ, van de Mheen D, Schoenmakers TM. Time to abandon Internet addiction? Predicting problematic internet, game, and social media use from psychosocial well-being and application use. *Clin Neuropsychiatry* 2017; 14:113–21.
15. Pontes HM. Investigating the differential effects of social networking site addiction and Internet gaming disorder on psychological health. *J Behav Addict* 2017; 6:601–10. <https://doi.org/10.1556/2006.6.2017.075>.
16. Shensa A, Escobar-Viera CG, Sidani JE, Bowman ND, Marshal MP, Primack BA. Problematic social media use and depressive symptoms among U.S. young adults: A nationally-representative study. *Soc Sci Med* 2017; 182:150–7. <https://doi.org/10.1016/j.socsci.med.2017.03.061>.
17. Saikia AM, Das J, Barman P, Bharali MD. Internet addiction and its relationships with depression, anxiety, and stress in urban adolescents of Kamrup District, Assam. *J Family Community Med* 2019; 26:108–12. https://doi.org/10.4103/jfcm.JFCM_93_18.
18. Mata D, Ramoa M, Bansal N, Khan R, Guille C, Di Angelantonio E, et al. Prevalence of depression and depressive symptoms among resident physicians: A systematic review and meta-analysis. *JAMA* 2015; 314:2373–83. <https://doi.org/10.1001/jama.2015.15845>.
19. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among US and Canadian medical students. *Acad Med* 2006; 81:354–73. <https://doi.org/10.1097/00001888-200604000-00009>.
20. Joules N, Williams DM, Thompson AW. Depression in resident physicians: A systematic review. *Open J Depress* 2014; 3:89–100. <https://doi.org/10.4236/ojd.2014.33013>.
21. Vargas-Cáceres S, Mantilla MF, Ortega G, Bruguera E, Casas M, Ramos-Quiroga JA, et al. Dual diagnosis among medical residents: A systematic review. *Adicciones* 2020; 0:1253. <https://doi.org/10.20882/adicciones.1253>.
22. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med* 2001; 16:606–13. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>.
23. Young KS. Psychology of computer use: XL - Addictive use of the Internet: A case that breaks the stereotype. *Psychol Rep* 1996; 79:899–902. <https://doi.org/10.2466/pr0.1996.79.3.899>.
24. Becker S, Al Zaid K, Al Faris E. Screening for somatization and depression in Saudi Arabia: A validation study of the PHQ in primary care. *Int J Psychiatry Med* 2002; 32:271–83. <https://doi.org/10.2190/XTDD-8L18-P9E0-JYRV>.
25. Andreassen CS. Online social network site addiction: A comprehensive review. *Curr Addict Rep* 2015; 2:175–84. <https://doi.org/10.1007/s40429-015-0056-9>.
26. Andreassen CS, Pallesen S, Griffiths MD. The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national survey. *Addict Behav* 2017; 64:287–93. <https://doi.org/10.1016/j.addbeh.2016.03.006>.
27. Moubarak G, Guiot A, Benhamou Y, Benhamou A, Hariri S. Facebook activity of residents and fellows and its impact on the doctor-patient relationship. *J Med Ethics* 2011; 37:101–4. <https://doi.org/10.1136/jme.2010.036293>.
28. Irfan KS, Farhana I, Eiad AF, Nassr AM, Al Mohammed AQ, Maya N, et al. Family physicians' utility of social media: A survey comparison among family medicine residents and physicians. *Afr Health Sci* 2018; 18:817–27. <https://doi.org/10.4314/ahs.v18i3.41>.
29. Klee D, Covey C, Zhong L. Social media beliefs and usage among family medicine residents and practicing family physicians. *Fam Med* 2015; 47:222–6.
30. Grover S, Sahoo S, Bhalla A, Avasthi A. Problematic internet use and its correlates among resident doctors of a tertiary care hospital of North India: A cross-sectional study. *Asian J Psychiatr* 2019; 39:42–7. <https://doi.org/10.1016/j.ajp.2018.11.018>.
31. Prakash S. Internet Addiction among junior doctors: A cross-sectional study. *Indian J Psychol Med* 2017; 39:422–5. <https://doi.org/10.4103/0253-7176.211746>.
32. Zhang MWB, Lim RBC, Lee C, Ho RCM. Prevalence of Internet addiction in medical students: A meta-analysis. *Acad Psychiatry* 2018; 42:88–93. <https://doi.org/10.1007/s40596-017-0794-1>.
33. Griffiths MD, Kuss DJ, Demetrovics Z. Social networking addiction: An overview of preliminary findings. In: Rosenberg KP, Feder LC, Eds. *Behavioral Addictions: Criteria, evidence, and treatment*. London, UK: Academic Press, 2014. Pp. 119–41. <https://doi.org/10.1016/B978-0-12-407724-9.00006-9>.
34. Throuvala MA, Griffiths MD, Rennoldson M, Kuss DJ. School-based Prevention for Adolescent Internet Addiction: Prevention is the Key. A Systematic Literature Review. *Curr Neuropharmacol* 2019; 17(6):507-525. doi: 10.2174/1570159X16666180813153806. PMID: 30101714; PMCID: PMC6712298.
35. Choi K, Son H, Park M, Han J, Kim K, Lee B, et al. Internet over-use and excessive daytime sleepiness in adolescents. *Psychiatry Clin Neurosci* 2009; 63:455–62. <https://doi.org/10.1111/j.1440-1819.2009.01925.x>.
36. Moreno MA, Jelenchick LA, Koff R, Eickhoff JC, Goniu N, Davis A, et al. Associations between Internet use and fitness among college students: An experience sampling approach. *J Interact Sci* 2013; 1:4. <https://doi.org/10.1186/2194-0827-1-4>.
37. Lin LY, Sidani JE, Shensa A, Radovic A, Miller E, Colditz JB, et al. Association between social media use and depression among U.S. young adults. *Depress Anxiety* 2016; 33:323–31. <https://doi.org/10.1002/da.22466>.
38. Seabrook EM, Kern ML, Rickard NS. Social networking sites, depression, and anxiety: A systematic review. *JMIR Ment Health* 2016; 3:e50. <https://doi.org/10.2196/mental.5842>.