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Smartphone Addiction and Self-reported Productivity among Hospital Health Professionals in Beirut

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ABSTRACT

Background: Excessive use of smartphones in the workplace can lead to addiction, which has a negative impact in terms of lowering productivity. The purpose of this research was to assess the addiction to smartphones and its relation to negative productivity among health professionals of six hospitals in Beirut, Lebanon.
Methodology: This is an observational cross-sectional study. Data was collected from 395 participants via a stratified random sampling method using a questionnaire providing a scale to rate smartphone addiction and work productivity assessment. Descriptive statistics and correlation/regression analysis were used to assess the significance of the results.
Results: 71.4% of the approved respondents (N=388) were found addicted to smartphone in age category under 19: (37.09±9.07, p=0.013), in single participants: (33.01±10.52, p=0.034), and in android operating system users: (31.32 ± 10.04, p=0.013). Results showed also, the percentage of addicted respondents using smartphones more than 3 hours per day: (35.03±8.52, p<0.001), internet: (32.94±9.42, p=0.004), and social media: (32.37±9.67, p=0.007). In addition, the Short Smartphone Addiction Scale (SSAS) showed a significant correlation with self-reported negative productivity (r=0.209, p<0.01), and the number of times of the smartphone usage per working day (r=0.264, p<0.01). A significant predictive relation between work productivity and the number of times of smartphones usage per working day was also shown.
Conclusion: Future research, on a national level could help identify a stronger association between addiction to smartphone and negative productivity among health professionals. Such results may provide policy guidance for the usage of smartphone among hospital professionals during working hours.

Keywords: Smartphone addiction, productivity, efficiency, health professionals, hospitals, Beirut.

INTRODUCTION

Since the release of the first cell phone (Motorola Dyna TAC 800X) in 1983, this industry greatly advanced with an increasing number of smartphone (SP) users year after year. The number of global smartphone users in 2022 was estimated at 6.6 billion, marking a 4.9 % annual increase. It is also 2.9 billion, or 79 %, more than the number of SP users there were in 2016, just six years ago[1]. A survey conducted in 2016 by the US based opinion Pew Research Center indicated that 88 % of Lebanese own a mobile phone, constituting the 20th highest share among 40 countries covered by the survey. In addition, 52 % of adults in Lebanon have a smartphone, representing the 16th highest share globally and the sixth highest share among emerging countries [2].

A smartphone is a term used for distinguishing mobile phones with advanced features from basic features phones. This term was basically introduced in the market for a new class of mobile phones that provides integrated services from communication, messaging, personal information, management applications and wireless communication capability [3]. Among types of SPs operating systems include Apple, Google Android based devices, and Microsoft Windows based devices. SP's apps are compact software programs that perform specific tasks for the mobile user. There are two types of SP apps: 1) The native app that must be installed on the device or that arrives preinstalled on the phone and 2) The web app existed on a server and is accessed via internet. The popular categories of SP apps include games, music, social networking, news, weather, maps/navigation, video/ movies, entertainment/food, sports, communication, banking/finance, productivity and travel/life style.

Some researchers believe that the frequent use of mobile phones will ultimately lead to positive results for users. For example, mobile phones facilitate communication. The SP's usage between the medical staffs help in immediate access to medical and health information that can lead to improved decision making and reduced numbers of medical errors [4, 5]. However, there is a dark side to the ubiquity of smartphone use, and some analysts consider the mobile phone usage as the biggest non-drug addictions in the 21st Century [6, 7].

On the bus, in the coffee houses, even in the street, it is now common to see many people immersed in their phones. There is a new word to describe these people: "phubber" which is a combination of "phone" and "snubber" [8]. According to the Macmillan dictionary the word phubber means "someone who repeatedly looks at their phone in a social setting while ignoring the people they are actually with.

Many people, particularly young generation, are addicted to SP's use which affects their physical health, in the form of neck, shoulder and back pathologies [9, 10]. Furthermore, the dependence leads to many psychological issues that leads to a reduced in work productivity. Young adults may display signs of addiction to their cell phone as they feel the need to constantly check and respond to text messages. This constant bombardment of information stimuli can lead to a drop in workplace productivity [11-13].

In the context of a survey realized by Pew Research Center about the use of smartphones and social media platforms, the Lebanese participants answer was : 80% use WhatsApp, 70% use Facebook, 34% use Instagram and 20% use Viber. In the cedars' land, 40% of mobile phone users say their phone frees them, compared with 30% who say it ties them down. 50% of Lebanese phone users say their phone saves them time compared with an equal percentage who says it wastes their time [14]. Recent studies have shown many examples of problematic use of smartphones in young Lebanese adults leading to decrease of concentration, compromise of interactions with others, or mental illness [15, 16].

There is limited scientific literature available regarding self-reported use of mobile phones and social media and their possible impact on hospital productivity. This study will focus on an examination of addiction to SP and self-reported productivity among health workers in six hospitals in Beirut, Lebanon. The outcome of this study is to assess the socio-demographic variables, the addiction to smartphone in relation to the patterns of smartphone usage; and to find a relation between the addiction to smartphone and low reported work productivity.

MATERIALS & METHODS

Quantitative descriptive research method has been chosen, which is frequently depicted as presenting a static image of social reality with an emphasis on relationships between variables. In this cross sectional study, the sample size for

qualitative variable was calculated according to a formula exposed by Pourhoseingholi et al (2013) [17].

Questionnaire design

An established questionnaire was used including the Short Smartphone Addiction Scale (SSAS) [18] and the Work Productivity and Activity Impairment Specific Health Questionnaire WPAI-SHP [19].

The questionnaire's aims were made explicit to respondents:

- The first section gathers basic information in order to analyze the demographic variables.
- The second section focuses on evaluating SP addiction. This ten-item scale is assessed on a six-point Likert scale, with less addictive tendencies corresponding to the lowest score (10) and greatest addictive tendencies corresponding to the highest score (60). This study defines respondents with scores equal or higher than 30 as addicted to SP, scores between the range of 20-40 are in a medium risk of addiction and equal or more than 40 as high risk of addiction. The higher is an individual's score, the higher is their level of addiction.
- The third section assesses the productivity at hospital and in relation to Smartphone use. Item 5 of the WPAI-SHP is designed to assess productivity at work. We replaced the word health by the word smartphone. We also included an additional item to query how many minutes and times each working day a person used his smartphone for different tasks. We considered, less than 30 the acceptable numbers for time (in minutes) and frequency of usage.

We translated this questionnaire into Arabic and French. Trained interviewers (two medical residents and one paramedical employee) administered the questionnaire to available consenting paramedical and medical staff.

Data sources

Between June and November 2019, 395 respondents in six hospitals were randomly selected using stratified, simple random and convenience sampling methods. This approach ensured that the various categories of hospitals operating in Greater Beirut (GB) were included in the study and coding of the hospitals was done to ensure confidentiality. The hospitals' managers selected were asked to provide the total number of workers in each stratum. In fact, the strata selected to our study were: Medical student, paramedical professional/student, healthcare professional (MD, nursing, midwife, and pharmacist), and employee (management team, admission, secretary, accountant, cafeteria …). Then the following steps were performed: (1) the size of the smallest stratum is determined from which the number of people required to achieve the desired error level (5%) and level of confidence (95%) was calculated. (2) The number of people in each of the other strata to achieve the same ratio was deducted.

STATISTICAL ANALYSIS

Participants' characteristics are summarized using mean ± standard deviation for continuous variables and n (%) for categorical variables. The independent 2-sample T test (Mann-Whitney-U-test)/ analysis of variance (Kruskal Wallis Test) was used to assess the statistical associations between SSAS and the categorical socio-demographic variables, the work productivity variables and the categorical socio-demographic variables, the SSAS and the patterns of smartphone usage, and the work productivity variables and the patterns of SP usage.

Multiple logistic regression analysis was used to examine the association between SP addiction level and work productivity assessment variables. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 24 for Windows. Assuming the normality of the data, Student's t-test for independent samples and one way analysis of variance (ANOVA) were used to compare the mean score of the SSAS across the categorical variables of the study for two and more than two categories

respectively. If the variances were not equal, the Bonferroni correction for the t-test and the non-parametric tests of Kruskal-Wallis were used respectively. A p value < 0.05 and 95% confidence intervals were adopted to report the statistical significance and the precision of the results.

The reliability is related to the results of the study that must be repeatable. It is presented by the Cronbach's alpha. A figure of Cronbach's alpha < 0.5 is a sign that the reliability of the questionnaire is very low; as the value increases the reliability increases.

Validity refers to whether a study is well-designed and provides results that are appropriate to generalize to the population of interest. The KMO value (Kaiser-Meyer-Olkin) is a test that has a positive relation to the degree of validity. The closer is KMO value to 1, the stronger the validity. KMO values less than 0.6 indicates the sampling is not adequate and that remedial action should be taken. SSAS 10 > 0.852. The Work Productivity and Activity Impairment questionnaire is a well validated instrument to measure impairments in work and activities [20, 21].

Ethical considerations

Approval of ethical committees of the selected hospitals was obtained. In addition, the WHO's Research Ethics Committee [22] were followed in our observational epidemiological research. We ensured that research respondents were not subjected to harm in any way whatsoever. The quality of expression, the non-offensive and nondiscriminatory language, were applied. The participants were asked whether they took any offence on the questionnaires content and if their dignity was respected. Therefore, the questionnaire has an introductory section explaining the purpose of this research, including a statement of related interests, and an assurance of adequate levels of confidentiality. Finally the nature and the aim of the questionnaire were explained in detail. A full and voluntary consent from respondents was obtained and recorded.

RESULT

Sample size

The minimum sample size needed to our study is 323 according to the formula: Sample size= (Z1-α/2)2f (1-f)/d2 where Z1-α/2 : is the standard normal variant at 5% type I error (p<0.05), it is 1.96 ; f: is the expected proportion in population on previous studies; and d: is the absolute error or precision.

Socio-demographics and pattern of smartphone's usage variables

Out of a total of 395, 7 questionnaires were excluded for incomplete filling of the information, lack of data, and absent of the consent form signature. Four private hospitals in Greater Beirut participated in the study with 82% of the total number of respondents; the rest was filled by participants from two public hospitals in the capital.

As shown in table 1, among the valid 388 respondents, 45.1% were male and 54.9% female. 68.6% were in age group higher or equal to 25 years and the majority single (58%). All the participants 100% were Lebanese. The lowest percentage of the respondents came from paramedical employee/students (6.7%), the employee category 33.3% and the healthcare professionals 47.4%. From all the workers, 66.7% responded positively with respect to substance use habits, such as smoking cigarettes or shisha and consuming alcohol. The subjects were of intermediate education (5.7%), secondary education (24.2%), university diploma (51.5%) and master/doctor degree (18.6%). Almost half of the respondents were in the range of the duration of employment between 2 and 9 years in service.

Table 1. Socio-demographic data

Variable	Type	Frequency	Percentage
Age (years)	< 19	11	2.8
	19 ≤ 25	111	28.6
	≥ 25	266	68.6
Gender	Male	175	45.1
	Female	213	54.9
Marital Status	Single	225	58.0
	Married	163	42.0
Nationality	Lebanese	388	100
Habits	Cigarettes	109	28.1
	Shisha	125	32.2
	Alcohol	25	6.40
	None	129	33.3
Educational Status	Intermediate education	22	5.7
	Secondary education	94	24.2
	University	200	51.5
	Master, MD	72	18.6
Profession of respondents	Medical student	49	12.6
	Paramedical student	26	6.7
	Healthcare professional	184	47.4
	Employee	129	33.3
Duration of Employment	< 2 years	91	23.5
	2 - 9 years	188	48.5
	9 - 20 years	89	22.9
	≥20 years	20	5.2
Type of mobile phone	Smartphone/ Android	274	70.6
	Smartphone/ I phone	114	29.4

All respondents (100%) used a smartphone with a majority (70.6%) using Androids' system. The purpose for using a smartphone (multiple answers question type) is 96.6% for social media (WhatsApp, Instagram, Facebook….) and 86.9% for basic phone services (SMS Call) while it is used in 67.8% for academic performance task and 50.3% for games. Almost half of hospital personnel used their mobile phone per day for a period higher or equal to 3 hours. During working hours 5.4% of the respondents set the phone on "OFF" mode, while 94.6% put their phone "ON" and alerting modes (table 2).

Table 2. Pattern of Smartphone usage (n= 388).

Variable	Type	Frequency	Percentage
Total time of SP's usage /day	Acceptable (<3 h)	192	49.5
	Unacceptable (≥3 h)	196	50.5
Purpose of using SP	Surfing the internet	307	79.1
	Social media	375	96.6
	Basic phone services	337	86.9
	Games	195	50.3
	Academic performance tasks	263	67.8
Phone settings during working hours	Off	21	5.4
	On	367	94.6

Smartphone addiction and work productivity

Addiction to smartphone was assessed in our questionnaire using SSAS score. We found 71.4 % of hospital professionals addicted to smartphone and 61.1% of respondents are in the medium risk of addictive tendencies. The mean addiction score is 32.12 ± 9.79 (table 3).

Productivity was assessed in our questionnaire as follow:

- The mean of self-reported respondents on how the phone impacts work productivity is 4.44± 2.61 (the lower the mean, the higher is the impact on productivity).
- The mean total number of times a SP is used during a working day is 32.2 ± 28.24.
- During working hours in a normal day, the mean time a SP is used by the respondents engaged for personal use is 29.84 ± 3.99 min.

Table 3. Risk of Smartphone addiction, SSAS score and work productivity assessment variables.

Variable	Type	Mean (SD)	Frequency	Percentage
SSAS		32.12 (9.79)		
	Addicted respondents		277	71.4
	Non addicted respondents		111	28.6
	High risk of addictive tendencies 40< ≤60		72	18.6
	Medium risk of addictive tendencies 20< ≤40		237	61.1
	Low risk of addictive tendencies 10< ≤20		79	20.4
Productivity (0 least productive, 10 most productive)		4.44 (2.61)		
Number of times (usage of the SP)/ working day		32.2 (28.24)		
Total time of SP's usage (minutes)/ working day		29.84 (3.99)		

Relation between socio-demographic variables and smartphone addiction

According to the results in table 4, significant differences were found between the socio-demographic variables (age, marital status, habits and type of mobile phone) and SP addiction among the respondents. In fact; the mean SSAS scores for age categories were significantly higher in the age category less than 19 years, the mean SSAS for singles is higher than the married respondents, and the mean SSAS for Android phone users is higher than I-phone users.

Table 4. Differences of Smartphone addiction and the socio-demographic variables.

Variables		Smartphone addiction				
Socio-demographic		Frequency	M	SD	Levene test	p
Age (years)	< 19	11	37.09	9.07	0.032	0.013
	19≤ <25	111	34.01	7.37		
	≥ 25	266	31.12	10.52		
Marital Status	Single	225	33.01	9.42	0.361	0.034
	Married	163	30.88	10.18		
Habits	Cigarettes	109	33.3	9.44	0.494	0.023
	Shisha	125	32.27	9.74		
	Alcohol	25	35.68	8.88		
	None	129	30.28	10.03		
Type of mobile phone	Smartphone/ Android	274	31.32	10.04	0.326	0.013
	Smartphone/ I phone	114	30.04	8.9		
	Other					

Relation between socio-demographic variables and work productivity

The mean self-reported work productivity is found with statistically significant difference as follow (table 5):

- The mean self-reported work productivity for the private facility is less than the public facility,
- The mean negative self-reported work productivity of married respondents is less than singles,
- Among educational status categories, hospital workers with intermediate education expressed the highest negative self-reported work productivity.
- Among profession of respondents' categories, employee category expressed the highest negative self-reported work productivity.
- The mean self-reported work productivity for Android user is less than the I-phone users.

Table 5. Differences of socio-demographic variables.

Variables		Self-reported work productivity				
Socio-demographic		Frequency	M	SD	Levene test	p
	Private	318	4.32	2.65	0.026	0.012
	Public	70	5.11	2.27		
Marital Status	Single	225	4.94	2.52	0.2	<0.001
	Married	163	3.81	2.58		
Educational Status	Intermediate education	22	1.18	1.37	0.05	<0.001
	Secondary education	94	3.4	2.3		
	University	200	4.94	2.5		
	Master, Doctor	72	5.53	2.29		

Table 5 To Be Continued…						
Profession of respondents	Medical student	49	5.88	1.61	< 0.001	<0.001
	Paramedical student	26	4.58	1.72		
	Healthcare professional	184	4.39	2.75		
	Employee	129	4.01	2.67		
Type of mobile phone	Smartphone/ Android	274	4.24	2.66	0.013	0.005
	Smartphone/ I phone	114	5.01	2.38		

Relation between socio-demographic variables and times usage of SP per working day

No significant statistical difference was found between the variable number of times of usage of the SP per working day and the following socio-demographic variables (age, gender, marital status, habits, profession of respondents, duration of employment and type of mobile phone). However, a significant statistical difference was found for the type of facility and educational status (table 6).

Table 6. Differences of socio-demographic variables and number of times (usage of the SP/working day)

Variables		**Number of times (usage of the SP/ working day)**				
Socio-demographic		**Frequency**	**M**	**SD**	**Levene test**	**p**
Facility	A	197	31.87	31.36	< 0.001	< 0.001
	Private	318	30.36	28.01	0.048	0.001
	Public	70	43.06	28.73		
Educational Status	Intermediate education	22	18.14	9.82	< 0.001	< 0.001
	Secondary education	94	28.72	32.87		
	University	200	31.57	26.69		
	Master, Doctor	72	45.22	27.3		
	Employee	129	31.69	29.02		

Relation between socio-demographic variables and total time of SP's usage per working day

A significant statistical difference was found for the type of facility, marital status, profession and habits of the participants (table 7).

Table 7. Differences of socio-demographic variables and total time of SP's usage per working day.

Variables		**Total time of SP's usage (minutes)/ working day**				
Socio-demographic		**Frequency**	**M**	**SD**	**Levene test**	**p**
Facility	A	197	30.35	4.18	<0.001	< 0.001
	Private	318	29.87	4.13	0.012	0.771
	Public	70	29.67	3.3		
Marital Status	Single	225	29.43	3.88	0.264	0.018
	Married	163	30.39	4.08		
Habits	Cigarettes	109	30.58	4.36	0.109	< 0.001
	Shisha	125	29.46	3.46		
	Alcohol	25	31.96	3.96		
	None	129	29.16	3.95		
Profession of respondents	Medical student	49	28.45	3.24	0.03	0.02
	Paramedical employee/student	26	31.12	3.47		
	Healthcare professional	184	29.71	4.17		
	Employee	129	30.27	3.95		

Relation between smartphone's usage patterns variables between smartphone addicted and non-addicted respondents

As reported in table 8, we found a significant statistical difference between the addicted and non- addicted to Smartphone for total time of SP's usage per day, surfing the internet and social media use. In fact, addicted respondents use the SP more than 3 hours ($M=35.03 \pm 8.52$, $p<0.001$) and use the internet (32.94 ± 9.42, $p=0.004$), and social media (32.37 ± 9.67, $p=0.007$) more than the non- addicted. No statistical significant difference was found between the addicted and the non-addicted to SP for the variable phone settings during working hours.

Table 8. Differences in SP's usage patterns and addicted respondents.

Variable	Type	SP addiction	M	SD	Levene test	p
Total time of SP's usage /day	Acceptable (< 3 hours)	192	29.15	10.12	0.016	< 0.001
	Unacceptable (≥3 hours)	196	35.03	8.52		
Purpose of using the SP	Surfing the internet	307	32.94	9.42	0.021	0.004
	Social media	375	32.37	9.67	0.627	0.007
	Basic phone services	337	32.31	9.67	0.334	0.326
	Games	195	32.9	9.39	0.183	0.115
	Academic performance tasks	263	32.31	9.79	0.73	0.738
Phone settings during working hours	Off	21	30	8.83	0.235	0.308
	On	367	32.24	9.84		

Differences in SP's usage patterns variables and self-reported work productivity

No statistical difference was found between the purpose of using the SP, the phone settings during working hours and the self-reported work productivity. There is statistically significant difference between the mean of the participants who reported negative work productivity with the total time of SP's usage per day (≥ 3 hours) is less than the participants who used the SP in acceptable hours (< 3 hours).

Correlation and regression analysis between SP addiction and work productivity variables

The linearity has been verified by the scatter plot diagrams (Fig 1, 2, 3). We assumed that the SSAS predicts self-reported productivity, the number of times of the SP's usage per working day, and the total time of the SP's usage per working day respectively. We chose the SSAS as the independent variable (X) and the dependent variables as follow: (Y_1) the self-reported productivity, (Y_2) the number of times of SP's usage per working day, and (Y_3) the total time of SP's usage per working day. Thus, a linear relation is detected between SSAS and number of times of SP's usage per working day.

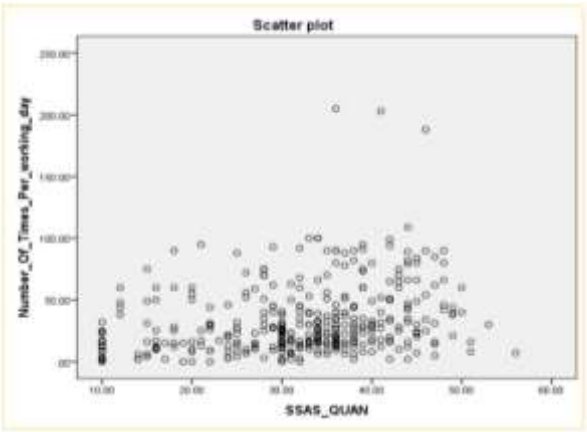

Figure 1. Scatter diagram of number of times of SP's usage per working day and SSAS

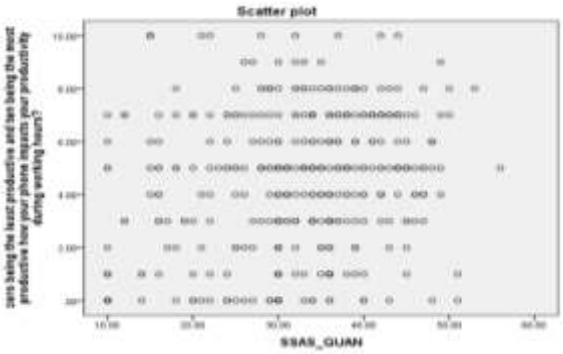

Figure 2. Scatter diagram of self-reported productivity and SSAS.

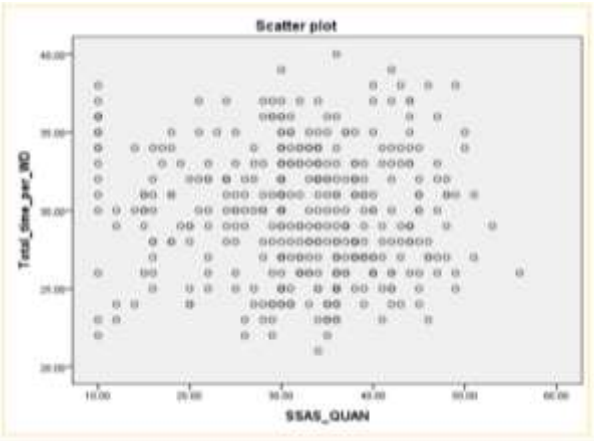

Figure 3. Scatter diagram of total time of SP's usage per working day and SSAS

In order to further explore this linear relationship, we conducted a Pearson correlation analysis. The relations between SSAS in one hand and self-reported productivity and total time of SP's usage per working day in the other hand are not linear. Consequently, Spearman analysis is conducted (Tables 9 and 10). According to the results shown in the tables above, a positive correlation is seen between self-reported productivity and SSAS ($p< 0.05$), coefficient of correlation is 0.209. Furthermore, a positive correlation is seen between the number of times of SP's usage per working day and SSAS ($p<0.05$), coefficient of correlation is 0.264. A linear regression analysis was conducted with the variables which showed a positive correlation (Tables 9 and 10). Table 9 shows that SSAS predicts by 7% of number of times of SP's usage per working day, which indicates that the SSAS has a certain predictive effect on the number of times usage per working day. Table 10 shows that SSAS predicts by 4.1% of self-reported work productivity, which indicates that the SSAS has a certain predictive effect on self-reported work productivity.

Table 10. Correlation analysis between number of times of SP's usage per working day and SSAS.

Variable	Number of SP's usage per working day	SSAS	p	N
Number of SP's usage per working day	1	0.264	< 0.01	388
SSAS	0.264	1		
Self-reported productivity	1	0.209	< 0.01	388
SSAS	0.209	1		
Total time of SP's usage per working day	1	-0.065	0.205	388
SSAS	-0.065	1		

Table 11. Regression analysis between number of times of SP's usage per working day and SSAS.

Dependent variable	Predictor variable	B	T	F	R	ΔR
Number of SP's usage per working day	**SSAS**	0.771	5.388	29.033	0.264	0.07
Self-reported productivity	**SSAS**	0.055	4.189	17.552	0.209	0.041

B: line slope between the predictor variable and the dependent variable; T: linearity coefficient
F: ratio of two variances; R: correlation coefficient

DISCUSSION

General overview of healthcare's SP usage

Despite Lebanon's mobile sector is one of the most expensive markets in the Arab world, the percentage of SPs usage increased. This may be due to a trend using mobile social networking and to the development of the fourth generation of broadband cellular technology. In addition, cellular and especially smartphones devices have become increasingly affordable products.

The purpose of using the SP is investigated in our study; the multiple responses results showed 96.6% of the respondents used social media, 86.9% used the SP for basic phone services, and 79.1% for internet

surfing. According to the PEW Research Center, 72% of all Americans use some type of social media and 86% the mobile connectivity to consult the internet [14].

The phone is set "ON" mode during working hours by 94.6% of the participants. More than two thirds of physicians regularly are using smartphone during working hours. SPs have allowed healthcare professionals and the general public to communicate more efficiently, collect data, and facilitate clinical decision making [23]. In his study, Mcbride (2017) found only 5.65% of nurses never used their mobile phone at work (excluding lunch and breaks); 74.49% of respondents used their mobile phone for work related activities and 26.62% of nurses reported using their SP for non-work related activities [24].

Relation between socio-demographic variables of SP addiction and work productivity

Our results showed that the mean of the SSAS among hospital professionals is 32.12, approximately in the middle of the score. Also, 71.4% of the respondents were detected addicted to SP. No differences were found between addiction and the profession, the educational status or the gender of the respondents. However, the rate of SPA was higher in females compared to males, in previous reports. For females, the cell phone is a means of social contact, in which messaging and social networks play prominent roles, while for males, a more diversified type of usage was observed involving text messages, voice conversations, and gaming applications [25-28].

The age group under 19 was significantly more addicted than the older groups. This result is consistent with the work of (Lemola et al. 2015) and other researchers who found that the most vulnerable age group, concerning excessive smartphone use, is adolescents aged from 14 to 18 years [29]. The results which are comparable to the paper of (Chen et al. 2017) show that the average overall score for addiction to smartphone in singles is 33.01 and 30.88 for the married; difference statistically significant [30].

The average overall SSAS for the respondents with habits (cigarettes, shisha, and alcohol) is statistically different from those with no habits. In fact, among the psychopathological aspects suggested by Li et al. (2018) [31] the substance dependence such as tobacco and alcohol influence Smartphone addiction. The average of overall SSAS in android users is 31.32 and 30.04 for I-phone users. This difference is statistically significant. Furthermore, in the present study, the mean scores of mobile-phone addiction for the rest of the socio-demographic variables were not statistically significant. This work does not investigate if SP addiction has become a factor affecting the quality of services delivered by healthcare professionals. We found no significant differences in SPA in relation to the type of facility.

This study aimed to illustrate the interrelations between socio-demographic and the productivity variables (self-reported productivity, number of times of the SP's usage per working day, and the total time of SP's usage per working day). The self-reported work productivity is expressed by the effect of how much the use of the SP affected productivity. The results showed that self-reported work productivity was more affected by the private compared to public facility, married compared to single, and android compared to I phone users. In addition, the most affected self-reported work productivity in respondents of intermediate education categories. No statistically significant difference was seen for the gender, age categories, and duration of employment categories.

Differences between addicted users and patterns of SP's usage

More than half of the addicted respondents were using their SP more than 3 hours daily. There was a significant statistical association between the total score of addiction and daily usage hours ($p<0.05$).

Our results are similar to other studies [32, 33]. Also, the results showed that addicted SP users consult significantly the categories surfing the internet and social media. Earlier studies have demonstrated that spending too much time on social networking sites through smartphones showed high addictive tendencies [34, 35].

Relation between self-reported work productivity and patterns of SP's usage

The participants expressed the least reported productivity when the total time of SP's usage was in the unacceptable category. Earlier research found a relation between the unacceptable daily uses of the SP with the self-perceived negative effects on productivity [36]. No statistical significance was found for the other variables: purpose of using the SP and phone settings.

Correlation analysis between SP addiction and work productivity

The results of the study demonstrated a correlation between SSAS and self-reported productivity-the coefficient of correlation is 0.209, as well as a correlation between SSAS and number of times of SP's usage per working day-the coefficient of correlation is 0.264. Both coefficient of correlation shows, positive but weak relation

Our findings are consistent with other researches [37, 38] that found a link between smartphone addiction and distraction among healthcare employees. In addition, Montag et al. [39] found a moderate positive relationship between hours at work lost due to the Smartphone and total SSAS. Furthermore, the total score for Smartphone addiction predicts the negative impact on work productivity [36]. Smith et al. showed that 7.3% of the patients admitted that the cellular phone had a negative impact on their performance [40]. However, the use of SP increases health providers' communication efficacy [41]. In addition, smartphone applications can be a valuable tool for nursing education, and computer-based references have straight forward search functions to allow students to find topics of interest [42].

Our results show from the regression analysis of SP addiction and self-reported productivity; SSAS has a significant positive predictive effect on work productivity, with an explanatory power of 4.1%. Also, from the regression analysis results of Smartphone addiction and number of times of SP's usage per working day, we found that SSAS has a significant positive effect on the frequency of SP's usage at work, with an explanatory power of 7%. This shows that smartphone addiction is an important cause for negative work productivity and frequent usage of the smartphone during working hours.

According to Lopez-Fernandez et al (2022) the severity of behavior pattern produced significant impairment in various areas of the participants' functioning, it is suggested that health professionals should target unhealthy preoccupations and monitor mixed feelings and thoughts related to smartphone use to support coping with cognitive distortions [43]. It is hoped; healthcare professionals will understand better the harms of smartphone addiction and thereafter cultivate protocols to reasonable use or to restrict mobile phone in the hospitals in order to obtain a safer and more efficient health environment.

Study limitations

Our sample was limited to some hospitals in Greater Beirut; therefore follow-up work with a longitudinal study should improve the survey at national level. The environment in each hospital and the present mood of each respondent may interfere with the results. More variables, adapted to the hospital environment must be included in the questionnaire. In future research, the development of scoring system for hospital work productivity should lead to more solid correlation between SPA and work productivity in hospitals.

CONCLUSION

There is a light positive correlation between smartphone addiction and negative self-reported productivity. The Short Smartphone Addiction Score has a certain predictive effect on self-reported work productivity and the number of times of the SP's usage per working day. From the analysis above, it is obvious that SPA is an increasing issue that may compromise security, privacy, quality, and efficiency of patient care. Recommendations of SP's usage in hospitals are designed and based on the strengths, weaknesses, opportunities, and threats (SWOT) analysis framework.

Declaration by Authors

Ethical Approval: Approved

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