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The Influence of Smart Phones on Human Health and Behavior: Jordanians' Perceptions

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Abstract - The advent of new touch technologies and the wide spread of smart mobile phones made humans embrace technology more and depend on it extensively in their lives. With new communication technologies and smart phones the world really became a small village. Although these technologies provided many positive features, we cannot neglect the negative influences inherited in these technologies. One of the major negative sides of smart phones is their side effects on human health. This paper will address this issue by exploring the exiting literature related to the negative side of smart phones on human health and behavior by investigating the literature related to three major dimensions: health, addiction and behavior. The third section will describe the research method used. The fourth section will discuss the analysis side followed by a section on the conclusions and future work.

Index Terms - Mobile phones, smart phone, touch screen, health effects, ergonomics, addiction, behavior.

1. INTRODUCTION

Technology has become a fundamental aspect in our lives and we cannot neglect its contribution in the welfare of human beings. Despite the pros offered by new technologies, they have several downsides, especially on human health. New technology extended from being stationary, local and wired to be wireless, mobile and global. Such issue made humans aim for more luxurious machines, smaller but convenient devices, and mobile and connected handhelds. We can sum such development in the process of extending the old personal computer (PC) to the new smart phone.

Smart phones are characterized by several features including the ease of use, speed, Internet connection, as well as download capabilities. Smart phones venders are providing extensive support for users by making available for them a wide variety of applications on their websites (Apps Stores). There are two types of smart phone: phone supporting a touch screen and a keypad phones with an attached screen. It is essential to consider the influence of peers (social influence) when adopting mobile phones use [1, 2].

The global smart phone users exceeded one billion users in the year 2012. The global electronic market expects that 4.55 billion people will be using mobile phone by the end of 2014.

Finally, mobile phone penetration will increase from 61.1% to 69.4% between 2013 and 2017 [3]. Latest studies indicated a wide spread of mobile application even to mobile government direction [4, 5].

Unfortunately, these advantages of technological developments overshadowed its downsides in the minds of young people, where many of them didn't realize the negative side of using smart phones on behavior and health. This paper will address many threats to human's health caused by smart phones. Also, methods for raising awareness of such issues are explored. Finally, an exploratory study will try to investigate the perceptions of Jordanian youth regarding the use of smart phones and its harmful effects.

2. LITERATURE REVIEW

Technology sector is growing progressively since many years and has several inventions that invaded human lives like mobile phone, smart phone, and touch screen devices. These devices have pros and cons with respect to their cost, use, environmental influences and health and social issues. This paper will discuss many aspects related to smart phones devices and the impact of smart phones on human health.

2.1. Smart phones growth and use

Technological developments are drawn on a path of continuous inventions. Such progressive development describes the evolution from phones, to mobile phones and finally smart phones [6]. A smart phone is a cellular telephone with a capability to operate advanced applications and browse the Internet [7]. It can be considered as a computer but integrated with mobile telephone and allows users to install and run applications (apps).

Smart phones are in the market since 1993 when Apple introduced the smart phone in a mass consumer market. The difference between today's smart phone and early smart phones is that the latter was mostly used by corporate employees and was used as an enterprise device. Earlier smart phones were expensive for the general users to acquire [11, 12].

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We can distinguish three main phases in the smart phone era: First, the enterprise phase, during which all smart phones were targeted toward corporations. The applications and feature are also part of the corporate requirements and suites like browsing corporate systems and using the camera. Blackberry can be considered one of the phones in this era.

The second phase is the advent of iPhone; in 2007 Apple smart phone was the major breakthrough. At the end of 2007, Google unveiled its Android operating system and introduced various features that satisfy customer's requirements like: email, chatting, Internet access, audio/video, and social website services. Finally, the existing smart phone era that started in 2008, where the gap between enterprise centric and general consumer centric smart phone was closed. The new smart phone witnessed substantial improvements in the display quality and display technology [6].

Using smart phones implies many issues and can be explored from different perspectives. The following are proposed by [8-15]:

- Mobile context: this issue means that when using mobile applications the user is not tied to one location, and maybe they are interacting with nearby people.
- Connectivity: we mean by that being slow and unreliable on mobile devices (or fast and reliable).
- Small screen size: mobile devices have limited screen size so the amount of information browsed will be limited.
- Different display resolutions: the resolution of mobile devices is reduced when compared to laptops or PCs.
- Mobile phones have limited processing capability, where they don't support long battery life. These constraints are vital to operate recent applications.
- Data entry methods: the methods available for input are different from methods for desktop computers.

2.2. Health issues of smart phones

Smart phone technology has positive and negative influence on human life, based on their nature and use. The use of smart phones in business, education, and social life inflected many health, psychological, and social effects. This part of the literature review will focus on health aspects related to smart phone.

Smart phones share some general or common health effects caused by using of them continuously and for a long period of time, the following are the major ones: *headache* followed by irritability from continuous use of mobile devices, *lack of concentration* especially between students because of the frequent messages and calls. Such lack of focus would distract students from completing their assignments and will negatively influence their academic performance.

The excessive use of mobile phones will cause some *anxiety* to users because of the flow of news or calls that they receive, which will eventually cause an *eye* strain (regardless of the size of screen, it will cause the same effect). Also, using mobile phones will cause tiredness from continuous calling, texting, and listening to others [9, 16].

The use of mobile and smart phones will result in *loss of appetite* and make users feel tired from being occupied with mobile phones. Also, *loss of hearing* from continuous calling, *problems in fingers* caused from the keypad use, and finally there are other health effects caused by continuous use of mobile phone like *neck pain*, *limb pains, lack of sleep*, *being disposed, and addiction* [16].

Addiction is a dangerous psychological influence that can be caused by using smart phones for a long period of time and for continuous periods of time. Such influence is similar to using drugs for a long period of time [15, 17]. Many behaviors indicate that a user of smart phone is addicted to using his phone can be summarized in the following: Making calls longer than any normal user, like to use cell phone rather than face to face, using cell phones for calling and chatting with his/her family members, annoyed from persons around him when he is using his/her cell phone, feeling depressed and nervous when he is separate/detached from his mobile phone [18].

3. RESEARCH METHODOLOGY

This study tried to explore Jordanians awareness regarding smart phones health issues and how they perceive using such device when weighed against its downsides. The major research question that this study tried to answer is the following: *Are university students aware of the touch devices impact on their health and behavior?*

The study utilized a survey that focused on three major dimensions: health, behavior and performance, and addiction. The survey was written in Arabic language to fit with the cultural issues and avoid language biases caused [19]. The survey also included a section related to major issues and measuring respondent awareness regarding the wide spread and use of smart phones. The authors developed a survey that consisted of four sections: first a short introduction to research followed by three demographic questions. The third section consisted of 10 items related to the level of awareness of the use and adoption behavior of students. Finally, the last section consisted of 24 items measuring health (8 items), behavior (6 items) and addiction (10 items). The survey utilized a 5 point Likert scale, where 1 represented totally disagree; and 5 represented totally agree. Such scale means that the means ranging between 1 and 2.333 presents a low perception, 2.333-3.666 presents a moderate perception and 3.666-5 presents a high perception.

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This study utilized 200 surveys distributed among students in a public university to measure their perceptions regarding the issues reported in previous studies and related to the influence of using mobile phones. The sample is acceptable for an exploratory descriptive study, where the issues where not empirically explored previously in Jordan based on the knowledge of the authors. Previous empirical research in Jordan focused more on buying and usage behaviors of Jordanian citizens [20]. The sample demographics are shown in Table 1.

4. DATA ANALYSIS AND DISCUSSION

This exploratory study explored Jordanians perceptions regarding issues and downsides of using mobile phones. The items used for the awareness dimension are shown in Table 2 with their means and standard deviations. The dimension reported a Cronbach's alpha equal to 0.738 (items Q1-Q10), which is acceptable in social sciences. Similarly the items related to the health dimension are shown Table 3, where the value of Cronbach's alpha equal to 0.796 (items Q11-Q18).

The Cronbach's alpha of the third dimension (behavior) did not meet the minimum acceptable threshold in social sciences, where the value of the six items was 0.566 (items Q19-Q24). The means and standard deviations are shown in Table 4. Finally, the items related to addiction yielded an acceptable value equal to 0.801. Table 5 shows the last 10 items (Q25-Q34).

Gender	Count	%		Age	Count	%		Education	Count	%
Male	74	37.0%		Less than 20	23	11.5%		Other	10	4.0%
Female	126	63.0%		20-40	177	88.5%		Bachelor	190	96.0%
Total	200	100%		Total	200	100%		Total	100	100%

Table 1: Sample demographics

#	Item Description	N	Mean	Std. Dev.
Q1	Development in technology contribute to more buying behavior	200	4.27	1.04
Q2	The higher education in a country will increase buying levels	200	3.59	1.13
Q3	Availability of application will improve the spread of phones	198	4.13	0.95
Q4	If others buy smart phones , I will buy	198	3.49	1.18
Q5	I use my mobile more when I face family problems	196	3.36	1.39
Q6	Mobile is a way of expressing our selves to others	199	3.39	1.25
Q7	I use mobiles more when facing a sad or negative situation	198	3.35	1.31
Q8	Using mobiles more will negatively influence my academic performance	197	4.00	1.09
Q9	Entertainment websites increased my use of mobile and the Internet	200	4.13	0.87
Q10	Unemployment rates contributed to increase of mobile use	198	3.88	1.07

All minimum and maximum values are 1 & 5 respectively.
Table 2: Item descriptions and means related to the awareness of use behavior

#	Item Description	N	Mean	Std. Dev.
Q11	I suffer from a headache when using my mobile phone	199	3.51	1.27
Q12	I feel exhausted when using my mobile phone	198	3.65	1.14
Q13	I suffer from vision problems when using mobile for a long time	199	3.50	1.17
Q14	I suffer from an ear pain when using mobile phones	197	3.37	1.20
Q15	My hands suffer from strains when using mobile phones	196	3.73	1.11
Q16	I suffer from sleeping disorder when using mobile for a long time	196	3.26	1.18
Q17	I felt a change of weight from using mobile phones	199	2.53	1.23
Q18	I feel depressed when using mobile phones	199	2.52	1.28

All minimum and maximum values are 1 & 5 respectively.
Table 3: Item descriptions and means of the "*Health*" dimension

#	Item Description	N	Mean	Std. Dev.
Q19	I use my mobile all places and during all times	200	3.70	1.26
Q20	I avoid putting my mobile in a silent or vibration mode	199	2.55	1.30

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Q21	Using my mobile reflected in increasing my friends	198	3.48	1.22
Q22	I feel annoyed when others talk to me when I am using my mobile	200	3.17	1.26
Q23	I don't mind responding to calls/messages from unknown numbers to me	197	2.92	1.38
Q24	I keep my calls and messages in a safe and secured place	200	3.05	1.31

Table 4: Item descriptions and means of the "*Behavior*" dimension

#	Item Description	N	Mean	Std. Dev.
Q25	I cannot finish daily activities without my mobile	200	3.40	1.33
Q26	I consider mobiles a necessary item (commodity)	196	3.62	1.23
Q27	I use my mobile while I drive my car	191	2.45	1.24
Q28	Communication apps contribute to more mobile acquisition	197	3.75	1.05
Q29	I don't mind responding to people around me when using my mobile	198	3.19	1.26
Q30	When I wake in the morning, I search for my mobile first	198	3.83	1.29
Q31	I feel happy when using my mobile	196	3.40	1.18
Q32	I don't feel lonely when I have my mobile with me	198	3.51	1.26
Q33	I hear sometime my phone ringtone, when it is not ringing	199	3.21	1.39
Q34	I don't wait to finish my lunch when I hear my phone ring	199	3.18	1.42

All minimum and maximum values are 1 & 5 respectively.

Table 5: Item descriptions and means of the "*Addiction*" dimension

5. CONCLUSIONS AND FUTURE WORK

Technology inventions are increasing every day, and these inventions are not static. Our life has changed dramatically because of technology and the latest advent is smart phones. Smart phones have converged from computing and communication into a mobile, connected and smart device. Unfortunately, this innovation has its negative side.

People now can easily search for information they need, stay connected with others and the web, and interact and collaborate with their social networks within multiple societies regardless of their place, time and interests. On the other hand, smart phones use has yielded many negative influences on human lives. This paper explored previous work and concluded to 24 items and 3 major dimensions that can negatively influence our life and they are: health issues, behavior, and addiction.

This study utilized 200 surveys distributed among young students in a public university in Jordan to probe their perceptions regarding such issues. Results indicated that students are aware of the reasons behind their use of smart phones, where they emphasized the development in technology as a major driver of such use (Q1, mean=4.27), the availability of apps (Q3, mean=4.13) and the spread of entertainment websites (Q9, mean=4.13). According to our scale, all items of awareness were perceived moderately and highly. Surprisingly, students emphasized that using mobile will negatively influence their academic performance (Q8, mean=4.00). Finally, the lowest awareness items were related to using mobile phones as an escape in sad and family situations (Q7, mean=3.35; Q5, mean=3.36).

Students' perceptions of the negative side of technology were reflected in the items shown in Table 3, where all items are perceived moderately except Q15 as it was perceived highly. The results indicated a high perception of hand strains (Q15, mean=3.73), and the lowest health issue reported was the change in weight (Q17, mean=2.53).

When asked about their behavior when using mobile phones, students reported high emphasis in one dimension related to using their phones everywhere and all time (Q19, mean=3.7). The 5 other issues were perceived moderately with Q20 as the lowest (I avoid putting my mobile in a silent or vibration mode, mean=2.55). Finally, the ten items related to addiction reported similarly moderate results except Q30 and Q28 respectively (When I wake in the morning, I search for my mobile first, mean=3.83; Communication apps contribute to more mobile acquisition, mean=3.75). The lowest addiction item was Q27 (I use my mobile while I drive my car, mean=2.45). The dispersion of such item might be caused by the fact that most Jordanian university students don't drive.

This study calls for future work to emphasize the issues explored, probe opinions of a larger sample, and expand the sample to all categories of Jordanian society. It is obvious how social media influenced our lives, but with the availability and capability of smart phones, such effect is much more efficacious.

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