Examining the Factors Affecting Behavioural Intention to Adopt Mobile Health in Jordan

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Abstract. Health organizations worldwide express a considerable attention to utilize Mobile technology applications to provide a better health services to their people. One of the most emerging apps in this regard is Mobile health (M-health). Large amount of efforts, money, and time have been invested to provide such innovative technology. Yet, the adoption rate of these systems is still low. Additionally, such system has never been examined over the Jordanian context. Thus, this study aims to test the most important factors that could shape the intention of Jordanian people to use Mhealth. Four factors: perceived usefulness, social influence, awareness, and innovativeness were proposed as key predictor of behavioural intention. Data was collected using convenience sample size of 365 and was analyzed using structural equation modelling. The main statistical findings supported the role of perceived usefulness, social influence, and innovativeness. More discussion will also be provided regarding the current study practical and theoretical implications.

Keywords: M-heath · Jordan · Adoption

1 Introduction

Mobile technology has been growing dramatically over the recent years either in terms of number of users or the range of applications and technical products and services provided (i.e. Mobile learning, Mobile commerce, Mobile banking, and Mobile healthcare) (Shareef et al. 2018). For instance, the number of mobile subscribers worldwide reached 4.77 billion in 2017 as stated by Statista (2018a). This represents a lot of opportunities for organizations from different sectors (i.e. government, education, banking, healthcare) to utilize such vehicles to deliver their services in an advanced and innovative way to their customers (Shareef et al. 2016, 2018). In this regard, about 3.8 million apps that are presented in Android and about 2 million for Apple's App store (Statista 2018b).

Such applications have also been the focus of attention of health organizations to serve their patients and provide their services and information in an effective and

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modern channel saving the time and efforts of both health organizations and recipients of health services (Shareef et al. 2012). Indeed, one of the man reasons that enhance the current prosperity of mobile usage and acceptance is the huge interest to invest in mobile technology by health and medical organizations (Statista 2018c). In this instance, according to the same report of Statista (2018c), the market size of Mhealth was about 21 billion dollars and this number is projected to increase to 60 billion dollars by (2020).

This prevalence of M-health could be returned firstly to the ability of such system to enhance the quality of medical services provided; having more interactive communicative channel with recipients of health services; cutting cost; hindering the impact of time and place restrictions (Shareef et al. 2016; Schnall et al. 2016). Additionally, people increasingly have more health conscious and therefore, are more interested in adopting M-health applications (Atallah et al. 2018; Brown III et al. 2013). Conceptually, M-health could be defined as a novel and new system empowered by using smart phones, personal digital assistants (PDAs), and any other mobile technology to attain a wide range of healthcare and preventive health services (Singh et al. 2017).

In Jordan, there is a recent interest in utilizing mobile facilities to provide and secure adequate level of healthcare services especially for residents of remote areas. For instance, a new project with cost of $1 million introduced by the Health Ministry of Jordan to serve about 10,000 people in the southern region is a "quantum leap (Jordan Times 2015). However, permanent challenge for any new system like M-health is to convince people about the benefits of such system and accordingly motivate them to adopt it (Alalwan et al. 2016; Lee and Han 2015). Therefore, there is a need to discover and examine the main aspects that could shape the Jordanian people intention toward M-health care applications. Nevertheless, as a new and very novel technology in Jordan, the related issues of mobile health have not yet received attention from researchers in Jordan. Accordingly, this study aims to identify and examines the main factors that could predict the Jordanian intention to adopt Mhealthcare.

2 Theoretical Foundation

As discussed above, the adoption of M-health is the corner stone of the success of implementing such systems. Thus, a good number of studies that have recently attempts to explore and examine the main factors predicting the customers' intention and adoption (i.e. Dwivedi et al. 2016; Hoque and Sorwar 2017; Lee and Han 2015). Such of that Lee and Han (2015) identified four factors: usefulness, monetary value, convenience value, illness experience as key determinants of Intention to adopt Mhealth. Their statistical results largely supported the impact of usefulness, convenience value, and monetary value while illness experience did not have any impact in this regard. Extending the Unified Theory of Acceptance and Use of Technology (UTAUT2) was also formulated Dwivedi et al. (2016) to predict the adoption of M-health. According to Dwivedi et al. (2016), excluding hedonic motivation, the rest factors of UTAUT2 (performance expectancy, effort expectancy, facilitating conditions, social influence, price value) have a direct influence on intention to adopt M-health. Likewise, Hoque and Sorwar (2017) propose their model base on UTAUT and

technology anxiety and resistance to change. Their empirical findings supported the effect of effort expectancy, performance expectancy, social influence, technology anxiety, and resistance to change on the customers' intention to adopt M-health. Perceived value, perceived behavioural control, perceived physical condition, subjective norm, technology anxiety, and self-actualization need were tested by Deng et al. (2014). Deng et al. (2014) also considered the moderation impact of age on the relationship between these predictors and intention to adopt M-health.

Their practical results found out that the impact of these factors significantly different form older to middle-aged. Differently, Zhang et al. (2017) provided statistical evidences regarding the main obstacles (health habit, sunk cost, transition cost, and privacy concerns) that hinder the customer's willingness to adopt M-health. Even though, there is an international interest in testing the adoption of M-heath, in Jordan, there is not any study that has tested such issues. This, in turn, motivates this study to consider the Jordanian health sector as well as to identify the main factors that could shape the Jordanian individual intention to adopt M-health applications.

3 Conceptual Model and Research Hypotheses

As noticed in the previous studies, there are a number of factors such as performance expectancy, usefulness, and social influence. The importance of these factors have been repeated in different studies (Alalwan et al. 2017; Dwivedi et al. 2016, 2017a, b; Hoque and Sorwar 2017; Lee and Han 2015). Therefore, these factors namely: perceived usefulness and social influence were considered in the current study model. However, over the mobile technology literature, innovativeness and awareness have been largely validated as key predictors of customers intention to adopt Mobile technology (i.e. Kapoor et al. 2015; Lu et al. 2005; Slade et al. 2015; Lee and Son 2017; Velmurugan and Velmurugan 2014). Therefore, both innovativeness and awareness were considered in the current study model. It was also supposed that perceived usefulness could be predicted by both innovativeness and awareness. The proposed conceptual model and research hypothesises are presented below (Fig. 1):

H1: Perceived usefulness will positively influence people intention to adopt Mhealth in Jordan.
H2: Social influence will positively influence Jordanian people intention to adopt M-health.
H3: Innovativeness will positively influence Jordanian people intention to adopt Mhealth.
H4: Innovativeness will positively influence perceived usefulness of M-health.
H5: Awareness will positively influence Jordanian people intention to adopt Mhealth.
H6: Awareness will positively influence perceived usefulness of M-health.

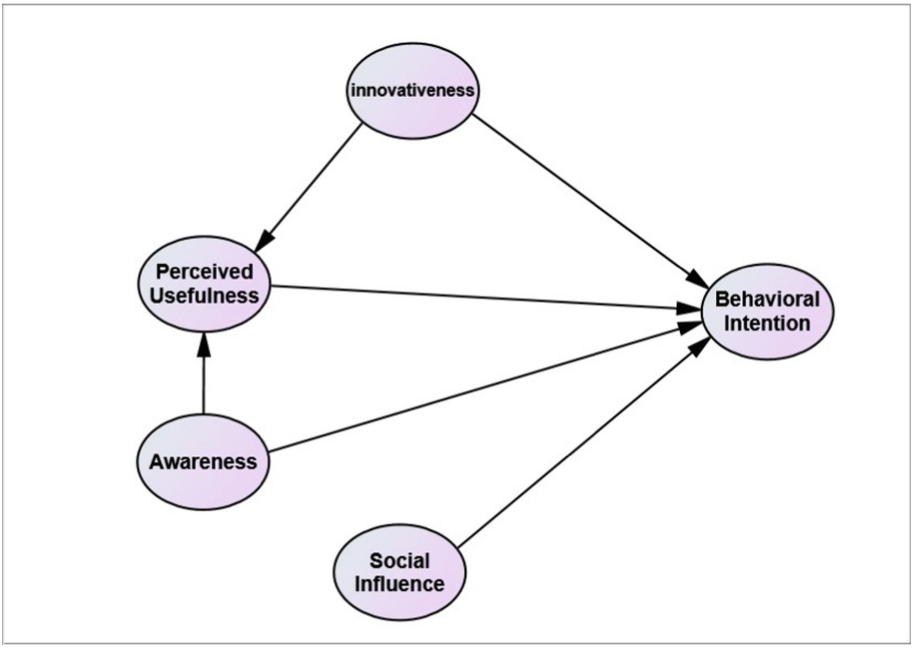

Fig. 1. Conceptual model Adapted from Dwivedi et al. (2016), Lee and Son (2017), Velmurugan and Velmurugan (2014)

4 Research Methodology

A questionnaire survey was conducted to collect the required data from a convenience sample size of 600 Jordanian people. Those respondents were approached in several places at hospitals and medical centers in Jordan. Researchers firstly provided those respondents with a brief about the concept of M-health and their features and benefits. Then, the questionnaire was left with respondents to be completed. The main scale items of usefulness and behavioral intention was tested from scale proposed by Davis et al. (1989). Social influence was tested using measure items from Venkatesh et al. (2012). A scale used by Aldás-Manzano et al. (2009) was considered to test Innovativeness while Rogers (2003) scale was adopted to examine awareness. Seven point Likert scale was employed to test these items. The questionnaire was converted to Arabic using back translation method suggested by Brislin (1976). A pilot study was also applied to for more sureness regarding factors reliability and validity. The results in this regard largely support all factors validity as well as Cronbach's alpha not less than 0.70 was recorded for all factors (Nunnally 1978).

5 Results

5.1 Response Rate

Out of 600 questionnaires allocated, 365 that are returned and found to be valid for further analyses. The vast majority of respondents (41.6%) were noticed to be within age group of 25 to 35. About 52.6% of the current study participants were female where about 47.4% are male. Regarding the educational level, more than 70% of respondents hold a bachelor degree or above and have income level between 400 JOD and 800 JOD. Descriptive statistics also indicted that more than 93.2% have been using smart phones for more than 3 years.

5.2 Structural Equation Modeling Analyses (SEM)

Two stage method of SEM was applied using AMOS 21.0. Five factors (BI, USF, AW, SI, and INN) with their items are targeted in the first stage of SEM: measurement model. The revised version of the measurement model was noticed to be adequately fit the observed data as all fit indices were noticed within their acceptable level as follow: CMIN/DF was 2.874, GFI = 0.921, AGFI = 0.886, NFI = 0.932, CFI = 0.958 and RMSEA = 0.055 (Hair et al. 2010; Byrne 2010). Both average variance extracted (AVE) and composite reliability (CR) were also examined and their results as presented in Table 1 existing withier their cut-off value (higher than 0.70 for CR and 0.60 for AVE). As seen in Table 1, the squared root of AVE for each construct was larger than the corresponding inter-constructs-correlation estimates, which in turn, supports the discriminant validity of the current study constructs.

Table 1. Constructs reliability and validity

	CR	AVE	SI	USF	INN	AW	BI
SI	0.885	0.722	0.850				
USF	0.874	0.637	0.299	0.798			
INN	0.910	0.773	0.350	0.249	0.879		
AW	0.901	0.696	0.498	0.280	0.685	0.834	
BI	0.891	0.673	0.357	0.353	0.492	0.402	0.821

At the second stage of SEM, structural model was tested with six causal paths that are presented in the current study model. The fit indices of structural model were approved to have acceptable values as such CMIN/DF was 2.954, GFI = 0.913, AGFI = 0.854, NFI = 0.921, CFI = 0.95 and RMSEA = 0.058 (Hair et al. 2010; Byrne 2010). About 45% of variance was accounted in the behavioural intention to use Mobile health care applications and about 32% of variance in perceived usefulness (Table 2).

According the path coefficient analyses, innovativeness ($\gamma = 0.39$, $p < 0.000$) was the most powerful factor affecting Jordanian customer's intention to adopt Mobile healthcare applications followed by perceived usefulness ($\gamma = 0.22$, $p < 0.000$); and

Table 2. Results of standardized estimates of structural model

	Hypothesized path	Estimate	S.E.		C.R.	P
H1	BI <—	USF	0.22	.072	3.843	***
H2	BI <—	SI	0.13	.042	3.129	.002
H3	BI <—	INN	0.39	.050	5.966	***
H4	USF <—	INN	0.15	.042	2.187	.029
H5	USF <—	AW	0.16	.042	2.325	.020
H6	BI <—	AW	0.03	.050	.042	.966

then social influence ($\gamma = 0.13$, $p < 0.002$). Yet, awareness does not reflect any variance in the behavioural intention ($\gamma = 0.03$, $p < 0.966$). Further, USF was found to be significantly predicted by the role of both innovativeness ($\gamma = 0.15$ $p < 0.029$); and awareness ($\gamma = 0.16 < 0.20$).

6 Discussion

As proposed in the current study introduction, this study attempts to provide further understanding regarding the main factors that could shape the Jordanian people perception and intention toward M-health. Thus, an empirical study was necessarily to be conducted. The main statistical results yielded largely supported the predictive validity of the current study model due to the fact that about 45% and 32% of variance was accounted in behavioural intention and perceived usefulness. This, in turn, supports the theoretical foundation proposed in the current study.

Statistical results also supported the impacting role of innovativeness in contributing both perceived usefulness and behavioural intention. This means that those respondents who have a high degree of innovativeness are more likely to positively value the benefits and utilities of M-health as well as they are more likely to be motivated to adopt such system soon. This could be attributed to the fact that Mhealth as any other mobile technologies is more novel and pioneer system, and accordingly, it is a manifestation of modern life. Different Mobile technology studies that have addressed the role of innovativeness such as Lu et al. (2005), Slade et al. (2015), Lee and Son (2017).

Perceived usefulness was the second strongest factor enhancing the behavioural intention to adopt M-health. As long as individuals perceived using M-health more efficient and productive than traditional way of attaining health services, they will be more motivated to adopt such services. In fact, Mobile technology and all related applications enjoy with high degree of Mobility, which in turns, empower individuals to access a wide range of services without time and place restrictions. As well as, Mhealth helps patients particularly to reduce waiting time of medical services and accordingly saving their time and efforts as well. Such results related to perceived usefulness are in the line with these studies that have supported the related area of Mhealth applications (i.e. Rana et al. 2017; Lee and Han 2015; Dwivedi et al. 2016). Statistical results have proved the role of social influence in predicting behavioral

intention to adopt M-health. This means that people are more affected by the opinion and suggestions coming from their social system. Such results could be attributed to the fact that social system in Jordan positively look at the mobile applications overall and people would like to share and generalize their positive experience with such applications with their friends, colleagues, and relatives. From the other hand, Mhealth is very new and novel technology. Accordingly, individuals who do not have adequate experience and information to cope with such novel and new systems are more likely to be influenced by opinions and information coming from people surrounding them (Venkatesh et al. 2012). Such results are compatible to other studies that have assured the role of social influence (i.e. Dwivedi et al. 2016; Hoque and Sorwar 2017).

Finally, even though there was not any effect for awareness on the behavioural intention, awareness is still very important factor in the current study model by it impact on the perceived usefulness. People who fully aware the main features of Mhealth and its associated benefits are more likely to perceive using such system as more productive and saving their time and efforts. This could be returned to increase health awareness and the importance of health technology among people in Jordan and worldwide. There is good number of studies (i.e. Kapoor et al. 2013; Vishwanath and Goldhaber 2003; Ajili et al. 2012; Alsheikh and Bojei 2014) that have supported the role of awareness in shaping the people perception toward new systems.

6.1 Theoretical and Practical Implications

Even though there is a growing interest in studying the related issues of M-health applications, this area still require further examination and explanation. Therefore, this study represents a good theoretical contribution by focusing more on the main aspects of M-health. In details, this study was successfully able to propose a solid theoretical model comprising a group of the most important factors (i.e. perceived usefulness and social influence). As well as, innovativeness and awareness have not been considered by prior M-health studies. Therefore, this study introduces another considerable contribution by expanding the current understanding regarding these factors. Further, the data was collected from 365 respondents and are analysed using SEM. By doing so, this study was successfully able to provide solid statistical evidence regarding the main factors predicting behavioural intention to adopt Mhealth. There are a few studies that have tested the adoption of M-health in developing countries. This is in addition to the fact that there is no study that has tested such technology in Jordan yet. Accordingly, This study represents a real contribution by expanding the current awareness and understanding regarding this phenomena in Jordan and developing countries as well.

From practical perspectives, a number of issues related to the current study findings have to be the focus of attention of M-heath service providers. Firstly, the significant role of usefulness should be taken into account. For instance, health organizations have to convince their target market about the benefits and utilities comprised in using M-heath such as less waiting time, less efforts, more convenience of time and location than traditional tools to attain the medical services. Organizations have also focus more in the novelty and newness of M-health along with the fact that using M-heath is a part of current modern life. This, in turn, will largely enhance the level of innovativeness existing in using M-health.

7 Limitations and Future Research Directions

There is a number of limitations that have to be addressed in the current study. Such as, convenience sampling was used in comparison with probability sampling method. This, in turn, reflects on the generalizability of the current study results. Further, this study only considers the behavioural intention while the actual use of M-health was nt tested. Thus, future studies could provide more accurate view about this area by considering the actual use behaviour. This study does not take into account the impact of resources and facilities required to use M-health, which in turn, represents an important of direction should be tested by future studies. The moderation effect of age and gender was not tested in the current study. Accordingly, these aspects have been the focus of attention of future studies. Finally, this study was conducted in Jordan, and accordingly, testing the related issues of M-health in different developing and developed countries could provide further understanding in this respect.

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