Implications of smartphone addiction on university students in urban, suburban and rural areas

Oliver Daoud*

Center of Advanced Technology Development,
Deir el Qamar, Shouf, Lebanon
Email: oliver@atdevcenter.com
*Corresponding author

Jacques Bou Abdo

Computer Science Department,
Notre Dame University,
Mar Abda Street, Deir el Qamar,
Shouf, Lebanon
Email: jbouabdo@ndu.edu.lb

Jacques Demerjian

LaRRIS,
Faculty of Sciences, Lebanese University,
Fanar, Lebanon
Email: jacques.demerjian@ul.edu.lb

Abstract: Smartphones are excellent connection tools that can join family members, continents apart, over a chat or birthday, but can hinder the communication between people in the same room. The different reactions to smartphones can be due to personal, cultural, economic or a combination of multiple factors with variable impacts. Several studies analysed the effects of smartphones on mental health as well as well-being. The limitation of most of these studies falls in the selected sample where all the respondents are assumed to belong to a coherent society/region. In this work, we categorise each respondent, based on his/her location, into urban, suburban or rural. The purpose of this study is to show that the relation between smartphone addiction and all the other factors varies with respect to the region or location.

Biographical notes: Oliver Daoud is a developer at the Center of Advanced Technology and Development. He received his BS in Computer Science from the Notre Dame University.

Jacques Bou Abdo is an Assistant Professor of Computer Science at the Notre Dame University. His research interest includes cybersecurity, blockchain, recommender systems, and network economics.

Jacques Demerjian is a Full Professor of Computer Science at the Faculty of Sciences at the Lebanese University. He received his PhD in Computer Science from the Telecom ParisTech – France in 2004. His main research interests include body sensor network, mobile cloud computing, recommender system and security.

1   Introduction

Smartphones became worldwide in a short time. They replaced a huge quantity of gadgets including cellphones, personal computers, televisions and a multitude of other devices. Their large screen size and mobility allows people to access a variety of capacities at any time and any place, making them the best solution to people's needs. With these smartphones, it is easy for people to keep in touch with each other, by calling or sending messages, finishing jobs and sending emails, keeping track of their meetings and appointments. They are also widely used as entertainment devices by almost every individual in the society; users can watch videos, listen to music, or even play their favourite games anytime they feel so.

Smartphones are invading youth's lives at high speed, in addition to other age categories. Youngsters as well as adults are becoming inseparable from their smartphones (Lepp et al., 2015), and this excessive use and dependency on the smartphone leads to a type of technological addiction, which is operationally defined as a behavioural addiction that involves human-machine interaction. These addictions feature the core components of addiction: salience (when the particular activity becomes the most important activity in the person's life and dominates their thinking), mood modification (subjective experiences that are a consequence of engaging in the activity), tolerance (the need to increase the amount of activity in order to achieve the mood modification), withdrawal (unpleasant symptoms when stopping the activity), conflict (between the addict and those around them, related to that activity), and relapse (tendency for the patterns of the addiction to be restored after many years of abstinence or control) (Griffiths, 2000).

Our daily routines, habits, social behaviours, values, family relations, and social interactions are being altered by smartphone uses. The constant checking or usage of smartphones 24 hours a day is directly linked to sleeping disorders, anxiety, stress, downturn in well-being and health, decrease in academic performance, as well as the drop in physical activities (Thomée et al., 2011). Fortunately, when the diagnostic and statistical manual of mental disorders (DSM-5) introduced a non-substance addiction (internet gaming disorder), it labelled this behaviour as a psychiatric diagnosis (APA, 2013; Pontes and Griffiths, 2015). This addition to the DSM-5 gives hope to researchers who have been conducting studies on non-substance addiction, an area that is expanding to encircle not only Internet gaming disorder, but all types of digital addictions.

People in different societies and regions have different daily routines, workloads and social and fun activities. We predict that such different lifestyles result in different reactions to smartphone addiction, stress handling and life satisfaction. In this paper, we

survey students from suburban and rural regions to compare the effect of smartphone addiction on these students with respect to different societies and lifestyles.

The remaining of this paper is organised as follows: Section 2 describes the related work necessary to understand the context of this research. Section 3 describes our proposed hypotheses. The method we used in our survey is discussed in Section 4; while the results are shown in Section 5. Section 6 concludes the paper.

2 Related work

In this section, we list the existing works that study the direct and indirect effects of smartphone addiction on academic performance in Lebanon and other countries.

2.1 Relation between smartphone addiction, stress, and academic performance in urban Lebanon

Samaha and Hawi (2016) studied the relationship between smartphone addiction, stress, academic performance, and satisfaction in life by testing three hypotheses using a survey targeting 293 respondents from Lebanese urban areas. The hypotheses are:

Hypothesis 1   Perceived stress mediates the relationship between risk of smartphone addiction and life satisfaction.

Hypothesis 2   Academic performance mediates the relationship between risk of smartphone addiction and life satisfaction.

Hypothesis 3   There was a zero order correlation between smartphone addiction and life satisfaction.

The survey results confirmed Hypotheses 1 and 2 while rejected Hypothesis 3.

2.2 Relation between social media addiction, self-esteem, and life satisfaction in urban Lebanon

Hawi and Samaha (2016) studied the relationship between social media addiction, self-esteem, and satisfaction in life in Lebanese universities by testing four hypotheses using a survey targeting 396 respondents from Lebanese urban areas. The hypotheses are:

Hypothesis 1   There is a zero-order correlation between social media addiction and life satisfaction.

Hypothesis 2   Self-esteem mediates the relation between social media addiction and life satisfaction.

Hypothesis 3   There are no gender differences between social media addiction and self-esteem.

Hypothesis 4   There are no gender differences between social media addiction and life satisfaction.

The survey results confirmed all four hypotheses. Other surveys found significant gender differences in the degree of addiction on the whole (Aljomaa et al., 2016).

2.3   Relation between smartphone addiction and academic performance in urban Lebanon

Hawi and Samaha (2016) studied the relationship between smartphone addiction and academic performance by testing four hypotheses using a survey targeting 293 respondents from Lebanese urban areas. The hypotheses are:

Hypothesis 1   Male and female university students are equally susceptible to smartphone addiction.

Hypothesis 2   Male and female university students' perceptions of smartphone use and related activities are the same.

Hypothesis 3   Male and female university students are equal in achieving cumulative grade point averages (GPAs) with distinction or higher within the same levels of smartphone addiction.

Hypothesis 4   Undergraduate students who are at high risk of smartphone addiction are less likely to achieve cumulative GPAs with distinction or higher.

The survey results confirmed all four hypotheses.

2.4   Relation between smartphone addiction and life stress in urban Taiwan

Chiu (2014) studied the relationship between smartphone addiction and life stress in Taiwanese university students by testing four hypotheses using a survey targeting 387 respondents from Taiwanese urban areas. The hypotheses are:

Hypothesis 1   Various life stresses negatively predict social self-efficacy.

Hypothesis 2   Various life stresses negatively predict learning self-efficacy.

Hypothesis 3   Various life stresses positively predict smartphone addiction.

Hypothesis 4   Social self-efficacy negatively predicts smartphone addiction.

Hypothesis 5   Learning self-efficacy negatively predicts smartphone addiction.

The survey results confirmed Hypotheses 1, 2 and 3 while rejected Hypotheses 4 and 5.

2.5   Other studies related to smartphone addiction

In the absence of statistics specifying the penetration rate of smartphones in Lebanon, we will refer to statistics from USA where the latest data from the Pew Research Center shows that out of all smartphone users, 46% said that their smartphone is something 'they could not live without' (Smith, 2015). Moreover, studies have shown that the percentage of smartphone ownership among adults in the USA increased from 35% in 2011 to 64% in 2014 (Smith, 2015). In addition, 15% of American young adults between the age of 18 and 29 years of age are classified as heavy phone addicts for online surfing (Smith, 2015). According to the data collected from the EDUCAUSE Center for Analysis and Research, 86% of undergraduate students owned smartphones in 2014, which represents an increase from 76% in 2013 (Dahlstrom and Bichsel, 2016).

Lee and Cho (2015) surveyed smartphone addiction in Korean rural areas and found out that 17% of the surveyed males have risk of addiction, while 31.3% of the surveyed females have risk of addiction. Jo et al. (2017) surveyed smartphone addiction in Korean urban areas and found out that 19.2% of the surveyed males have risk of addiction, while 19.8% of the surveyed females have risk of addiction. We cannot depend on the above results to draw conclusions or define a correlation between urban and rural areas, but the large difference between the results of the above two studies triggers questions concerning the accuracy of other surveys and the suitability of their selected samples.

A number of studies have discovered negative effects of mobile uses on academic performance (Judd, 2014; Karpinski et al., 2013; Rosen et al., 2013; Junco and Cotten, 2012). Other studies linked smartphones to Lepp et al. (2015) and satisfaction in life (Lepp et al., 2014). Social efficiency, family pressure, and emotional stress were shown to be important factors for smartphone addiction (Chiu, 2014; Hawi and Samaha, 2017). Several other studies proved that perceived stress can be a predictor of life satisfaction (Hamarat et al., 2001; Matheny et al., 2008). There is a positive correlation between low levels of perceived stress and high levels of life satisfaction of the students (Coffman and Gilligan, 2002; Extremera et al., 2009), and perceived positive stress is positively related to life satisfaction in the students, regardless of academic success or failure (Abolghasemi and Varaniyab, 2010).

3 Hypotheses setting

To the best of our knowledge, none of the previous surveys compared smartphone addiction, stress, academic performance, and satisfaction in life over different cultures, societies or regions. The difference between urban and rural societies is evident, thus we highly suspect that the results concluded in previous surveys are specific to the studied societies if not considered trivial. Accordingly, our research hypotheses are as follows:

Hypothesis 1   Smartphone addiction negatively predicts stress for students in rural regions.

Hypothesis 2   Smartphone addiction positively predicts life satisfaction for students in suburban regions.

Hypothesis 3   Perceived stress mediates the relationship between risk of smartphone addiction and life satisfaction across all regions.

Hypothesis 4   Genders have the same responsiveness to perceived stress and satisfaction across all regions.

4 Method

The survey targeted the students of one of NDU's remote campuses (Notre Dame University – Shouf Campus at Deir el Qamar) which includes approximately 490 students. We collected the answers from 51 students (approximately 10% of the studied population) who range between 18 and 25 years old. Cases with invalid responses to trap question were removed from the dataset, which reduced the sample size to 50. The survey

is identical to that used in Samaha and Hawi (2016) and is composed of four separate sections as follows:

- Section 1: Covers the demographic information. It includes the location (city/village of residence), gender, age, education level, and academic major. The city/village record is used to categorise the respondent as suburban or rural, and to find the correlations with sex and GPA, as these metrics are critical to confirm or reject our hypotheses set in Section 3.

- Section 2: Covers the smartphone addiction scale-short version (SAS-SV), which looks at smartphone usage to identify the level of risk for smartphone addiction. It is composed of 10 questions with six-point Likert-type scale, ranging from 'strongly disagree', coded 1, to 'strongly agree', coded 6. The SAS-SV was developed and validated in Kwon et al. (2013), and it was shown that it has good reliability and validity for the assessment of smartphone addiction. The authors confirmed that it could be used efficiently for the evaluation of smartphone addiction in community and research areas.

- Section 3: Covers the perceived stress scale (PSS), which is designed to measure the degree to which situations in a person's life are marked as stressful. PSS was proven to be reliable, and when correlated with life-event scores, it was a much better predictor. It is composed of 10 questions with five-point Likert-type scale, ranging from 'never', coded 0, to 'very often', coded 4 (Cohen et al., 1983).

- Section 4: Covers the life satisfaction scale (SwLS). It is composed of five questions with seven-point Likert-type scale, ranging from 'strongly disagree', coded 1, to 'strongly agree', coded 7. SwLS was proposed in Diener et al. (1985) to assess global life satisfaction and it was shown to have favourable psychometric properties including high internal consistency and high temporal reliability.

5   Results

The demographic information of the 50 respondents we surveyed is shown in Table 1. The demographic information of students from the urban region in Lebanon (Samaha and Hawi, 2016) is added to the table.

Table 1   Demographic information (Section 1 of the survey)

	Urban (Samaha and Hawi, 2016)	*Suburban*	*Rural*
Number of male respondents	135	11	12
Number of female respondents	114	13	14
Total respondents	249	24	26
Percentage of male respondents	54.2%	45.8%	46.2%
Percentage of female respondents	45.8%	54.2%	53.8%
Percentage of respondents by region	N/A	48%	52%
Average age of male respondents	N/A	21.1	21.2
Average age of female respondents	N/A	20.5	21.1
Average age of respondents	20.96	20.75	21.4
Standard deviation	1.93	1.73	1.47

The statistics of Sections 2 and 3 of the survey are shown in Figure 1.

It can be seen in Figure 1 that the rural region is experiencing the highest levels of smartphone addiction and perceived stress; almost 70% of the respondents in rural areas are at high risk of addiction and stress while the suburban region is experiencing higher levels of perceived stress than the urban region but slightly lower levels for smartphone addiction. This shows that as much as you are far from rural regions, you lower your risks of being addicted to smartphones and of having stress.

Figure 1 Smartphone addiction and perceived stress results (Sections 2 and 3 of the survey) (see online version for colours)
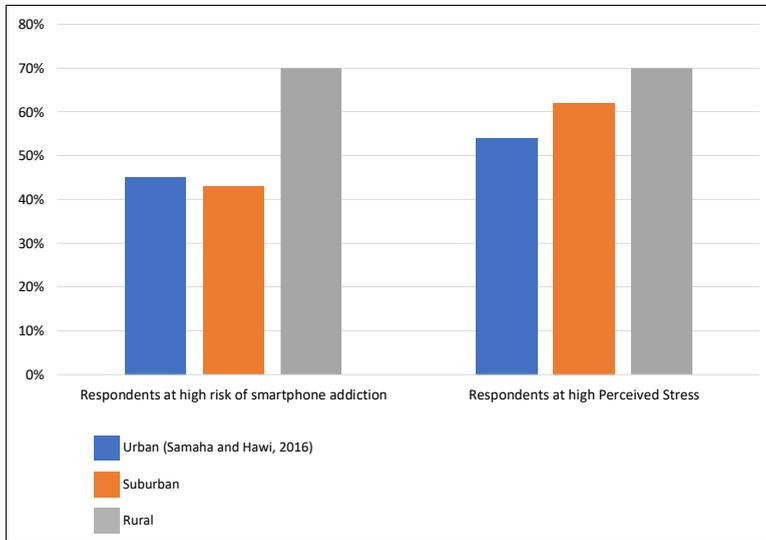
5.1 Smartphone addiction vs. life satisfaction

Table 2 shows the Pearson correlations between sex, GPA, smartphone addiction, perceived stress and life satisfaction for urban, suburban and rural regions.

Table 2 Pearson correlations between research variables

Region	Urban	Suburban	Rural	Taiwan (Chiu, 2014)
Sex vs. GPA	0.279	–0.351	0.298	N/A
SAS-SV vs. GPA	–0.143	0.0023	0.04	–0.02
PSS vs. GPA	–0.049	–0.157	0.379	–0.12
SwLS vs. GPA	0.182	–0.264	0.313	N/A
SAS-SV vs. sex	0.164	0.216	–0.051	N/A
PSS vs. sex	0.008	–0.328	–0.026	N/A
SwLS vs. sex	0.147	0.143	0.166	N/A
PSS vs. SAS-SV	0.193	0.118	–0.122	0.34
SwLs vs. SAS-SV	0.077	0.282	–0.065	N/A
SwLs vs. SAS-SV	0.077	0.282	–0.065	N/A

The correlation between risk of smartphone addiction and life satisfaction was investigated using a Pearson product-moment correlation coefficient. To ensure no violation of the assumptions of normality, linearity and homoscedasticity, preliminary analyses were performed.

Both urban and rural regions have very small correlation between life satisfaction and smartphone addiction in contrast to the suburban region which has a considerable positive correlation (r = 0.282). Smartphone addiction is positively correlated to life satisfaction for both urban and suburban regions. This confirms our second hypothesis.

5.2   *Smartphone addiction vs. GPA*

As can be seen in Table 2, GPA is inversely proportional to smartphone addiction in the urban region (r = –0.143), thus the student's GPA decreases as he spends more time utilising the smartphone. On the contrary, a student in suburban or rural regions has no correlation between GPA and smartphone addiction, thus his GPA does not depend on the time he consumes using the smartphone. Such behaviour can be due to the absence of other time consuming activities in rural regions, especially during the winter season.

The difference in the effect of smartphone addiction on students in urban and suburban regions is that smartphone addiction is negatively correlated with GPA for urban students while no correlation can be drawn for suburban students.

5.3   *Smartphone addiction vs. stress vs. sex*

The analysis shown in part B can be confirmed through other correlations such as that between perceived stress and smartphone addiction which is negative (r = –0.122) (i.e., the student from a rural region has less stress as he utilises the smartphone more). This confirms our first hypothesis.

The correlation between smartphone addiction and perceived stress is positive for urban (r = 0.193) and suburban (r = 0.118) regions but negative for rural regions (r = –0.122). This discussion holds for the correlation between perceived stress and sex, but this time the suburban region has a considerably negative correlation (r = –0.328).

5.4   *Stress vs. life satisfaction*

As for the correlation between life satisfaction and perceived stress, it is negative for urban (r = –0.492) and rural regions (r = –0.219) but positive for suburban (r = 0.315). We can conclude that perceived stress mediates the relationship between risk of smartphone addiction and life satisfaction in urban regions only, but this hypothesis is rejected for other regions. So our third hypothesis is rejected.

5.5   *Other considerations*

The only correlation that is relatively constant across all three regions is between sex and life satisfaction. The correlation between sex and perceived stress is not existing in urban and rural regions, but negative (r = –0.328) in suburban regions. As for the correlation between smartphone addiction and sex, it is positive in urban (r = 0.164) and suburban (r = 0.216) regions, but not existing in rural regions. This rejects our fourth hypothesis.

6   Conclusions

Although the survey has only covered the students of one of NDU's remote campuses (Notre Dame University – Shouf Campus at Deir el Qamar), the results were promising and pinpointing the difference in reaction to smartphone addiction between regions and cultures. We also found out that the smartphone is considered as a fun and stress relieving activity when no other alternatives are available.

Future work shall include a larger size of the sample in order to have a higher significance of the results. In addition to that, we will diversify the sample of respondents to include students from other universities, which will give more reliable conclusions since it will be covering a wider portion of the society, in addition to including other research variables that will help us predict the factors leading to the difference between regions and genders.

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