Research Article

Internet Addiction by Using the Smartphone-Relationships between Internet Addiction, Frequency of Smartphone Use and the State of Mind of Male and Female Students

Liron Ben-Yehuda, Liel Greenberg and Aviv Weinstein[*]

Department of Behavioral Science, Ariel University, Science Park, Ariel, Israel

[*]**Correspondence to:**
Aviv Weinstein, PhD
Department of Behavioral Science
Ariel University, Science Park
Ariel 40700, Israel
Tel: 00 972 4 6399151
E-mail: avivweinstein@yahoo.com

Abstract

Objective: In recent years, the use of Smartphones got a lot of attention due to their possible physiological, psychological and behavioral effects. The aim of the present study was to examine the relationships between Smartphone use, Internet addiction and level of interest of users by assessing differences in frequency of Smartphone use in three different situations (boredom, passive activity and active activity) among male and female students.

Procedure: The sample consisted of 40 participants - 20 women and 20 men, University students age range 21-29, who were recruited by convenience sampling. The experiment was conducted in three conditions: state of boredom, passive activity and active activity in counter-balanced order. Before the experiment participants completed Internet addiction, Visual Analog Scales (VAS) and Smartphone Addiction Scale (SAS) questionnaires. After each experimental condition participants completed the VAS questionnaire.

Results: There was a correlation between the frequency of Smartphone use and Internet addiction. High frequency of Internet use rather than type of activity or gender predicted Smartphone addiction.

Conclusions: The use of the Smartphone may be associated with Internet addiction and is not influenced by any interest or involvement in daily activities. This may be a result of compulsive use of the Internet.

Keywords

Internet addiction, Smartphone addiction, Behavioral addiction

Introduction

Behavioral addictions have been described as means to: "produce pleasure, provide escape from emotional or physical discomfort, and are characterized by powerlessness (i.e., an inability to control the behavior) and unmanageability (i.e., significant negative consequences resulting from the behavior)" [1]. There can be a natural tendency for addiction, based on either genetics or a physical condition, which leads individuals to develop attachment to chemical substances or different activities [2].

Diminished control is a core defining concept of psychoactive substance dependence or addiction. This similarity has given rise to the concept of non-substance or "behavioral" addictions, i.e., syndromes analogous to substance addiction, but with a behavioral focus other than ingestion of a psychoactive substance. The concept of behavioral addictions has some scientific and clinical heuristic value, but remains controversial. Issues around behavioral addictions are currently being debated in the context of development of DSM-V [2].

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There are several different models have been proposed for Internet and gaming disorder [2-4]. Some have considered it part of the obsessive-compulsive spectrum of disorders, in that there is a similarity between obsessive-compulsive disorder (OCD) and the intrusive, anxious urge to repetitively check one's e-mail or Facebook page or repetitively play an online video game. This model is supported by some preliminary pharmacologic treatment studies with selective serotonin reuptake inhibitors (SSRIs) [5, 6]. PIU has also been conceptualized as an impulse control disorder, characterized by the urge to repeatedly engage in a behavior—going online—that is pleasurable in the moment but can lead to negative downstream effects [7]. A third conceptualization for PIU is as a "behavioral addiction" similar to a substance use disorder [8]. That is suggested by the presence of withdrawal-like and tolerance-like features in PIU as well as by the individual's continued use of the Internet despite adverse consequences—all of which are often seen in substance addiction.

These days, we are witnessing a new, phenomenon of specific behavioral addiction, to a variety of different kinds of technologies, such as: television, video games and the Internet [3, 9, 10].

Internet addiction is defined as "The inability to control one's use of the Internet, a condition that causes severe impairment of various life functions"[11]. Internet addicts may use the Internet for long periods of time, isolating themselves from other forms of social frameworks and concentrating wholly on Internet-related activities, rather than on the limitations of real life events [3].

The latest generation of mobile phones (i.e., Smartphones) contains tools such as Internet, which allow involvement in various activities beyond the traditional spoken and written communication (SMS) among people (e.g., gambling, social networking, shopping, etc.) [12]. With abundant applications, Smartphones have provided their users Internet-based communication [11]. Previous studies have investigated the frequency of different use of Smartphone and its effects on mental and physical health measures [13-17].

Smartphone is a handheld computer, representing the last step in the evolution of Information technology and mobile communication [18]. It incorporates data communication and features such as access to Internet and telephone functions. Due to rapid expansion and excessive use, the Smartphone became the main tool that can enhance Internet addiction in all ages. Previous studies examined the issue of Internet addiction via mobile Smartphones and there are several studies that focused on the student population [19].

There is controversy whether there is "Smartphone addiction" and indeed Billieux et al. [12] showed the lack of studies supporting the idea of mobile phone addiction. Smartphone use is based on web-based applications (apps). Therefore, its usage requires skill functions using the Internet. Based on the likely relationship between frequent use of Smartphones and the Internet, the subject of use of Smartphones was examined in the context of addiction to the Internet as well [11]. Several studies examined the connection between the use of Smartphones and Internet addiction. Recent researches have shown positive correlation between addiction to Internet and frequent use of Smartphones, indicating that a higher frequency of Internet-based use of Smartphone apps, such as social media, is a significant predictor of an existing addiction [9, 20].

Given these findings, this study investigated whether there is a positive correlation between Smartphone use and Internet addiction. In accordance with the study of Jung and colleagues [11] it was predicted that higher Smartphone use may be associated with Internet addiction. Secondly, this study investigated whether there would be effects of the level of interest in the participants on the frequency of Smartphone use. It was predicted that there would be differences in the frequency of Smartphone use between states of boredom, being a passive participants and during high activity. It was predicted that frequency of Smartphone use would be higher during a boredom state compared with being a passive and active participant in a demanding situation. Finally, the study investigated gender differences in Smartphone use and Internet addiction. Internet addiction was significantly higher among men than women [11, 20]. Given these findings, it was predicted men will use Smartphones more frequently than women.

The rationale behind this study was whether the use of the Smartphone was associated with the level of interest of the participants. It was assumed that when people play an active role in a situation and consequently may have more interest in it, they would use the Smartphone less frequently since that involvement would compete with their cognitive resources.

Procedure

The study was conducted among a sample of 40 students from a University. The students were sampled on a convenience basis (among friends and study acquaintances) and by using coupons distributed to participants in research experiments at the university. There were 20 men and 20 women. Table 1 presents data on the socio-demographic background of the participants.

Table 1: Descriptive characteristics of the sample (N = 40).

Variable		Percentage%	N	M	SD	Range
Age	Years			24.10	1.87	21-29
Living area	North	17.50%	7			
	Center	80.00%	32			
	South	2.50%	1			
Family status	Single	70.00%	28			
	Cohabitation	20.00%	8			
	Married	10.00%	4			

Questionnaires

Internet Addiction Test (IAT) questionnaire

The Internet Addiction Disorder Questionnaire [21]

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includes 20 items and its goal is to examine Internet addiction in three levels: mild, moderate and severe. The answers are in Likert scale, between 1 and 4, where 1 signifies never, 4 signifies always. The range of scores between 20-49 in the questionnaire demonstrates a low level of addiction, between 50-79 demonstrates a moderate level of addiction and from 80 to 100 demonstrates a high Level of addiction. Reliability measure of α = 0.91 was found in this sample.

Visual Analogue Scale (VAS) questionnaire

The VAS Questionnaire included seven statements [20]. Answers were on a Likert scale from 1-11, where 1 means not at all, 11 means very much. The amount of answers was divided to three levels of Addiction: Low (1-26), medium (27-52), high (53-77). Reliability of α = 0.91 was found in this sample.

Smartphone Addiction Scale (SAS) questionnaire

Smartphone Addiction Scale Questionnaire includes 33 statements [20]. Answers were on a Likert scale between 1-6, where 1 signifies strongly disagree, 6 signifies strongly agree. The amounts of answers were divided to three levels of addiction: low (1-66), medium (67-132) and high (133-198). Reliability α = 0.95 was found in this sample. The SAS was first introduced, validated and correlated with VAS questionnaire [20].

Method

Before starting the experiment, the participants signed an agreement form to participate in the research. At baseline, participants filled the Internet addiction, VAS and SAS questionnaires. Next, the participants were brought to the specific condition/situation (boredom/ passive/ active activity). In each one of the situations there were different experimental conditions with a time measurement of 30 minutes (at counter-balanced order):

Participation during an activity

All participants were requested to draw with a pen/pencil a picture that was screened on the board.

Passive participation

All participants watched a film together in the same classroom.

State of boredom

All participants were requested not to have any verbal communication with other participants in the same class. After every situation, the participants in the experiment filled in the VAS questionnaire (exhibit 5 shows the short test procedure).

Results

Table 2 presents descriptive characteristics of the key study variables.

Participants reported a relatively low level of frequency of Smartphone use according to the VAS questionnaire. The average of 33.35 was within the range of low addiction according to the questionnaire coding. The level of Internet addiction showed range scores between 20-49 which indicates a low level of addiction. The addiction level of the participants to Smartphones was medium on average. Range scores between 67 and 132 in the addiction to Smartphone questionnaire indicated a medium level of addiction.

Table 2: Descriptive characteristics of key study variables (n = 40).

Variable	M	SD	Min	Max
Frequency of Smartphone use	33.35	11.56	11.67	62.67
Internet Addiction	41.25	12.06	21.67	67
Smartphone Addiction	85.22	22.56	41	140.67

Treatment of the hypotheses

The first research hypothesis predicted a positive correlation between Smartphone use and Internet addiction. Multivariate regression was performed for investigating the effects of Internet addiction, situation status of the experiment (boredom, passive and during high activity) and gender on Smartphone addiction ratings. The results are presented in Table 3.

According to the results presented in the Table 3, only Internet addiction had a positive significant contribution to the variance of Smartphone addiction ratings and that gender of the participant or the situation they did not contribute significantly to the variance of these scores.

Table 3: Regression coefficients predicting variance of Smartphone addiction ratings according to Internet addiction, situation status of the experiment (boredom, passive and active) and gender.

Predictors	Dependent variable: Smartphone Addiction Coefficients				
	B	SE	B	t	R^2
Internet Addiction	0.78	0.2	1.43	** 7.16	0.69
Gender	-0.2	4.91	-8.92	-1.81	
Boredom situation (gap)	0.1	0.32	0.27	0.85	
Passive situation (gap)	0.08	0.26	0.22	0.83	
Active situation (gap)	-0.17	0.51	-0.91	-1.76	

*p <.01 **

The second research hypothesis predicted that there would be differences in the frequency of Smartphone use, depending on the situations examined. Frequency of use of Smartphones before and after the situation examined will be highest in the state of boredom, then in passive situation, and during a state of activity we will find the lowest gap score of Smartphone use.

In order to test the second research hypothesis, a dependent sample t-test examined the differences in frequency of Smartphone use before and after each situation. The findings are presented in Table 4.
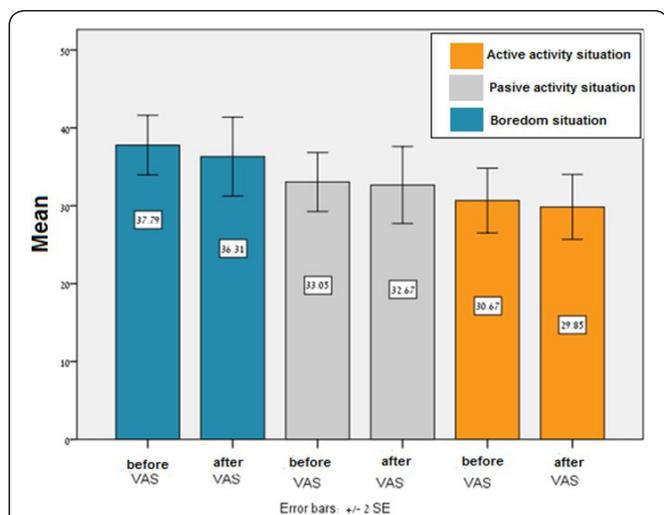
According to the findings presented in the Table 4, there were no significant differences between the frequency of Smartphone use before the situation compared to after the situation, in any of the three experimental conditions.

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Table 4: Means and standard deviations of frequency use of smartphone before and after the experimental condition.

	VAS Before 40 = N		VAS After 40 = N		t	p
	M	**SD**	**M**	**SD**		
Boredom	37.08	12.62	35.63	16.18	1.1	N.S
Passive activity	32.8	11.79	32.15	15.59	0.5	N.S
Active activity	30.67	12.99	29.85	13.03	1.23	N.S

Table 5: Means and standard deviations of frequency use of smartphone by gender

	Male 20 = N		Female 20 = N		t	p
	M	**SD**	**M**	**SD**		
Boredom situation	36.5	14:52	37.65	10.75	-0.28	N.S
Passive situation	31.05	11.73	34.55	11.9	-0.93	N.S
Active situation	28.75	13:59	31.6	12.97	-0.67	N.S

The chart below presents the average and standard deviations of VAS questionnaire before and after each of the three experimental conditions.

According to the data shown in Figure 1, it can be seen that the score of frequency of Smartphone use in boredom condition is the highest, afterwards in the 2nd place the score of the passive condition and the lowest score was the active condition. However, in all of the three experimental conditions there was no increase in the frequency of Smartphone use after the experimental condition compared to the frequency before the experimental condition. These findings do not support our second hypothesis.

Figure 1: Difference of the frequency use of smartphones before and after the operation in the three experimental conditions.

The third research hypothesis predicted gender differences when examining the frequency of Smartphone use among the student population.

In order to test the hypothesis, an independent sample t-test was conducted between ratings of males and females in all experimental conditions. The findings are presented in Table 5.

According to the findings presented above, there were no significant differences between men and women in the frequency of Smartphone use at all three experimental conditions. These findings do not support the third hypothesis.

Discussion

The appearance of technology in our lives has increased the spectrum of behavioral addiction and today Internet addiction, gadgets and other technological accessories are not rare. The purpose of this study was to examine the relationship between Internet addiction and Smartphones use, to examine the differences related to gender, and the differences in the frequency of Smartphone use in three different situations, state of boredom, during passive activity and during activity among students.

The study demonstrated a positive correlation between Smartphone use and Internet addiction. This finding is supported by the existing literature which suggests that higher frequency of Internet-based use of Smartphone apps (for example: social media), is a significant predictor of addiction [9, 20]. The Smartphone is an accessible and convenient device for users to connect to various websites and media channels, thus it can provide the Internet-dependent individual maximal and constant availability for his/her addiction. Internet users who use the Smartphone excessively will find the way to satisfy their Internet addiction and to fulfill their desire.

The study did not find any differences in the frequency of Smartphone use depending on the situations examined-state of boredom, passive activity, and in an active situation. There may be several reasons why the hypothesis was not supported. Participants of this study reported low average levels of frequency of Smartphone use and addiction to Internet, a fact that may explain lacks of gaps in the three experimental conditions. It is possible that individuals with high frequency rate of Smartphone use and Internet use will use the Internet more in situations of boredom or passivity in an attempt to relieve the lack of interest and action. It was wrongly assumed that interesting situations that require active participation would compete with Smartphone use. It seems that the compulsive use of the Smartphone is done regardless of level of interest or activity. We argue that compulsive use of the Internet via the Smartphone damages "natural reward"-interesting and actively pursued activity.

Thirdly, the study did not show gender differences in the frequency of Smartphone use among this population in any of the experimental situations. It is possible that there were no gender differences among students using a Smartphone due to the fact that the students are mostly part of a young population who frequently use this device for social and academic purposes and also for dating purposes that are

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relevant to both sexes.

Previous studies have investigated the consequences of Smartphone use on psychological and physical health measures. Smart phone use was largely driven by a desire to connect socially rather than for the purpose of addictive activities such as Internet use and gaming [13]. However, Demirci et al. [14] using the Turkish version of the Smartphone Addiction Scale found that total scores for gaming were significantly higher than those for voice calling, short text messaging and other categories. Demirci et al. [15] also found that depression, anxiety, and sleep quality may be associated with Smartphone overuse. Smartphone overuse also enlarged the median nerve, caused pain in the thumb, and decreased pinch strength and hand functions [16]. Finally, Smart phone use was associated with duration and frequency of headache attack and using analgesics to relieve headache Demirci et al. [17].

Summary

The findings suggest that in the technological era saturated with technological equipment which essentially stands the Smartphone, the excessive use of this device requires treatment like the rest of behavioral addictions. Internet dependent individuals have difficulty in solving personal problems, in adapting and coping in daily life. Usually these are people with low confidence and self-esteem, struggling with social relationships [22, 23]. Internet and Smartphones may provide means for escaping from challenges of reality into a virtual world that may be fictional and different. Internet addiction and excessive Smartphone use may occur in both genders and in different life situations (i.e., boredom, passive activity and active activity). It is plausible that regular use of the Smartphone results in users not able to differentiate between different states of social and cognitive activity whether they are boring or require active participation. This finding may support the notion that behavioral addiction such as Internet and gaming disorder results in excessive use of the Internet that may damage interpersonal skills and the ability to understand and convey emotional and social information. Instead, there is an obsessive-compulsive use of these devices regardless of the influence of the real world.

Limitations

The current study used a convenience sample which included and tested only students from a university in Israel, so it is possible that study participants do not reflect the population as a whole. In addition, the current study included only 40 participants, may be a larger sample could of yield different results, which may reflect more appropriately the population. It is also possible that the difference in times between the conditions (a week from any situation) was an obstacle course of the study, as evidenced by the high reliability of the questionnaires between the three situations as well as the length of time manipulation itself may constitute an obstacle (30 min).

Finally, this current study focused on the student population that mostly didn't present a frequent use of the Smartphone. Future studies that will examine the hypotheses on young populations that don't belong necessarily to the academy or other academic institutions, with high levels of Smartphone use or Internet addiction with a greater difference of times between situations, and manipulated for longer times (over 30 minutes) may yield different results.

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