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ORIGINAL RESEARCH

Internet use and addiction among medical students of Universiti Sultan Zainal Abidin, Malaysia

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Video abstract

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Background: The use of Internet has now become indispensable, and the technology has revolutionized the medical education and practice worldwide. Currently, medical students and professionals have an enormous opportunity to keep them always updated with the exponential growth of knowledge because of potential progression of Internet throughout the world that enables them to become a lifelong learner. Internet addiction is a widespread phenomenon among students and academicians at universities in Malaysia. Students use the Internet for recreational purpose and personal and professional development. The Internet has become an integral part of day-to-day life of the university students, including medical students. The aim of the present study was to examine the Internet use and addiction among students of Universiti Sultan Zainal Abidin, Malaysia.

Methods: This was a cross-sectional study in which a questionnaire, Internet Addiction Diagnostic Questionnaire, developed by the Center for Internet Addiction, USA, was used. One hundred forty-nine medical students of Universiti Sultan Zainal Abidin participated in this study. Data were analyzed using Statistical Package for the Social Sciences software.

Results: The mean scores were 44.9±14.05 and 41.4±13.05 for male and female participants, respectively, which indicated that both the genders were suffering from mild Internet addiction.

Conclusion: This study shows almost similar level of Internet usage among medical students irrespective of their socioeconomic background, with no statistically significant (p>0.05) differences, except among the years of study (p=0.007). Overall, from the research data and having worked with this cohort very closely, Universiti Sultan Zainal Abidin medical students can be labeled as wonted and recurring users of the Internet. Nevertheless, it is very difficult to define as Internet addicts or pathological users of the Internet because of small sample size and cross-sectional study.

Keywords: Internet, addiction, medical students, UniSZA, Malaysia

Introduction

The use of Internet has now become indispensable, and the technology has revolutionized the medical education and practice worldwide. Medical students have the opportunity to keep updated with the exponential growth knowledge to become a lifelong learner. The use of the Internet has grown enormously, and students and academicians at universities in Malaysia have started using the Internet for acquiring knowledge, searching information, entertainment, mail, and social interaction.[1,2] Rapid expansion and proliferation of the Internet has provided better opportunities for communication, information, and social interaction. Moreover, medical schools in both developed and developing countries are utilizing educational technology to bring effective changes in medical education.[3]

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A number of studies reported that Malaysian university students spend a major portion of their time in accessing the Internet for both academic and extracurricular purposes.[1,2,4] One study has reported that Internet usage was very high among university students; therefore, researchers consider it as "pathological Internet use (PIU)".[5] PIU is a new kind of mental illness afflicting some individuals surfing online. Many researchers consider the main causes of PIU as extreme use of the Internet or misuse of some Internet functions. Multiple studies report that around 13%–18% of the study population of a public university in Malaysia and UK were suffering from PIU.[6,7] Furthermore, a number of studies from different countries and universities have reported excessive use of Internet at the level of addiction leading to lots of adverse reactions such as depression, anxiety, hostility, interpersonal sensitivity, psychoticism, psychosomatic symptoms, lack of physical energy, physiological dysfunction, weakened immunity, emotional symptoms, behavioral symptoms, and social adaptation problems.[8–20] Nevertheless, despite the tremendous potential of the Internet, riotous overuse by some individuals throughout the world has led to the development of new ideas that could be denoted equally as addictive behavior with mental health implications.[21–27]

The term addiction has generally been associated with substance use.[28] Again, such excessive Internet use is considered as addiction since symptoms of Internet addiction (IA) are comparable to the symptoms of addiction to nicotine, alcohol, or drugs.[24] The term IA is defined as "a psychological dependence on the Internet, regardless of the activity once logged on".[29] Furthermore, IA is described as "characterized by excessive or poorly controlled preoccupations, urges, or behaviors regarding computer use and Internet access that lead to impairment or distress".[30] The *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM*-V) identifies Internet Gaming Disorder in Section III as a condition warranting more clinical research and experience before it might be considered for inclusion in the main book as a formal disorder.[31] Thus, IA is documented as a psychiatric ailment with precise diagnostic and management principles. Also, an editorial note in the American Journal of Psychiatry states that "IA appears to be a common disorder that merits inclusion in DSM-V".[25] The US psychiatrist Jerald Block thought that IA was a "compulsive–impulsive spectrum disorder" and that the definition should include "online or offline computer usage, with recognition of at least three subtypes. The subtypes are as follows: excessive gaming, sexual preoccupations, and email/text messaging".[25]

The Daily Telegraph reported that compulsive Internet usage is a public health delinquent which became such a serious issue that there was an urgent need to formally document it as a clinical ailment.[32] A number of reports published in reputed journals and leading newspaper The Guardian claimed that South Korea is one of the leading countries where IA is a serious public health issue.[32–34] However, Dr Ronald Pies, Professor of Psychiatry, SUNY Upstate Medical University, Syracuse, New York, and Clinical Professor of Psychiatry, Tufts University School of Medicine, Boston, Massachusetts, described that it is an urgent necessity to consider obsessive Internet usage as a complete and distinct mental illness, an increasing number of studies recommend that some individuals with IA are at substantial risk and demand specialized care and treatment because of the risk of grave psychological, emotional, and physical complications.[27,35–37] Among the most common adverse reactions due to excessive Internet use are isolation from family members and community, refusing to answer calls, musculoskeletal pain, headache, and eye irritation.[13] Internet usage, especially online gaming, has been so severe that it has led to the establishment of specialized treatment centers in South-East Asia, the US, and Europe, reflecting the growing need for professional help.[37]

A number of studies have been conducted in this field among the university students of Malaysia, but there has been little focus on medical students, particularly in the east coast of Malaysia and at Universiti Sultan Zainal Abidin (UniSZA). The aim of the present study was to examine the Internet use and addiction among students of UniSZA, Malaysia.

Materials and methods

This cross-sectional study was conducted among the medical students of UniSZA of Year 1–5 during the academic session 2014–2015. The data were collected in October 2015. A questionnaire, Internet Addiction Diagnostic Questionnaire,[38–40] developed by the Center for Internet Addiction, USA (http://netaddiction.com/internet-addiction-test/)[40] was used to collect the data. Formal permission was obtained from the Center for Internet Addiction (Dr Kimberly Young) to use this questionnaire for the present study. The Internet Addiction Diagnostic Questionnaire is a widely utilized screening instrument examining compulsive Internet use.[41] The questionnaire was slightly modified to add sociodemographic parameters and applied to the context of UniSZA. The simple random sampling technique was used to select the cohort. The sample size was calculated as 169 among a total of 300 medical students of Faculty of Medicine, UniSZA, using a sample size calculator.[42] Another 10% was added to counter the missing value of questionnaires due to potential nonresponse, bringing the total number of subjects to 186.

Unfortunately, when data were collected during a prearranged time in the lecture hall, only 149 students returned the questionnaire, with 37 students not completing the questionnaire, despite the research participants being evidently explained the purpose and personal confidentiality of the research.

The questionnaire contains 20 questions that examine the symptoms of IA based upon a five-point Likert scale (0=Not applicable, 1=Rarely, 2=Occasionally, 3=Frequently, 4=Often, 5=Always). After all the questions were answered, the numbers for each response were added to obtain a final score. The higher the score, the greater is the level of addiction and creation of problems resulting from such Internet usage. The severity impairment index is determined as follows:

1. None: 0–30 points
2. Mild: 31–49 points. You are an average online user. You may surf the Web a bit too long at times, but you have control over your usage.
3. Moderate: 50–79 points. You are experiencing occasional or frequent problems because of the Internet. You should consider their full impact on your life.
4. Severe: 80–100 points: Your Internet usage is causing significant problems in your life. You should evaluate the impact of the Internet on your life and address the problems directly caused by your Internet usage.

Sociodemographic data such as age, gender, marital status, year of study, and another five closed-ended Internet-related questions were added to the original questionnaire. A pilot study was conducted on 15 undergraduate students and it was found that the survey instructions and items were easily comprehensible and suitable for the study. The students who participated in the pilot study were excluded from the final study. Most of the sections of this questionnaire demonstrated acceptable values of Cronbach's alpha, with a range between 0.672 and 0.882, which indicated that both instruments possessed good internal consistency and reliability. Evidence of convergent validity was shown by the significant correlations between the items of each section and the overall mean in each section (r_s=0.332–0.718; p<0.05).[43,44] The data were then compiled and analyzed using Statistical Package for the Social Sciences Version 21 (IBM Corporation, Armonk, NY, USA). Quite a number of missing values were noted and the cases with missing values were excluded from the analysis automatically by SPSS. However, for the descriptive analysis of the sociodemographic characteristics of the participants and the questions on IA, the missing values were coded as "not known".

For conducting this research, the certificate of ethical approval was obtained from the UniSZA Research Ethics Committee (UniSZA, C/1/UHREC/628-1 (44), August 3, 2015). The UniSZA Research Ethics Committee had examined the questionnaire before the study was started and was satisfied that there were no sensitive questions. Research ethics were strictly maintained, especially regarding confidentiality. The current research was totally anonymous and voluntary. Adequate explanation concerning the purpose of the study was provided to the participants, and informed consent was obtained to utilize their data for research purposes.

Results

The sociodemographic characteristics of the participants are shown in Table 1. A total of 149 participants returned the questionnaire; giving a response rate of 80.11%. The study participants' (SPs) mean age was 22.0±1.54 years. Among them, 40.3% and 55.7% were male and female, respectively. Most of them (81.9%) were single, and 20.1%, 20.1%, 15.4%, 19.5%, and 20.1% were from Year 1, 2, 3, 4, and 5, respectively (Table 1).

The distribution of answers in the questionnaire is shown in Table 2. Majority (40.3%) of the participants mentioned that they frequently stayed online longer than they intended. Approximately 13% was always online longer than they planned. It was also found that majority of the participants occasionally neglected their household chores to spend more time online (35%), checked their emails before doing

Table 1 Sociodemographic characteristics of the participants (N=149)

Variables	Frequency (%)
Age (years) (mean±SD)	21.99±1.535
Gender	
Male	60 (40.3)
Female	83 (55.7)
Not known	6 (4.0)
Marital status	
Married	11 (7.4)
Unmarried	122 (81.9)
Not known	16 (10.7)
Year of study	
Year I	30 (20.1)
Year II	30 (20.1)
Year III	23 (15.4)
Year IV	29 (19.5)
Year V	30 (20.1)
Not known	7 (4.7)

Abbreviation: SD, standard deviation.

Table 2 Distribution of answers in Internet addiction test (N=149)

Question	Rarely, frequency (%)	Occasionally, frequency (%)	Frequently, frequency (%)	Often, frequency (%)	Always, frequency (%)	Not known, frequency (%)
Stay online longer than intended	10 (6.7)	33 (22.1)	60 (40.3)	27 (18.1)	19 (12.8)	–
Neglect household chores to spend more time online	43 (28.9)	52 (34.9)	35 (23.5)	13 (8.7)	6 (4.0)	–
Prefer the excitement of the Internet to intimacy with partner	52 (34.9)	37 (24.8)	30 (20.1)	18 (12.1)	5 (3.4)	7 (4.7)
Form new relationships with fellow online users	74 (49.7)	45 (30.2)	22 (14. 8)	8 (5.4)	–	–
Others complain about the amount of time spent online	67 (45.0)	42 (28.2)	25 (16.8)	10 (6.7)	3 (2.0)	2 (1.3)
Grades or college work suffers because of the amount of time spent online	56 (37.6)	55 (36.9)	24 (16.1)	10 (6.7)	3 (2.0)	1 (0.7)
Check email before something else	57 (38.3)	62 (41.6)	18 (12.1)	9 (6.0)	3 (2.0)	–
Academic performance or productivity suffers because of Internet	54 (36.2)	56 (37.6)	21 (14.1)	11 (7.4)	7 (4.7)	–
Become defensive or secretive when anyone asks regarding online presence	51 (34.2)	59 (39.6)	28 (18.8)	10 (6.7)	–	1 (0.7)
Block out disturbing thoughts about life with soothing thoughts of the Internet	46 (30.9)	48 (32.2)	34 (22.8)	14 (9.4)	7 (4.7)	–
Find yourself anticipating to go online again	41 (27.5)	53 (35.6)	31 (20.8)	19 (12.8)	5 (3.4)	–
Fear that life without Internet would be boring, empty, and joyless	33 (22.1)	49 (32.9)	35 (23.5)	21 (14.1)	9 (6.0)	2 (1.3)
Snap, yell, or act annoyed if someone bothers you while you are online	78 (52.3)	38 (25.5)	22 (14.8)	9 (6.0)	1 (0.7)	1 (0.7)
Lose sleep due to late-night log-ins	51 (34.2)	48 (32.2)	30 (20.1)	14 (9.4)	5 (3.4)	1 (0.7)
Feel preoccupied with Internet when offline or fantasize about being online	68 (45.6)	47 (31.5)	25 (16.8)	7 (4.7)	1 (0.7)	1 (0.7)
Find yourself saying "just a few more minutes" when you are online	29 (19.5)	41 (27.5)	39 (26.2)	29 (19.5)	11 (7.4)	–
Try to cut down the amount of time spent online and fail	33 (22.1)	50 (33.6)	37 (24.8)	23 (15.4)	5 (3.4)	1 (0.7)
Try to hide how long you have been online	58 (38.9)	43 (28.9)	27 (18.1)	16 (10.7)	3 (2.0)	2 (1.3)
Choose to spend more time online over going out with others	70 (47.0)	40 (26.8)	25 (16.8)	10 (6.7)	4 (2.7)	–
Feel depressed, moody, or nervous when offline, which goes away once are back online?	80 (53.7)	36 (24.2)	18 (12.1)	13 (8.7)	1 (0.7)	1 (0.7)

Notes: Mean ± SD of total scores = 43.49±13.704 (max. = 100, min. = 20).
Abbreviations: Max., maximum; Min., minimum; SD, standard deviation.

something else that they needed to do (41.8%), had their academic performance or productivity suffer because of the Internet (37.6%), became defensive or secretive when anyone asked them what they were doing online (39.6%), blocked out disturbing thoughts about their life with soothing thoughts of the Internet (32.2%), found themselves anticipating when they would go online again (35.6%), feared that life without the Internet would be boring, empty, and joyless (32.9%), found themselves saying "just a few more minutes" when online (27.5%), and tried to cut down the amount of time they spent online but failed (33.6%).

The mean scores were 44.9±14.05 and 41.4±13.05 for the male and female participants, respectively. Therefore, on average, both genders were suffering from mild IA. Also, the mean scores were 39.1±11.53 and 42.9±13.46 for married and single SPs, respectively. Consequently, on average,

both married and single SPs were also suffering from mild IA. It was also noted that the median and interquartile range scores of Year 1, 2, 3, 4, and 5 students were 46.5±19.75, 40.0±29.00, 43.0±13.00, 41.0±20.50, 31.0±16.75, respectively. Accordingly, all participants, irrespective of the year of study, were harmoniously suffering from mild IA. No significant differences were observed in the total scores of IA between genders (p=0.143) and marital status. However, statistically significant (p=0.007) differences were observed among the different years of study (Table 3). Post hoc analysis of comparison of the total scores of IA test between the different years of study using Mann–Whitney *U* test showed that there was a statistically significant difference observed between Year 5 and Year 1 (p=0.001), Year 3 (p=0.015), and Year 4 (p=0.005) (Table 4). There was a slightly negative, but statistically significant correlation between the total scores of IA and age (r=−0.194, p=0.025), meaning the total score was lower for older participants. However, there was no statistically significant correlation between the total scores of IA and duration of daily Internet usage (r=−0.074, p=0.394) (Table 5). The association between the total scores of IA with age and duration of daily Internet usage is depicted in Figures 1 and 2, respectively. There was a slightly positive, but not statistically significant correlation between the examination grade and duration of Internet usage (r=0.085, p=0.548) (Table 6; Figure 3).

Majority of the participants possessed two gadgets for browsing the Internet (64.4%), had one Internet connection (65.8%), got an account on Facebook (86%), and used WhatsApp for texting (74.5%). The number of social network accounts of the SPs was 0–1 (71.14% [106]) or 2–3 (18.79% [28]). Unfortunately, none of these components showed any statistically significant difference (p>0.05) when compared using Kruskal–Wallis test and Mann–Whitney test

Table 3 Comparison of total scores of Internet addiction test between sociodemographic characteristics using independent *t*-test (N=149)

Variable	N[a]	Mean (SD)	*t*-Statistics (*df*)	*p*-Value
Gender				
Male	59	44.85 (14.050)	1.472 (131)	0.143
Female	74	41.38 (13.054)		
Marital status				
Married	11	39.09 (11.528)	–0.905 (123)	0.367
Unmarried	114	42.89 (13.463)		
Year of study				
Year I	28	46.5 (19.75)[b]	–	**0.007**[c]
Year II	27	40.0 (29.00)[b]		
Year III	21	43.0 (13.00)[b]		
Year IV	28	41.0 (20.50)[b]		
Year V	28	31.0 (16.75)[b]		

Notes: [a]With some missing values. [b]Median (interquartile range). [c]Kruskal–Wallis test. Bold indicates significant data.
Abbreviations: *df*, degrees of freedom; SD, standard deviation.

Table 4 Post hoc analysis of comparison of total scores of Internet addiction test between the years of study using Mann–Whitney *U* test (N=149)

Groups	*p*-Value
Year 5 Versus	
Year I	0.001*
Year 2	0.066
Year 3	0.015*
Year 4	0.005*
Year 4 Versus	
Year I	0.376
Year 2	0.479
Year 3	0.678
Year 3 Versus	
Year I	0.175
Year 2	0.884
Year 2 Versus	
Year I	0.181

Note: *Significant difference was found between Year V and Years I, III, and IV.

Table 5 Correlation between total scores of Internet addiction test and exam grade, age (in years), and duration of daily Internet usage (in hours) using Pearson's correlation test (N=149)

Variables	*p*-Value	*p*-Value
Total score		
Versus age	–0.194	**0.025**
Versus duration of daily Internet usage	0.074	0.394
Versus exam grade	–0.262	0.069

Note: Bold indicates significant data.

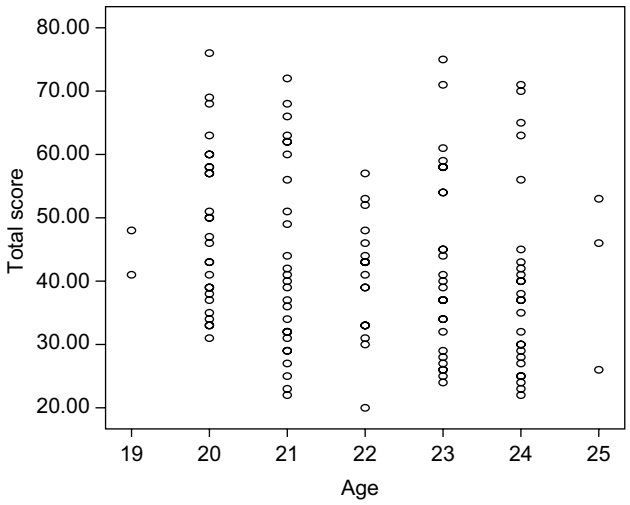

Figure 1 Correlation between total scores of Internet addiction test and age (in years).

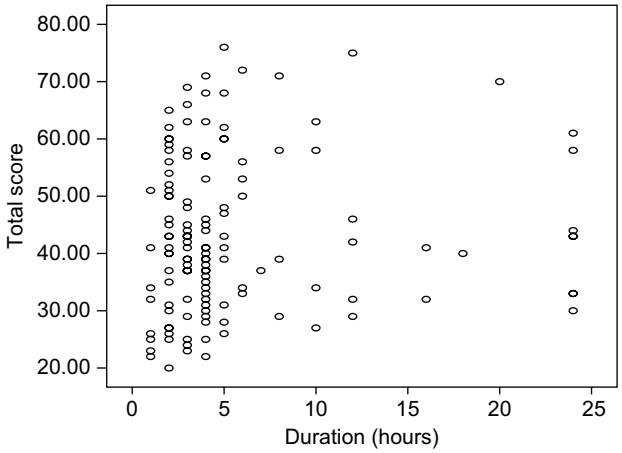

Figure 2 Correlation between total scores of Internet addiction test and duration of daily Internet usage (in hours).

Table 6 Correlation between examination grade and duration of Internet usage (N=147) found using Spearman's correlation test

	r-Value	*p*-Value
Exam grade versus duration of Internet usage	0.085	0.548

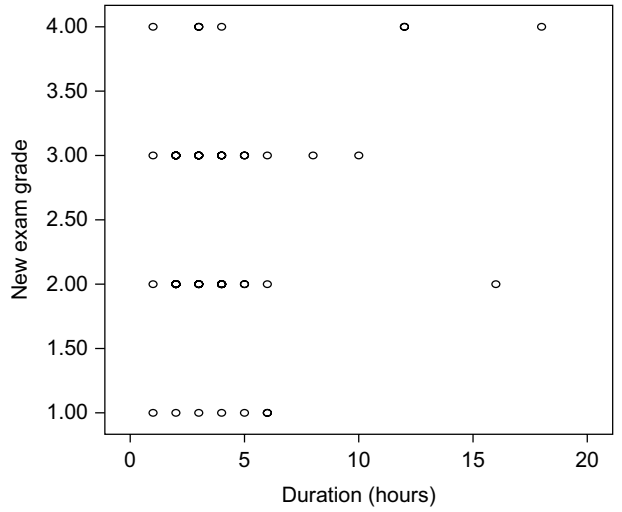

Figure 3 Association between examination grade (1=A, 2=B, 3=C, 4=pass) and duration of Internet usage in hours (N=147).

(Table 7). Median and interquartile range are used here instead of mean and standard deviation (SD) because the variable is skewed and not normally distributed, and thus, using mean and SD will give a biased average. All participants had email addresses and the specifics are portrayed in Figure 4. It was noted that 87% and 13% of students had one and two email addresses, respectively (Figure 5), but they did not indicate their most commonly used email addresses. The reasons for Internet use included (Figure 6): social networking (56.2%), entertainment (39.7%), educational

Table 7 Comparison of total scores of Internet addiction test between social media characteristics using nonparametric test (N=149)

Variable	N[a]	Median (IQR)	*p*-Value
No. of gadgets used			
1	29	42.0 (23.50)	0.831[b]
2	96	40.0 (17.00)	
3	7	41.0 (27.00)	
No. of Internet connections			
1	98	39.0 (18.50)	0.666[b]
2	30	41.0 (20.25)	
No	5	45.0 (25.50)	
Has Facebook account			
Yes	129	41.0 (23.00)	0.390[c]
No	6	38.0 (5.00)	
Using WhatsApp			
Yes	111	41.0 (20.00)	0.886[c]
No	25	39.0 (24.50)	
No. of social media accounts owned[d]			
0–1	106	41.0 (20.25)	0.569[c]
2–3	28	43.0 (25.25)	

Notes: [a]With some missing values. [b]Kruskal–Wallis test. [c]Mann–Whitney test. [d]Such as Facebook, Twitter, or others.
Abbreviation: IQR, interquartile range.

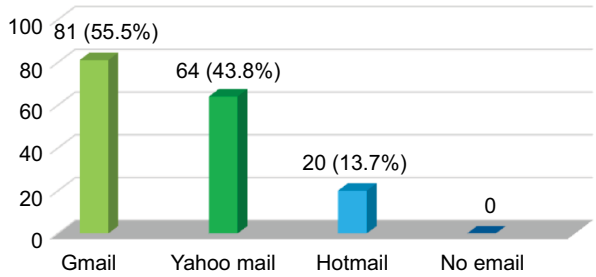

Figure 4 Email addresses used by participants (N=146).

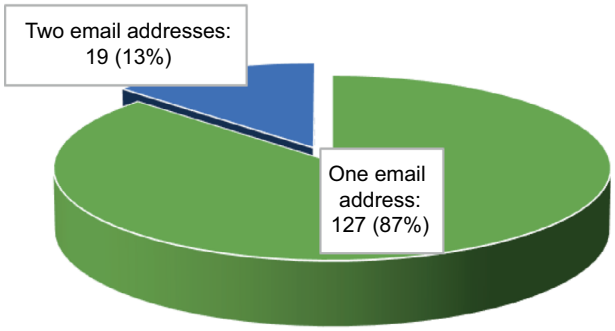

Figure 5 Number of email addresses owned by participants (N=146).

(34.9%), research (12.3%), and email communication (12.3%). Approximately half and one-third of the participants were suffering from mild and moderate addiction, respectively, and the subsequent problems resulting from Internet usage (Figure 7). It was noted that one-quarter of the students had no IA.

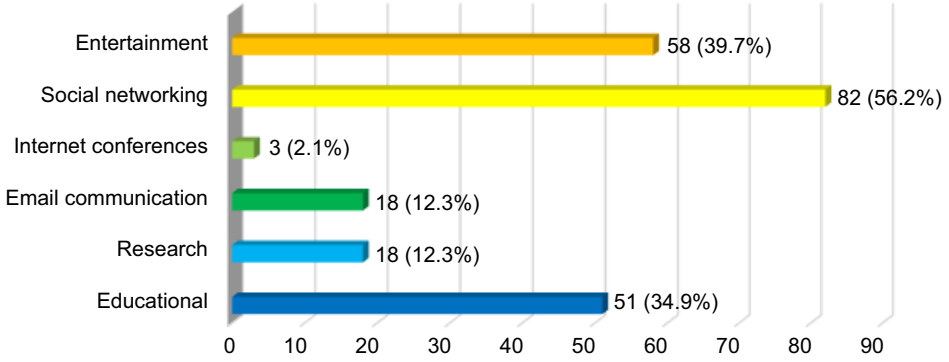

Figure 6 Major purpose of using Internet (N=146).

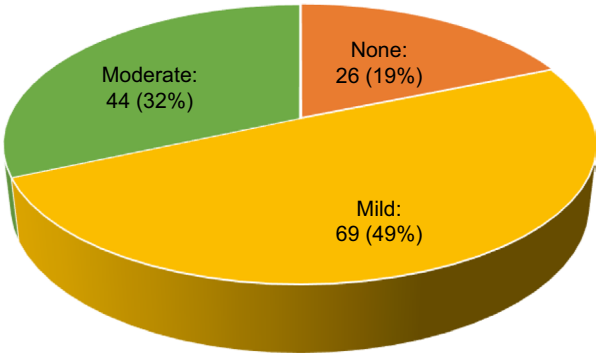

Figure 7 Distribution of severity scale of Internet addiction (N=139).

Discussion

IA has become a progressively more dominant public health issue for out-and-out research concerns from abundant scientific arenas including psychology, psychiatry, and neuroscience.[45] In the present study, the response rate of the participants was 80.11%, which is very similar to that of a Danish study.[46] Moreover, female medical students were outnumbered by their male counterparts, which was demonstrated in many studies from other countries.[47–55] Average age of the students of this study was also similar to other Malaysian studies conducted in medical schools.[47–52,56] Many studies also supported the findings of the present study that the majority of the students spent online than they intended.[9,57] The students occasionally neglected their household responsibilities, which was in line with the findings of other studies.[9,58,59] The preference of excitement of the Internet over intimacy with the partner was also revealed in studies conducted in separate contexts using different instruments.[59–62] US college students also form new relationships with fellow online users, as found in the present study.[63] About one-fifth of the students reported that they received frequent complaints about spending much time online. However, another study from the USA reported only 1%, which is much lower than that in the present study.[63] More than half (>50%) of the respondents stated that their academic performance was affected either frequently or occasionally; however, a number studies recorded lower response (<50%).[63,64] In this study, just over 50% of students either frequently or occasionally declared that they checked email first before doing any other work, but it was much lower in the US study (37%) and in an Italian study (23%).[63,64] It was also found that over 50% students either frequently or occasionally declared that their job performance was affected because of Internet use, but it was much lower in studies of the modern world (26%–41%).[63,64] A group of scientists claimed that behavioral addictions, such as substance addictions, bring to mind numerous areas, which include natural history, phenomenology, tolerance, comorbidity, overlapping genetic contribution, neurobiological mechanisms, and response to treatment, supporting the DSM-V Task Force proposed new category of Addiction and Related Disorders encompassing both substance use disorders and nonsubstance addiction.[65] Majority (>50%) of the students showed defensive behavior when they were asked about Internet usage. This figure was much higher than that reported in the study conducted in the USA.[65] Nonetheless, defensive behavior is often seen in substance addiction and is called as "Freudian defense mechanism".[66] Obsessive intrusive thoughts are defined as unwelcome, involuntary thoughts, images, or unpleasant ideas that may become obsessions, are upsetting or distressing, and can be difficult to be free of and manage.[67] About 65% of the current SPs suffered, more or less, from disturbing thoughts in their life. The current findings were much higher earlier studies in Europe and North America.[63,64] Therefore, some of the SPs were facing some obsessive behavior. More than 68% of the SPs anticipated that they would go online again. This result was again much higher than that reported in an earlier study,[61] but almost similar to that reported in another study.[64] Anticipating subsequent online sitting is a diagnostic feature of IAs.[68] About 70% of the respondents considered that their life would be boring,

empty, and miserable without the Internet. Again, this figure is much higher than that reported in a previous study,[63] but practically similar to the result of another study.[64] This finding was in the same line with the findings of a number of research reports on people who think that life devoid of the Internet or substance abuse will be troublesome.[62,69,70] Less than half (<50%) of SPs get irritated and shout with others for bothering them while browsing the Internet. Studies of the modern world reported much lower figure than the current study.[63,64] Multiple studies have described substance addicts' behavior, including the signs and symptoms. The ones that are regularly noticed include obsession, engaging in the behavior even though it is causing harm, compulsively engaging, withdrawal, loss of control, denying problems, hiding the behavior, blackout, depression, poor self-esteem, feeling anxious, suicidal ideation, having no control over their environment, and coming from psychologically or physically abusive families.[71,72] Therefore, the current SPs' quarreling tendency is also in the same line of addiction. Just over >61% of SPs lose their sleep due to extended usage of the Internet. A number of studies reported that constant access to the Internet causes sleep disorders, depression, followed by low quality of work.[73,74] Again, the finding on loss of sleep in the current study was much higher than that reported in previous studies.[63,64] Among the current SPs, just over >50% of the population fantasizes when the Internet is offline and that soon they will be online. The substance users also showed similar feeling of daydreaming and sensed pleasure that actually persuaded and coerced them to repeat the behavior again.[75,76] Yet again, the number of current SPs' fantasizing was much higher than that reported in two earlier studies.[63,64] Roughly 73% of the current SPs found themselves saying "just a few more minutes" when online; this figure was also much higher than that reported in earlier studies.[63,64] Around 74% of the SPs tried to cut down the amount of time spent on Internet, but failed. These data were quite similar to that reported in the North American study, but much higher than that of the European study.[63,64] More or less 58% of the SPs hide how long they are online. This finding is also much higher than that reported in earlier studies.[63,64] A functioning addict can be defined as someone who is able to hide the excesses of their alcohol or drug use and develops a high degree of skill for hiding the addiction.[77,78] Thus, at least a portion of the SPs may be suffering from addiction liability. Just over >50% of the SPs prefer spending more time online over going out with others; this figure is higher than that reported in the US study,[63] but quite similar to that of the Italian study.[64] A substance abuser or addict often prefers to mingle only with other addicts rather than with family members, relatives, and friends; the person also avoids family get-togethers or such events.[79] Hence, the current findings were also in the same line as the earlier report.[79] Around 44% of the SPs sometimes feel depressed, moody, or nervous while being offline, which goes away once they are back online; last but not least, this figure is also much higher than in the two earlier studies.[63,64]

There were no statistically significant (p=0.143) differences between genders. Similar insignificant differences were observed between genders in a study conducted at the Mahatma Gandhi Memorial Medical College, Indore, India.[80] The mean scores of both genders were between 31 and 49; therefore, both male and female medical students of UniSZA were suffering from mild IA, but had control of the usage. Among the current SPs, 49% suffered from mild addiction; various studies from different Asian countries reported 35%, 51.3%, and 57.77% to be suffering from mild IA.[28,81,82] Therefore, the current study data were quite similar to those of earlier studies.[28,81,82] A study conducted among medical students of the Middle East reported that 19.1% of them suffers from a moderate degree of IA, but the figure in the present study was little higher (32%).[83] Some Asian studies have reported that 0.3% and 0.9% were suffering from severe IA; nevertheless, in the present study, we were not able to detect any single medical student with severe IA,[28,83] although a little positive, but not statistically significant (p=0.548) correlation was found between the examination grade and duration of Internet usage. Nonetheless, another recent Malaysian study reported that a significant (p=0.003) relationship was observed between cumulative grade point average and Internet usage during weekdays. However, there was no significant relationship between Internet usage and cumulative grade point average during weekends (p=0.677).[17] Another investigation conducted among Malaysian university students found statistically significant differences in academic performance between average users and excessive users (t=−18.95, degrees of freedom = 651, p<0.001).[84] Similar significant relationships were also observed in South Africa, but no relation of causality could be recognized between rigorous Internet usage and poor academic performance, even though the study results approved the negative effects on academic achievement due to abusive use of the Internet.[85] Another Indian survey conducted on 500 medical students of three reputed medical institutes (Hamdard Institute of Medical Sciences and Research, New Delhi; All India Institute of Medical Sciences, Jodhpur; and Dr SN Medical College, Jodhpur) revealed that there is a significant relationship between

students' usage of the Internet and their academic performance.[86] Another appraisal conducted among 400 South Asian science and technology university students found that IA had a statistically significant negative relationship with academic performance (r=−0.13, p<0.0).[87] Consequently, the current study findings were in the same line as those of earlier studies of home and neighboring countries.

Limitations of the study

The study has a number of limitations. This cross-sectional study involved only students of a medical school in Malaysia and had a small sample size; therefore, caution needs to be taken to generalize the findings. Moreover, as the study was cross-sectional, it was not possible to conclude a cause–effect relationship between the causative factors and IA among students. Longitudinal, multicentered studies with large sample size should be conducted to identify the trends of Internet usage among health care professional students and its likely implications on students' learning and their physical and mental health.

Conclusion

The present study revealed that 81% (49%+32%) of the SPs had mild to moderate IA, according to the study instrument of Dr Kimberly S Young. The study as well concludes that both male and female medical students were suffering from mild IA. It was found that the majority of participants frequently stayed online longer than they intended. Approximately 13% was always online longer than they had planned. Majority of the participants mentioned that Internet usage occasionally made them neglect their household chores and hampered their academic performance or productivity. IA is becoming more prevalent among medical students. They are among high-risk PIU groups because they use the Internet for both educational purposes and noneducational purposes. Easy access to the Internet without parental control is one of the important factors for IA among medical students. This study finding is quite alarming and demands the attention of concerned educational authorities because this is a public university and medical education is heavily sponsored by the Government of Malaysia, with almost no out-of-pocket personal and parental expenses. A good amount of studentship allowance is provided for each and every medical student for day-to-day incidentals, which actually comes from the tax money paid by the Malaysian people. Appropriate preventive and interventional strategies need to be developed to encourage rational use of Internet in order to protect the physical and mental health of the users.

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