Research in Management of Technology and Business Vol. 2 No. 1 (2021) 308–320

RMTB

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/rmtb
e-ISSN : 2773-5044

Adoption of Mobile Health Applications Among Adults in Kulai, Johor

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DOI: https://doi.org/10.30880/rmtb.2021.02.01.022
Received 01 March 2021; Accepted 30 April 2021; Available online 01 June 2021

Abstract: In what way of usage level and practicality of mobile health applications (m-health apps) to support a healthy lifestyle among Malaysian is unclear. So, the purpose of this research is to identify the factors towards the adoption of m-Health apps and to determine the relationship between the factors and the adoption of m-Health apps among adults (age of 20 to 60 years old) in Kulai, Johor. The factors that being studied were a relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk. This study was a cross-sectional study using a structured questionnaire as a survey instrument and employed convenient sampling techniques. Based on the population in Kulai, Johor, the expected number of samples was 383 respondents. Later, the total number of 245 sets of online questionnaires form had been distributed and the rate of response was 63.97%. Descriptive analysis using SPSS was used to analyze the data from the questionnaire. The finding of this research identified factors towards the intention of using m-Health apps and the relationship between the factors and usage of m-Health apps. This research may contribute some insights to m-Health apps software developer to improve their apps so that it is easy-to-use and more user friendly.

Keywords: Mobile technology, Mobile health Applications, m-health apps, DoI theory

1. Introduction

In recent decades, according to WHO, 60% of related factors to individual health and quality of life are correlated to lifestyle. Millions of people follow an unhealthy lifestyle. Besides that, most people are encounter illness, disability and even death. Several diseases like metabolic diseases, diabetes mellitus, cardiovascular diseases, hypertension, overweight, mental health and so on, can be caused by an unhealthy lifestyle. The relationship between lifestyle and health should be highly considered. In addition, about 45 per cent of Malaysian men and nearly half of women are overweight or obese compared with global levels of about 30 per cent (Anonymous, 2014). These reflect the most

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obese nation in Southeast Asia, and Malaysians are becoming more and more obese due to unhealthy behaviour in daily life.

Therefore, the government has been ramping up public awareness campaigns and mass street-exercising programs over the last year. Moreover, the government also encourages people to use mobile health and wellness application to control their daily health. The affordability, portability and wide use of smartphones along with their sophisticated features and capabilities make them the perfect tools for the purposes they serve for those tasks (Doh, 2019). Furthermore, m-Health apps cannot only deal with diseases but also provides different resources to help people prevent disease (Mishra *et al*., 2015). In short, numerous technologies of wellness application have been created to assist individuals in living healthy lifestyles and behaviours.

1.1 Research Background

Mobile applications are software programs designed to run on mobile devices. In today's market, health and fitness apps are plentiful. Currently, the Apple Store and Google Play allow users to quickly search for up to 165,000 different types of health and fitness applications. According to the Global Mobile Health Market Report 2010–2015, in 2015, more than a third of the 1.4 billion smartphone users will use some kind of mobile health application. Moreover, according to the number of m-Health apps downloads worldwide from 2013 to 2017, users who have to download the health and wellness application increased from 1.7 billion to 3.7 billion. Nevertheless, mobile health and wellness tracking apps have gained widespread popularity by facilitating the maintenance of health and empowering individuals to contribute to their own well-being and health (Birkhoff & Smeltzer, 2017).

In addition, the mobile health and wellness application is a useful tool for all the fitness freaks and for those who don't go to the gym and exercise often. This is because of its easy functionality updates in order to assist them to exercise regularly. The several types of m-Health such as fitness apps, food and nutrition apps and track of user sleep quality apps which includes Fooducate, My Fitness Pal, Sleep Cycle, Headspace, Daily Burn and others can usefully help user to maintain their body health as well. The m-Health and wellness applications can track the daily footstep by the user due to count the steps and track the distance of user walked and even provide personal health coaches to monitoring user in their daily workout. Therefore, mobile health and wellness applications can give motivation for the user to target their health goal in daily life.

1.2 Problem Statements

Nowadays, due to Malaysia have better socio-economic conditions, the lifestyle of Malaysian has been undergoing changes over time. According to data based on BMI measurements for average, overweight and obese people in 2010 and 2014 which from secondary analysis based on the latest data gathered by the World Health Organization (2015), the overall percentage increase in overweight and obese people in Malaysia is considered to be the highest in Southeast Asia. Another report also ranked Malaysia's population as the 10th largest overweight population in the world (Anonymous, 2015). According to the Deputy Health Minister, the majority of the Malaysian population had a BMI measurement of more than 25, which was above average or natural weight. This is because most Malaysians eat six meals a day and the meals contain high fats and carbohydrate. In addition, the majority of the Malaysian population do not allocate enough time for physical exercise. As a result, Malaysians have the potential of suffering overweight and obesity due to their lifestyle.

The rapid development of industrialization and urbanization in Malaysia in recent decades has brought about changes in the lifestyles of Malaysians. According to Datuk Ayub Rahmat, Johor State of Health and Environment Committee Chairman, at least half of the state's population in Johor are obese and need to put in more efforts to lose weight and be healthy. Likewise, Johor State is ranked fifth in the country with 49.1% of its population are obese. The study took place in Kulai, Johor

because Kulai is a district very near Johor Bahru, a fast-growing urbanized and developed capital city in Malaysia. Hence, the researcher found that findings of previous studies of Obesity Among Health Staff at Kulaijaya District Health Department (2012) showed that they have amongst male staff, office and inspectorate personal and medical officers were higher prevalence of obesity and overweight. The issue of obesity and overweight prevalence of Kulaijaya District Health Department (KDHD) was also higher than the national and southern zone prevalence.

Therefore, obesity and overweight are serious emerging health and lifestyle issues among personnel adults, especially in Southern Malaysia. Throughout the changing of urbanization in Southern Malaysia, most of the Southern Malaysia adults are changes their lifestyle behaviour such as a change in dietary habits and food preferences. It boosts the issue of obesity to lead to the risk of more chronic illnesses in the rank of adult peoples. Besides that, most of the adult people are busy with their working or studying in this urban country, cause them to a reduction of physical activities. The surroundings of works and study may cause the adult peoples to entail prolong time to sit with work in front of the computer rather than physical movements. However, there are technologies that facilitate busy working life people to manage their health and wellness. The presence of mobile health applications is growing globally. But research regarding the adoption level and practicality of mobile health applications by Malaysians still inadequate. There are also some issues of mobile health applications usage such as related to privacy concern. Personal information of m-health apps users can be disclosed to others parties by the software developers. So, this research intended to study the factors of m-Health apps adoption among adults age between 20 to 60 years old in Kulai, Johor.

1.3 Research Questions

(i) What are the factors towards the adoption of m-Health apps among adults in Kulai, Johor?
(ii) What is the relationship between the factors and the adoption of m-Health apps among adult in Kulai, Johor?

1.4 Research Objectives

(i) To identify the factors towards the adoption of m-Health apps among adults in Kulai, Johor.
(ii) To determine the relationship between the factors and the adoption of m-Health apps among adults in Kulai, Johor.

1.5 Scope of the Study

This research took place in Johor State, and to be more specific, it was done in the Kulai district. The unit of study in this research is individual. So, respondents were adults age between 20 to 60 years old. The population of Kulai district is about 291,000 peoples based on the official portal from the Economic Planning Department of Johor.

1.6 Significance of the Study

This research studied the factors towards the adoption of m-Health apps. The factors were relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk. By identifying factors toward adoptions of m-Health apps, it can benefit software developers to improve their apps. Generally, users choose an application that is user friendly and fulfil their specifications. M-Health apps are much more needed in today busy working society. By knowing users' specifications of m-Health apps, it will increase usage and can facilitate our society to maintain good and healthy lifestyles. Besides, apps developers can gain more profit from huge subscriptions.

2. Literature Review

2.1 Mobile Technology

Over the last decade, the number of people worldwide who own a cell phone or other portable electronic communication device has increased exponentially (Gagnon *et al*., 2016). The recent developments in mobile technology have made it possible for mobile users to conduct tasks with portable devices previously not possible. In modern society, the use of digital, internet-connected, handheld, cellular telephones such as cell phones is a ubiquitous activity. Technology is increasingly important in the support of regular health and activity monitoring (Anonymous, 2011). Smartphone technologies, powering 3.6 billion devices across the world, have been impacting people from all walks of life through the adoption and diffusion of mobile health (Gopinath Krishnan, 2019). Mobile and wireless technology have the potential to deliver health-related information and interventions for the prevention and management of non-communicable diseases (NCDs) with potentially greater reach and lower long-term costs than traditional interventions (Klasnja & Pratt, 2012; Steinhubl *et al*., 2013).

2.2 Mobile Health Applications

Mobile health and wellness application are referred to the provision of health services and health information via mobile technologies to provide personalized content, self-monitoring of health and any time anywhere access to health information. Health and fitness are a dominant category, on both iPhone and Android platforms that provide m-Health apps (Krishnan, 2019). Meta-analysis has shown that even simple text-messaging interventions may boost smoking avoidance, weight loss, and adherence to medication and that behaviour improvement may continue after an intervention has ended. Health and wellness applications have been developed to cover a wide variety of areas of this field, including fitness activities, walking and running distance monitoring using GPS pedometer, weight loss, nutrition and diet, mental health and sleep monitoring (Krishnan, 2019).

2.3 Diffusion of Innovation Theory

The Diffusion of Innovation (DoI) theory is one of the most extensively used models in the recent past, which has been widely accepted in disciplines like marketing, information technology, agri-business, communication and education (Taylor & Todd, 1995). Innovation is a concept that is perceived as a new idea and is practised by an individual or group (Rogers & Everett, 1983). DoI theory is a model that works on the belief of the user for the latest innovation (Lau & Woods, 2008). DoI model recognises the dynamic nature of diffusion (Huang *et al*., 2020). According to Sahin (2006), the set of characteristics includes relative advantage, compatibility, complexity, trialability and observability. This theory can be clearly exploring the various factors influencing user's adoption of mobile health applications. Nevertheless, Davis (1989) introduced the technology acceptance (TAM) model, one of the most extensively use models for explaining a potential user's behavioural intentions for using an innovative technological product (Davis *et al*., 1989). In the TAM model, the antecedent of intention to use technology is determined by one's attitude toward the use of technology which is influenced by user beliefs about perceived usefulness (PU) and ease of use (EU). TAM model also described that a significant determinant of user behaviour is the behavioural intention and behavioural intention needs to be measured in order to predict this behaviour of user's healthy lifestyle together with their adoption of mobile health applications.

(a) Relative Advantage

Relative advantage refers to the degree to which an innovation is perceived as providing more benefits than its predecessor (Moore & Benbasat, 1991). Relative advantage results in increased

efficiency, economic benefits and enhances status (Sahin, 2006). Mobile health applications are created to assists consumer patients, and healthcare providers to manage health (Boulos *et al*., 2014). As an example, mobile health applications provide improved benefits to users by offering electronic health data management which is record-keeping and innovative features, such as multimedia features, context awareness which includes location, preference, and network awareness, round the clock accessibility, and portability (Boulos *et al*., 2014); Liu *et al*., 2011). The perceived advantages of mobile health applications may trigger people's desires to try them and test if their expectations are met.

(b) Perceived Ease of Use

Perceived ease of use (PEOU) is a critical component of technology adoption and usage behaviour. The perceived ease of use (PEOU) is characterized as the degree to which an individual believes that the use of technology is effortless, easy to understand or use (Davis, 1989). Venkatesh (2000) found that 'the degree to which individuals perceive how easy it is to use the technology. Mobile health applications help users more easily to monitor health-related to some health activities. It can be assumed that all other things as equal, the easier an application's features is to use and become more useful for users adopting in mobile health applications. Mobile health applications can help users more easily monitor health-related to certain health activities. Monitoring tools and comprehensive databases of mobile health applications allow users to access nutrition and exercise information. In addition, the functions of data entry and access will be very flexible, so that users can adapt them to their personal preferences. Therefore, it is expected that the perceived ease of use (PEOU) in mobile health applications will have an impact on the intention to adopt mobile health applications.

(c) Compatibility

According to Zolkepli and Kamarulzaman (2015), the compatibility of innovation largely depends on users' lifestyles, situations, beliefs, and social status that are likely to be adopted. It is possible that technologies will be introduced that are more consistent with personal and social status. Compatibility shows the consistency between technology and user needs, so this will promote compatibility to effectively affect the user's adoption of health application technology. Greater compatibility is a positive thing between human needs and technology because it facilitates the understanding of technology in a more intimate sense (Hidayanto & Negara, 2018).

(d) Observability

Observability is referring to the degree to which the results of an innovation are visible to others (Sahin, 2006). People tend to adopt an innovation due to the positive results of its usage are visible (Sahin, 2006; Zolkepli & Kamarulzaman, 2015). It reflects that observability will change the attitude and perception of users. In addition, the observability of innovation also depends on the nature of the innovation itself. Mobile health applications are relatively observable factors, it can be easily seen, downloaded and used on smartphones. As there are more than 160,000 5,000 mobile medical applications for iOS and Android smartphones (Terry, 2015), consumers are increasingly exposed to mobile health applications.

(e) Trialability

Trialability refers to the degree to which an innovation may be experimented with on a daily basis (Sahin, 2006). The trialability is enabling make potential users to have opportunities to test an innovation to determine whether it fits their own criteria before it is fully adopted by a specific application (Zolkepli & Kamarulzaman, 2015). It is a factor to encouragement entail users to try an innovation that is void of full commitment and costs (Al-Hakim, 2007). The user who is trying an

innovation offers can definitely help them to validate expectations and form ideas on how it can fulfil personal needs.

(f) Perceived Risk

Perceived risk refers to the user's privacy, which is the uncertainty related to the negative consequences of using a particular product or service, and involves any potential loss due to the disclosure of personal information (Treiblmaier & Chong, 2011). Perceived risk factors can influence users' attitudes towards mobile applications with perceived security risks. Health information technology may exacerbate personal privacy issues regarding the potential abuse of users' personal health data. This means that when using mobile health applications, users still face certain threats, such as privacy violations, legal and performance risks.

2.4 Research Framework and Hypotheses

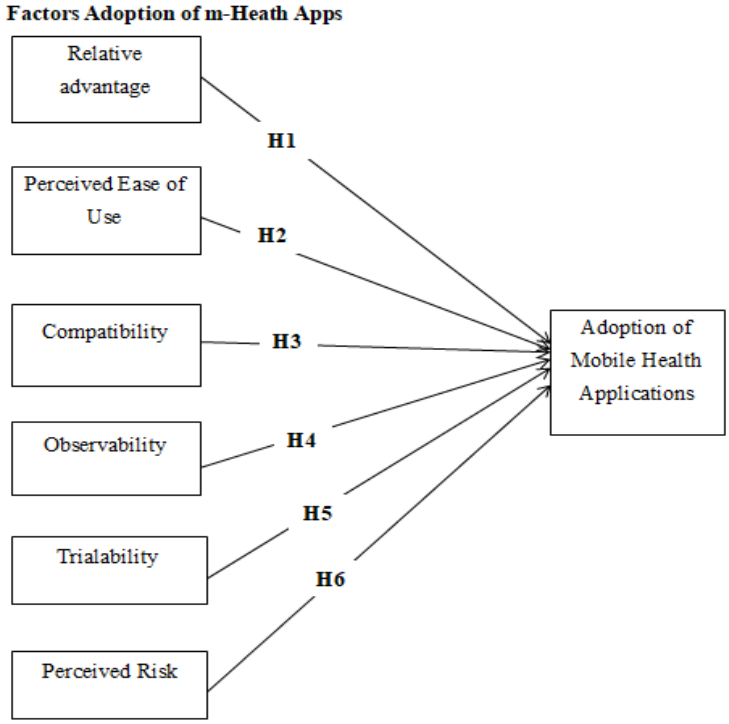

Figure 1: Conceptual framework of factors towards adoption of mobile health applications among adults

The following hypotheses are aimed to be tasted:

H1: Relative advantage has significant relationship with users' adoption of mobile health applications.

H2: Perceived ease of use has significant relationship with users' adoption of mobile health applications.

H3: Compatibility has significant relationship with users' adoption of mobile health applications.

H4: Observability has significant relationship with users' adoption of mobile health applications.

H5: Trialability has significant relationship with users' adoption of mobile health applications.

H6: Perceived risk has significant relationship with users' adoption of mobile health applications.

3. Research Methodology

3.1 Research Design

In doing this research, the quantitative method is using sampling methods and sending out an online questionnaire to gather data from the respondent. Quantitative research is more reliable and objective. In addition, the researcher used the statistical method to generalize a finding using the data collected and the relationships between variables. The quantitative method emphasized questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques. Besides that, the close-ended questions have been chosen of the researcher to conduct in this survey, including multiple-choice questions. The researcher's goal in conducting quantitative research in the relationship between adult users' factor intention towards adoption of a mobile health application in Kulai, Johor.

3.2 Population and Sampling Techniques

Data taken from the official portal of the Johor State Economic Planning Department states that the total population of Kulai, Johor is about 291,000 peoples. The target group for this study is adults aged in the range between 20 years old to 60 years old. This group is chosen by the researcher because at these ages, respondents have reached maturity thinking and besides, at these ages, people are becoming more concerned about their health, lifestyles and physical appearance. Shalihin *et al*., (2012) found that obesity reached an alarming level in the southern region of Peninsular Malaysia, particularly in Johor state, as the occurrence is highest in this state compared to other states. In addition, the Covid-19 pandemic currently hit the world and also our country leads the public to begin their fitness journey in order to improve their health (Murugesan, 2020). During this critical period, home exercise preference has evolved as individuals continue to practise social distancing.

In this study, a non-random sampling technique was used. The samples were selected from adults aged between 20 to 60 years old in Kulai, Johor who are using mobile health applications to keep and manage their body health in daily life. Of the non-random sampling technique, the convenient sampling method was used due to some reasons such as easy, inexpensive, and fast to execute research. Based on Krejcie and Morgan table, at least 383 respondents needed in this research. However, only 245 sets of questionnaire form responded to by respondents. The rate of return was 63.97%.

3.3 Research Instrument

This research was quantitative research in which a survey questionnaire was used as the research instrument. The number of target respondents in this research was based on Krejcie & Morgan table. In this study, the sample size of the population of adult users in Kulai, Johor is about 291,000, which is more than 100,000 at a 95% confidence level. Therefore, the researcher has to distribute the number of 383 sets of questionnaires to target respondents through an online platform. In the questionnaire, there are 3 sections which include section A, section B and section C. Section A is the respondent's profile, section B is the factors of mobile health applications adoption, and section C is about the adoption of mobile health applications. In section A, it composed of 10 items which include gender, races, age, marital status, level of BMI, employment status, income status, the reason for using mobile health applications, type of using mobile health applications, and frequencies of using mobile health applications. In this section, the researcher used nominal and ratio as the level of measurement to collect data regarding the respondent's information. Section B consist of questions regarding independent variables which are the factors of mobile health applications adoptions i.e. relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk. Lastly, section C is about the adoptions. To measure the agreement on the independent variables and the dependent variable, the research was using the 5-point Likert Scale and 5-point Likert Scale in the questionnaire survey of this study.

3.4 Pilot Test

Table 1 shows the Conbrach's Alpha of the independent variables and dependent variable which test by 30 respondents of adult users in Kulai, Johor in this research. All independent variables include relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk. The reliability value of result Conbrach's Alpha to each independent variable are 0.868, 0.901, 0.860, 0.757, 0.858 and 0.844 respectively. Meanwhile, the reliability value result of the dependent variable which is the adoption of mobile health applications in Conbrach Alpha is 0.796. As a result, all of the reliability value of both independent variable and dependent variables are above the value of 0.7.

Table 1: Pilot test analysis of adoption of mobile health application among adult users in Kulai, Johor

Variables	Cronbach's Alpha	Total of Respondent
Relative advantage	0.868	30
Perceived ease of use	0.901	30
Compatibility	0.860	30
Observability	0.757	30
Trialability	0.858	30
Perceived Risk	0.844	30
Adoption of mobile health applications	0.796	30

4. Results and Discussion

4.1 Demographic Information Analysis

The results showed that out of 111 out of 245 respondents are men and 134 are respondents of women. This result indicated that the percentage of women (54.7%) is greater than men (45.3%). The race of respondents showed that 97 respondents are Chinese (39.6%), 80 are Malay (32.7%), and 66 are Indian (26.9%). Regarding the age of respondents, 138 of respondents are aged between 20 to 30 years (56.3%), 76 are aged between 31 to 40 years (31%), and 31 are aged 41 years and above (12.6%). While 143 respondents (58.4%) are single and 100 respondents are married (40.8%). Most of the respondents are working (54.7%) and students (29.8%). Then, 45.3% of the respondents have an income between RM2001 and RM4000, 43.3% have income below RM2000, and 11.4% have an income above RM4000.

59.2% of respondents have normal BMI level which ranges between 18.5 to 24.9, 15.1% of respondents have low BMI which is below 18.5 and 7.3% of respondents have a high BMI level which is 30.0 and above. The reason that respondents are using m-Health apps is due to they feel comfortable with the apps (24.1%), and there are 16.3% of respondents are using m-Health apps due to the apps are more reachable than go to the gym. Among the popular m-Health apps used by respondents are My Fitness Pal (29.4%), Runkeeper (21.2%) and Mi Fit (17.1%). Data also showed that 28 respondents (11.4%) using m-Health apps every day, 71 (29%) respondents using m-Health apps once a week, 102 (41.6%) respondents using m-Health apps one to two times per week, 44 (18%) respondents using m-Health apps 3-5 times per week.

4.2 Analysis of Factors Towards Adoption of Mobile Health Applications

Table 2 shows that most of the target respondents of this study have tended to give the positive feedback on relative advantage by throughout the mean and standard deviation value that has been analyzed by SPSS in 4.05 and 0.87 respectively. Likewise, this circumstance of prediction adopted by mobile health applications has proven to be a factor of relative advantage. In contrast, the small rating means the value of the factor gained from this study is throughout by perceived risk (M = 2.69, SD =

1.31). Although the perceived risk factor was obtained in a small rating, it is also an appropriate result which is at the level of medium.

Table 2: Mean and standard deviation score of adoption factors

Adoption Factors	Mean	Std. Dev.	Level of Agreement
Relative advantage	4.05	0.87	High
Perceived ease of use	4.00	0.88	High
Compatibility	3.99	0.81	High
Observability	3.92	0.83	High
Trialability	3.82	0.83	High
Perceived risk	2.69	1.31	Medium

4.3 Reliability Test

Table 3 shows the value of Cronbach's Alpha for each variable measured by using SPSS reliability analysis. There have 6 independent variables which include relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk. There have 4 items encompasses in each of the independent variables through this study. Based on the SPSS result, each of the independent variables has achieved by Cronbach's alpha coefficient value of 0.9, 0.9, 0.9, 0.9, 0.89 and 0.95 in respectively. While adoption of mobile health applications as a dependent variable, which has the Cronbach's alpha coefficient value of 0.92 shows excellent internal consistency in this study.

Table 3: Reliability test results

Variables	Cronbach's Alpha	N of Item
Relative advantage	0.90	4
Perceived ease of use	0.90	4
Compatibility	0.90	4
Observability	0.90	4
Trialability	0.89	4
Perceived risk	0.95	4
Total		32

4.4 Normality Test

This study was conducted to assess the relationship between adoption factors and adoption of mobile health applications among adults (20 years old to 60 years old) in Kulai, Johor. Based on the results gathered from SPSS, the researcher will prefer testing result carried out from the group of Kolmogorov Smirnov, due to the target respondents are more than 50 respondents throughout this study. Kolmogorov Smirnov test as a non-parametric method, and if the p-value is higher than 0.05, then the null hypothesis is accepted and data is considered to be distributed approximately normally. While if the p-value is less than, 0.05, the null hypothesis is rejected and the data is said to deviate from the normal distribution (Field, 2002). According to Table 4, the normality analysis between all variables in factor intention and mobile health applications adoption has come out with abnormal results of less than 0.05.

4.5 Hypotheses Test

Based on Table 5, the findings of the relationship between factor intentions of the adult user to the adoption of mobile health applications are showed are following:

H1: Relative advantage has significant relationship with adoption of mobile health applications.

H2: Perceived ease of use has positively significant relationship with adoption of mobile health applications.

H3: Compatibility has positively significant relationship with adoption of mobile health applications.

H4: Observability has positively significant relationship with adoption of mobile health applications.

H5: Trialability has positively significant relationship with adoption of mobile health applications.

H6: Perceived risk has negatively significant relationship with adoption of mobile health applications.

Table 4: Result of normality test

Items	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
avRA	0.140	245	0.000	0.863	245	0.000
avPEOU	0.164	245	0.000	0.876	245	0.000
avC	0.171	245	0.000	0.898	245	0.000
avO	0.141	245	0.000	0.902	245	0.000
avT	0.115	245	0.000	0.923	245	0.000
avPR	0.178	245	0.000	0.900	245	0.000
avAMHA	0.202	245	0.000	0.852	245	0.000
a. Lilliefors Significance Correction						

Table 5: Spearman's Rho correlation test

Variables			RA	PEOU	C	O	T	PR	AMHA
Spearman's Rho	RA	Correlation Coefficient	1.000	.728**	.693**	.723**	.654**	-.269**	.758**
		Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
		N	245	245	245	245	245	245	245
	PEOU	Correlation Coefficient	.728**	1.000	.622**	.711**	.629**	-.140*	.693**
		Sig. (2-tailed)	.000		.000	.000	.000	.020	.000
		N	245	245	245	245	245	245	245
	C	Correlation Coefficient	.693**	.622**	1.000	.678**	.608**	-.068	.709**
		Sig. (2-tailed)	.000	.000		.000	.000	.286	.000
		N	245	245	245	245	245	245	245
	O	Correlation Coefficient	.723**	.711**	.678**	1.000	.620**	-.102	.734**
		Sig. (2-tailed)	.000	.000	.000		.000	.112	.000
		N	245	245	245	245	245	245	245
	T	Correlation Coefficient	.654**	.629**	.608**	.620**	1.000	-.049	.685**
		Sig. (2-tailed)	.000	.000	.000	.000		.448	.000
		N	245	245	245	245	245	245	245
	PR	Correlation	-.269**	-.140*	-.068	-.102	-.049	1.000	-.200**

	Coefficient							
	Sig. (2-tailed)	.000	.020	.286	.112	.448		.002
	N	245	245	245	245	245	245	245
AMHA	Correlation Coefficient	.758**	.693**	.709**	.734**	.685**	-.200**	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.002	
	N	245	245	245	245	245	245	245

**Correlation is significant at the 0.01 level (2-tailed).

4.6 Discussions

(a) Objective 1: Identifying factors towards the adoption of mobile health applications among adults in Kulai, Johor

According to the outcomes of this study, most of the respondents chose relative advantage as the main factor (M = 4.05, 0.87) to adopt m-health apps. Relative advantage referring to have well performance features that encompass interface design, multimedia content embedded in the mobile health applications. The second factor towards the adoption of mobile health applications is flexibility. Mobile health applications flexibility enables users to customize their health goal through the health goal setting provided by mobile health applications. Not only with customization of goal setting is important, while the personal data tracking, and tailored messaging, were universally taking of important part for adult users to adopt mobile health applications. According to a study carried out by Chan *et al*. (2017), they found that mobile health applications facilitate young adulthood users to practice a healthier lifestyle. This is because mobile health applications provide real-time feedback on biometric data such as the track of their heart rate and calorie expended. By monitoring their heart rate and calorie, users are stimulated to get their steps walking more than yesterday. Indirectly, this situation will definitely help m-health apps users stick around with play their video games.

(b) Objective 2:

Regarding the results of the relationship, the test shows that all studied factors i.e., relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk have a relationship with the adoption of mobile health applications. The hypotheses are supported by the results of the test substantively. For instance, the result shows that the factors towards adoption of mobile health application are heavily influenced by relative advantage, perceived ease of use, compatibility, observability and trialability. However, only the factor i.e., perceived risk has less relationship towards adoption of mobile health applications. Based on the results in table 5 indicates that there is a strong positive significant relationship between relative advantage and adoption of mobile health applications. This outcome reflects that mobile health applications offer a lot of benefits to increase users' intention to adopt mobile health applications. This study's findings were similar to previous studies in which the advantage and usability of the system have effects on the behaviour of mobile health applications adoption. Karahanna *et al*. (1999) and Polites and Karahanna (2012) identified that there was consistent relationship between relative advantage and the intention to adopt mobile health applications.

However, when examined the last factor, perceived risk, a variable taken from Technology Acceptance Model (TAM), this factor has a negative and significant relationship with the adoption of mobile health applications. The results in Table 5 shows that the value of the correlation coefficient of the perceived risk factor is -0.200. The value shows that respondents in this survey do not so concerned about the possibility of disclosure of their health and personal information when using mobile health applications. The previous study by Sutanto *et al*. (2013), found that despite the perceived risks of online applications, users still choose to overcome their fears and adopt new

technologies. Therefore, this result reflects that most adult users trust the performance of mobile health applications outperforms the feeling of perceived risks of the mobile health applications.

5. Conclusion

In conclusion, all studied factors i.e., relative advantage, perceived ease of use, compatibility, observability, trialability and perceived risk have a significant relationship with the adoption of mobile health applications. The first five factors have a positive correlation and the last factor has a negative relationship with the adoption of mobile health applications. Among the factors, the relative advantage is the most dominant towards the adoption of mobile health applications, particularly in Kulai, Johor, the location where this study was executed. Adults in Kulai, Johor choose mobile health applications due to the quality of their functions and able to provide more values such as features of real-time feedback data of health result based on their health conditions. While the adapters are also easier to access mobile health applications to maintain and track their health conditions anywhere and anytime.

For software developers, to develop not only innovative mobile health applications but also marketable, it is essential to know the factors towards the adoption of the applications. This study may provide some insights towards developing marketable mobile health applications.

Acknowledgement

This research was made possible by support from the Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia.

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