Research Article

FACTORS INFLUENCING JORDANIANS' ACCEPTANCE OF E-HEALTH ENVIRONMENTS IN DEVELOPING COUNTRIES

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Abstract

With the spread of internet technology, governments, and healthcare providers are investing in e-health to promote better quality of healthcare, access to healthcare information, and patient affordability.Despite the fact that e-health has a number of potential benefits, implementing them remains a challenge.Yet, the acceptance and adoption of such technologies by patients are essential to the success of e-health systems. However, there hasn't been much research on how patients use and adopt e-health, particularly in developing countries. Additionally, it has been claimed that cultural differences affect how behavioral models of technological acceptance perform. Therefore, the purpose of this study is to empirically validate an extended TAM in a developing country like Jordan by including three additional constructs: (privacy, trust, and perceived empowerment).Data were gathered using a questionnaire completed by 598participantsin Jordan. Using structural equation modeling based on PLS, the measurement and structural model were estimated and tested. According to the data analysis results, all of the hypotheses are supported, except the privacy construct. This demonstrates that the extended TAM is applicable and can be used in the Jordanian context. Based on our findings, the implications are that policymakers and developers must take into account that e-health is not just a technology solution, but social and behavioral factors must also be considered.

Keywords: Technology Acceptance Model, TAM; E-health, Structural Equation Modeling, Developing Countries, Jordan.

INTRODUCTION

The implementation of healthcare-related technologies started with information and communication technology (ICT) development. New ways of health care services started to be proposed by the healthcare providers in order to stay up with the sector's rapid expansion and make use of technologies like the Internet. This was demonstrated by the amazing increase in the quantity of healthcare portals and websites as one of the primary areas on the Internet (Kildea *et al.,* 2019). Additionally, the Internet has altered how users or patients behave and interact. Patients now take an active role in their healthcare by seeking service transparency and health information access, as well as knowledge about the newest medications. As a result, it can be said that the patient-healthcare provider relationship has changed (Zayyad and Toycan 2018). Professionals and academic researchers are now paying more attention to studies on e-health consumers' acceptance of e-health(Alifan B., 2020).The majority of studies were conducted in developed countries and focused on the perspectives of service providers, i.e. the attitude of doctors and nurses toward e-health acceptance; while, to date, there are few studies conducted to investigate the attitude of e-health consumers towards e-health acceptance in developing countries, especially Jordan. Numerous earlier studies conducted in developing nations have emphasised attitudes about privacy and trust as variables impacting the adoption of technology, particularly e-health. These variables were mentioned in addition to users' attitudes. TAM is regarded as having a greater predictive ability than other technology acceptance prediction models.

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Additionally, it is frequently chosen due to its practicality, widespread acceptability, and comprehensive model that covers a variety of issues that can be used to describe technology adoption (Beldad and Hegner, 2018; Rahimi *et al.,* 2018 and Beglaryan *et al.,* 2017). TAM, however, lacks to adapt to the influence of more broad cultural factors like Hofstede's dimensions (Hofstede, 1980;1984). It is therefore not clear whether or not TAM is suitable for E-Health acceptance in developing / Arab countries, it is being researched. The reliability and validity of the TAM and, therefore, its generalizability remain in doubt as it has been criticized for its cultural bias, especially when tested for non-developing countries (McCoy *et al.,* 2005; Srite and Karahanna, 2006). This study discovered that there are very few empirical studies pertaining to the acceptance of technology in the context of the Jordanian nation. Additionally, among those few research, the interpretive quantitative studies are either outdated or place a stronger emphasis on the viewpoints of the healthcare providers. Therefore, this study intends to fill the gap exists by extending TAM for e-health acceptance in the context of Jordan. This study adopted the TAM model, due to the fact that TAM was initially intended for use in a business environment, the primary factors in technology acceptance in TAM are insufficient to measure acceptance of e-health technology. As a result, additional factors like privacy attitudes toward exchanging health information online, online trust, and perceived empowerment will be added. It is expected that this addition will be able to clearly test e-health acceptance. The remainder of the essay is structured as follows: The study framework and a synopsis of the literature review in the area of e-health acceptance are presented in the next section. The findings of the measurement and structural model are presented in section three, along with data analysis. The paper's main findings and conclusion are presented in section four.

Theoretical framework

Figure 1 displays the overall conceptual model. The following sections describe and support the anticipated links between the exogenous and endogenous components in light of prior results from the literature.
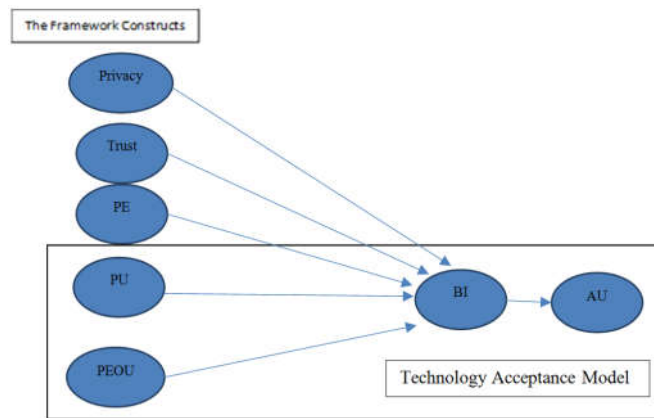

Fig. 1.

Perceived usefulness and perceived ease of use

According to Davis (1989) TAM revealed that PU and PEOU were two crucial factors that influence an individual's attitude (ATT), behavioral intention to use technology (BI), and actual usage behavior (U). BI and U are typically acknowledged as reliable acceptance indicators (Davis *et al.,* 1989). Despite the fact that the original TAM composed of the PU and PEOU constructs has a solid explanation for predicting users' acceptance of new technologies which include e-health, some research suggests that other predictors beyond PU and PEOU will be required, but this depends on the specific technology environment. (Venkatesh and Davis 2000, Plouffe *et al.,* 2001; Wu *et al.,* 2007; Kibelloh and Bao, 2014; Kibelloh and Bao, 2014; Beldad and Hegner, 2018; Rahimi *et al.,* 2018). Therefore, it is hypothesized that:

H1: Perceived ease of use will directly and positively impact the intention to use e-health portals among Jordanian.

H2: Perceived Usefulness (PU) will directly and positively impact the intention to use e-health portals among Jordanian.

Privacy

Numerous online issues and concerns regarding Internet security for personal privacy have been extensively discussed in previous studies and literature on privacy and technology. Along with e-commerce, privacy concerns have also extended to e-health, which is also susceptible to hacking (Fung and Paynter, 2006; Tavares and Oliveira, 2017). This issue has taken center attention of the healthcare provider. Patients are reluctant to disclose health-related information including psychiatric behavior, genetic information, and sexual preference even if it is necessary for diagnosis and treatment because they fear it will put them in a bad light in society and subject them to prejudice (Hoque *et al.,* 2016). Another concern is that patients believe that the information collected may be used for purposes other than those listed (Goldman and Hudson 2000; Tavallaei and Ahmadi, 2018). User information has been collected before, but privacy concerns are often high in e-health (Liu *et al.,* 2004; Tavallaei and Ahmadi, 2018).

Thus, User privacy is still a major concern. E-health users are aware of this concern and believe that privacy is even more crucial than many other factors in determining e-health acceptance (Tao *et al.,* 2016). Because of this issue, e-health acceptance is facing a poor adoption rate in both developed and developing nations. Privacy in e-health has thus become one of the obstacles to the implementation and development of e-health (Deloitte, 2006, Tavallaei and Ahmadi, 2018).Tao et.al (2016) in their systematic review research pointed out that privacy was one of the most significant factors that predict e-health consumers' acceptance of health information technologies. Therefore, this study proposes the following hypothesis:

H3: Privacy will directly and positively impact the intention to use e-health portals among Jordanian.

Trust

Just like privacy, the relationship between trust and acceptance of technology has been investigated and confirmed by numerous research. thus, trust is one of the obstacles to e-health acceptance. According to their level of trust, e-health users are willing to disclose their health conditions and medical information to e-health systems (Tavallaei and Ahmadi, 2018). Tao *et al.* (2016) in their review paper indicate that trust is among the most important determinants of health information technologies acceptance. This is consistent with previous research. Trust is one of the most important factors influencing a patient's decision to accept and continue to use e-health systems and services Smith and Manna (2004), McGraw (2009), and Hossain *et al.* (2019). Finally, Hussein *et al.* (2019) in their research to predict the factors influencing Bangladeshi communities to accept e-health strongly recommended adding trust as an additional factor to their model. Previous studies seem to have led in the right direction by examining trust between e-health consumers and health care providers. Thus, we propose the following hypothesis:

H4: Trust will directly and positively impact the intention to use e-health portals among Jordanian.

Perceived Empowerment

Many academic fields, including management, psychology, community development, economics, and education, embrace the idea of empowerment. Therefore, there are numerous definitions of empowerment. The term "empowerment" is currently popular, but that does not mean it is a brand-new term. It began in the middle of the seventeenth century in a profound sense "to invest with authority"(Dictionary, 2010). The timeline began in the late 1960s and early 1970s and again experienced a deeper meaning in the late 1980s.Then, in the 1990s and 2000s, increasing attention was received to empowerment theory. This was started byConger and Kanungo (1988) as a form of motivational approach and psychologically enabling. Psychological empowerment is a form of motivation that helps people act in ways that will help them achieve their objectives. Rappaport (1987, 1995) asserts that empowerment has an impact on health care providers because it emphasises the improvement of the individual's perception of competence to actively participate in health and health care decisions. Empowerment in the context of healthcare is characterized by perceptions of control over one's health and medical care. Additionally, it has to do with the perception of competence

because an individual can maintain and care for his or her health by consulting with doctors, interacting with the healthcare systems, and internalizing health concepts and objectives (Rappaport, 1987; Conger and Kanungo, 1988; and Menon, 2002). Patients cannot become empowered unless health care providers provide them with the opportunity to be empowered. Therefore, the idea of empowerment requires a balance of power between the patients and the healthcare providers. In this situation, health IT technologies like e-health portals offer chances to inform and engage patients by giving patients access to pertinent information and enabling them to make decisions, listen and respond to questions. Thus, patients must generally feel empowered particularly with regard to their health related issues and illnesses so that they can manage their health-related concerns (Manojlovich, 2007). Furthermore, IT tools can be viewed as an empowering technology that supports the needs of e-health consumers (Füller *et al.*, 2009). If adequate health tools are able to meet users' needs in health planning and management activities for example e-health portals, patients will definitely choose these tools. as a result, perceived empowerment is a key factor that will influence patients' motivation to participate in e-health which in turn will promote users to accept and use e-health portals. Lead to conclusion that perceived empowerment through the use of e-health systems and services is likely to influence the willingness of health consumers to accept and use e-health portals. However, little is known about how perceived empowerment can impact the acceptance of e-health portals and how users intend to use them.

To date, no studies are focusing on perceived empowerment in e-health portals. However, Previous studies on the use of information technology found the effect of perceived empowerment on attitude and behavioral intention, thus there is a substantial correlation between perceived empowerment and system usage(Kim and Gupta, 2014;Mendes-Filho *et al.,* 2018). A survey by Mendes-Filho *et al.* (2018) of 268 itinerant tourists showed that perceived usefulness and perceived empowerment are crucial factors of individuals' attitude and intent to use user-generated content (UGC) for travel planning, if this extends to the role of e-health portals in health management, empowered individuals who feel more in control are expected to use that control by using e-health portals to manage their health goals. There is scarce information on the importance of empowerment and its outcomes. Additionally, empirical research on the topic of the impact of empowerment on patient acceptability of e-health portals is still lacking. Thus this paper seeks to address a gap in the literature that provides an empowerment perspective that can be utilised to explain patient behavior with a particular focus on increasing access to the use of ICTs and e-health portals that influence behavior. Essentially, it can be said that this paperalsoexamines the effect of perceived empowerment on e-health consumers' acceptance and intention to use e-health portals. So we hypothesized that:

H5: Perceived Empowerment will directly and positively impact the intention to use e-health portals among Jordanian.

Behavioral Intention (BI)

TAM and TRA have been differentiated by BI. Behavior intention is a direct precursor to usage behaviour and provides indication about people's preparedness to engage in a particular behavior. Ajzen (1991) states that there is a core rule that can be followed: "the stronger the intention to engage in a behavior, the more likely should be its performance". whereas Davis (1989) found that in TAM, both PEOU and PU have an influence on an individual's intention to use technology, which in turn influences usage behavior. Thus, there is a significant relationship between BI and usage behavior in general (Davis *et al.,* 1989; Venkatesh and Davis, 2000; Venkatesh *et al.,* 2003). Thus, we propose the following hypothesis:

H6: Individual's BI will positivelyimpact his/her actual usage of E-health portals among Jordanians.

RESEARCH METHODOLOGY

The survey method was used because of its advantages (Rudestam and Newton, 2014; Sekaran and Bougie, 2016). With the researcher isolated from the study's objectives, objectively this research aims to investigate hypothesized relationships in the context of technology acceptance. In addition, the constructs and the relationships between them that are used in the conceptual model have undergone extensive development and validation in theories and models related to adoption and technological acceptance. Additionally, this study used the Structural Equation Modeling (SEM) technique to run a number of tests in order to test the proposed hypothesis and the relationships between them. This study has selected Jordanian citizens in Jordan enrolled by the Department of Statistics as the target population. The population is distributed across twelve governorates in Jordan divided into three regions (Central Region, Northern Region, and Southern Region). proportionate random sampling will be adopted to find out the number of citizens who shaped the sample frame for the current research. Then, 768 questionnaires were distributed to three different regions in Jordan. Prior to that, it is necessary to determine the probability sampling of citizens for each Region. The following formula was used to compute the probability sampling:

Probability sampling of a citizen = NP * NS / T

(NP= Number of the citizen in each Region, NS= Number of samples to be distributed, T= the total number of citizens in all three regions).

A total of 768 online questionnaires were distributed to citizens in Jordan who are internet users, the number of returned questionnaires was 614 indicating a 79.94% response rate. There were 598 valid questionnaires after we additionally disregarded the incomplete ones. All of the items (questions) utilized in this study were also taken from the literature, where it was noted that they were reliable and valid for measuring the phenomena they were meant to represent (see Appendix A).

RESULTS

Profile of Respondents

The demographic characteristics of respondents are reported in Table 1. It can be shown that (318) of the respondents were males by about 53%, while females were (250) by about 47%. Of the participants, 39% were between 20 and 24 years, 25% were less than 20 years, 15% were between 25 and 29 years,

12% were between 30 and 40 years, 7% were between 41 and 50 years, and finally, 2% were over 50 years old. Regarding the educational level, there were 59% of the respondents have bachelor's, 13% have master's, 11% have Ph.D., 9% went to a high school, and finally, 8% have a diploma.

Table 1. Demographic characteristics

		Count	Percent
Gender	Male	318	53.2%
	Female	280	46.8%
Age	Less than 20 years	148	24.7%
	20-24 years	232	38.8%
	25-29 years	92	15.4%
	30-40 years	74	12.4%
	41-50 years	42	7.0%
	Over 50 Years	10	1.7%
Education Level	High School	54	9.0%
	Diploma	50	8.4%
	Bachelor	352	58.9%
	Master	76	12.7%
	PhD	66	11.0%
E-Health Portals Experience	Never Used	232	38.8%
	Some Experience	242	40.5%
	Experienced	124	20.7%
Computer use and internet skills	Beginner	26	4.3%
	Moderate	260	43.5%
	Expert	312	52.2%
I use E-Health Portals Currently	Yes	296	49.5%
	No	302	50.5%
How many times have you accessed E-Health Portals so far?	Never	252	42.1%
	1-3 times	116	19.4%
	4-6 times	98	16.4%
	7-9 times	70	11.7%
	10 times or more	62	10.4%
Position	Academic Staff	98	16.4%
	Administrative Staff	56	9.4%
	Student	444	74.2%
Area	North	230	38.5 %
	Central	292	48.8 %
	South	76	12.7 %

About the E-health portals experience, about 41% have some experience with it, 39% have never used it, and about 21% were experienced. About half of the sample (52%) was expert in computer use and internet skills, 44% have moderate experience, and only 4% were beginners.

The results also revealed that about 50% do use E-Health portals currency, while the other half don't. About 42% have never accessed E-health portals so far, 19% have accessed it from 1 to 3 times, 16% have accessed it from 4 to 6 times, 12% have accessed it from 7 to 9 times, and 10% have accessed 10 times or more. Finally, 74% of the respondents were students, about 16% were academic staff, and 9% were administrative staff.

Descriptive Statistics

Descriptive statistics also revealed that most participants responded favorably to the study's constructs, which are measured (See Table 2). For the independent variables (PEOU, PU, Privacy, Trust, and PE), all means were greater than 3.5, while the dependent variables' means were 3.9 and 3.7 (BI and AU).

C: The Structural Model Analysis and Hypothesis Testing

The relationships that had been hypothesized were all tested using structural equation modeling (See Table 3). The estimated values of fit indices for the suggested research model in this study have demonstrated a satisfactory structural model fit to the data (See Fig. 2). The table clearly shows that all values were within the suggested range.
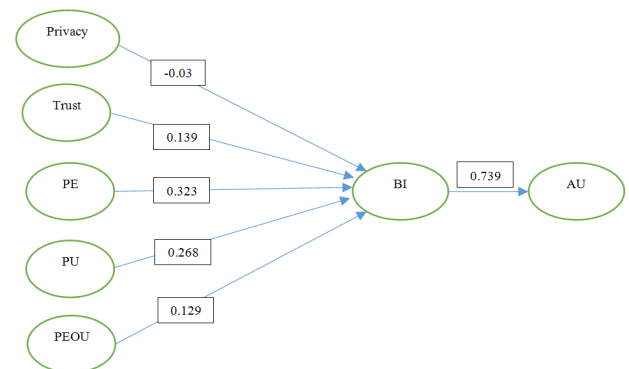

Fig. 2.

The results in table 3 showed that hypotheses (H1, H2, H4, H5, H6) are supported. However, the hypotheses (H3) are not significant at p <0.05. PEOU (ß=0.129**, p<0.01) and PU (ß=0.268***, p<0.001) were found to have a significant positive influence on behavioral intention to use e-health, thus H1 and H2 are supported.

Table 2. Descriptive Statistic

Variable	Symbol		Mean (M)	Standard Deviation (SD)	Coefficient of Variation (CV)
Perceived Usefulness	PU	X1	3.875	0.764	19.70%
Perceived Ease of Use	PEOU	X2	3.628	0.699	19.81%
Privacy	Privacy	X3	3.868	0.808	20.90%
Trust	Trust	X4	3.622	0.610	16.85%
Perceived Empowerment	PE	X5	3.669	0.757	20.62%
Behavioral Intention	BI	ME	3.906	0.799	20.47%
Actual Usage	AU	Y	3.711	0.806	21.72%

Table 3. Summary of Direct Hypothesized Results

H#	Proposed Relationship	Effect Type	Path Coefficient	Remark
H1	PEOU -> BI	Direct effect	0.129	Supported
H2	PU -> BI	Direct effect	0.268	Supported
H3	Priva -> BI	Direct effect	-0.03	Not Supported
H4	Trus -> BI	Direct effect	0.139	Supported
H5	PE -> BI	Direct effect	0.323	Supported
H6	BI -> AU	Direct effect	0.739	Supported
Notes: * p<0.05; ** p<0.01; *** p<0.001				

Trust (ß=0.139**, p<0.01) has a positive influence on users' behavioral intention to use E-health in the Jordanian context, so the fourth hypothesis is accepted. It should be mentioned that Jordanians were found to be highly affected by being felt empowered to accept and use e-health, PE has a high significance, PE (ß=0.323***, p<0.001) to support H5. Finally, users' BI was found to have a highly significant positive effect on his / her actual usage of e-health, BI (ß=0.739***, p<0.001), so H6 is confirmed.

DISCUSSION AND CONCLUSION

The focus of this study's research topic is on the variables that influence e-health acceptance and usage in Jordan. A conceptual model has been proposed that expands TAM to include the key determinants of perceived empowerment, privacy, and trust. The empirical evidence for these correlations in the Jordanian context is thus discovered in this study for the first time. Our findings demonstrate the validity of the direct relationships between PEOU, PU, privacy, trust, and PE with BI (with 61% of its variance explained) as well as BI with AU (with 55% of its variance explained). Our study, which differs from the majority of studies that focus on western nations, confirms TAM's reliability and validity in the context of e-health in the developing world, particularly in Jordan. Our findings showed that the effects of PEOU, PU, Trust, and PE on Jordanian intention to use e-health were significant factors, however, the findings showed that privacy had no substantial impact on Jordanian citizens' willingness to use e-health services. This can be attributed to the fact that privacy is present at the back end of any platform, regardless of how users feel about the system when they use it directly. Furthermore, given that e-health in Jordan is still merely informational and in its early phases, this may also be explained by a lack of citizen concern about maintaining privacy. For instance, Jordanian e-health services at this time do not demand that users register or reveal any personal data. Even though TAM and other user acceptance models have received empirical validation, research is still being done to include social elements to overcome the models' limited capacity for the explanation, This work advances that idea. We can define and comprehend how Jordanians decide to use and accept e-health by incorporating Privacy, Trust, and PE as the primary dominants. Our study showed that social contexts should take precedence over technology solutions when implementing e-health.

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APPENDIX

Table 4. Constructs and Variables of the Research Model

Construct	Sources
Perceived Usefulness	(Davis FD, 1989; Davis FD and Venkatesh V., 2004 ; Chau and Hu, 2002; Taylor and Todd, 1995; Ek *et al.,* 2013)
Perceived Ease Of Use	(Davis FD, 1989; Davis FD and Venkatesh V., 2004 ; Chau and Hu, 2002; Taylor and Todd, 1995; Ek *et al.,* 2013)
Behaviour Intention to use the e-health portals	(Davis FD, 1989; Davis FD and Venkatesh V., 2004 ; Chau and Hu, 2002; Taylor and Todd, 1995; Ek *et al.,* 2013)
Actual Usage	(Wang and Chuan-Chuan, 2011; Dulcic *et al.,* 2012)
Privacy	(Featherman and Pavlou, 2003; Chellappa, 2002; Chellappa and Pavlou, 2002; Korgonkar and Wolin, 1999; Lu *et al.,* 2003;Mohammadi, 2009)
Trust	(Gefen *et al.,* 2003; Yoon, 2002; Tung *et al.,* 2008; Loiacono *et al.,* 2002; Lam, 2011)
Perceived Empowerment	(Morgan and Hunt,1994)

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