*Research Article*

# Factors Influencing the Intention to Use Mobile Health Applications Among Young Adults in Malaysia

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## ABSTRACT

Mobile health applications are the confluence of wireless technologies in mobile and computing device health statistics systems. This study explains the factors of effort expectancy, performance expectancy, social influence, facilitating conditions and health consciousness that influence young adults' intention in Malaysia to use mobile health applications. A cross-sectional design was used to collect quantitative data from 312 Malaysian respondents, and the data was collected via an online survey. The relationships between the factors to use mobile health applications were investigated in this study. All the factors positively affected the relationship between the intention to use mobile health applications. The findings revealed that health consciousness greatly impacted the intentions to use mobile health applications. Other theories can be applied to guide future studies to discover more factors that influence young adults to use mobile health applications.

## INTRODUCTION

M-health refers to healthcare mobile application facilitated by the convergence of wireless technology in mobile and computing device health statistics systems, as well as different networks consisting of Bluetooth and mobile networks. The main objective of the M-health application is to improve well-being outcomes through dynamic self-administration and contribute to medical services. The quick spread of the coronavirus disease (COVID-19) as well as the severity of the sickness in a significant number of individuals have demanded exceptional public health measures. To solve the issue, health institutions throughout the world

are fighting against the clock, adopting extraordinary steps. There are several alternatives for health professionals to discover, treat and monitor COVID-19 patients effectively and efficiently, as well as to prevent the disease from spreading further (Echeverría et al., 2020). Therefore, this study is aimed to assess the factors that influence the adoption of mobile health applications among young adults in Malaysia. The outcomes of this study are useful for the researchers to understand the relationship between determinants and behavioural intentions.

There are five objectives of this research:

1. To identify the relationship between performance expectancy and intention to use mobile health applications among young adults in Malaysia.

2. To examine the relationship between effort expectancy and intention to use mobile health applications among young adults in Malaysia.

3. To identify the relationship between social influence and intention to use mobile health applications among young adults in Malaysia.

4. To identify the relationship between facilitating conditions and intention to use mobile health applications among young adults in Malaysia.

5. To identify the relationship between health consciousness and intention to use mobile health applications among young adults in Malaysia.

**Signification of the Study**

**Society**

Chronic disease prevalence is steadily increasing in developing countries, as is the burden of communicable diseases. The use of mobile technologies such as cellular phones to assist public health and clinical care, or "mobile" health, or M-health, holds promise in responding to both types of disease burdens. In 2018, over half of all smartphone users have at least one mobile health app on their devices. Mobile health applications have been proven to increase medication adherence for patients with chronic diseases, monitor eating behaviours for diabetic patients, and encourage the gathering of blood pressure measurements for hypertensive patients, according to a series of studies (Lu et al., 2018).

**Government**

By offering a clear argument for the necessity of designing and implementing mobile health technology and applications for the general population, this research has the potential to have a considerable impact on government and healthcare policy (Pai & Alathur, 2019). Literature in this subject is insufficient in articulating the value of mobile phone-based healthcare solutions for health services and serious disease outbreaks, particularly in Malaysia.

**Researchers**

The creative application of emerging mobile and wearable health information and sensing technologies (M-health) has the potential to lower healthcare costs and improve well-being in a variety of ways (Birkhoff & Moriarty, 2020). These apps are being developed in a range of fields, but more research is needed to fully understand the benefits and drawbacks of using mobile technologies to improve health outcomes. The proof regarding M-health's efficacy is currently lacking. Even though these technologies are enticing and appear to be harmless, more research is needed to determine when, where and for whom M-health devices, applications and systems are effective (Brinkhoff & Moriarty, 2020).

**Young Adult**

The adult Certified Health Executive population is a highly attractive group in which to initiate M-health initiatives due to their relatively young age, affinity with mobile devices, chronic conditions necessitating lifelong surveillance and the general need to reduce the burden of disease. The additional monitoring of clinical parameters (e.g. heart rate, blood pressure, weight, etc.) might enable physicians and specialised nurses to improve the early recognition of clinical deterioration and to deliver sophisticated patient-tailored care remotely, e.g. titration of diuretics and antiarrhythmic agents (Schuuring et al., 2016).

**LITERATURE REVIEW**

**Intention to use M- health application**

The intention to use the M-health application model of health service utilization is one of the most extensively used models for improving the understanding of why people use health services and promoting equitable access to healthcare (Andersen & Newman, 2005). Even though this approach is commonly utilized in the general healthcare industry, it has never been applied in a mobile health study because mobile health is a healthcare innovation, applying this paradigm to it could help design a more comprehensive mobile health adoption model.

**Effort Expectancy**

According to Venkatesh et al. (2003), effort expectancy defines as the accuracy and ease with which a system can be used. The premise behind effort expectation is that there are relationships between the amount of effort put in at work, the achievements achieved because of that effort and the rewards received because of that effort (Ghalandari et al. 2012). Adults' attempts to utilize the M-health app via gadget technology such as smartphones are expected to make it simpler for these groups to see their level of health regularly. In studies examining M-health applications in the context of Unified Theory of Acceptance and Use of Technology, also discovered that effort expectancy has a positive relationship on intentions to use M-Health apps (Alam, Hu, & Barua, 2018).

**Performance Expectancy**

Performance expectancy is an important concept that influences the adoption and eventual use of information systems. Indicators such as perceived usefulness, intrinsic and extrinsic

motivation, job-fit, relative advantage and information technology outcome expectancies all play a role in determining performance expectancy (Wu et al., 2012).

According to Bora Semiz and Semiz, (2021), performance expectancy has a considerable impact on users' use of mobile apps. However, past study from (Hoque and Sorwar, 2017), performance expectancy creates a positive relationship between the consumer intentions to use M-Health because it can affect consumers significantly in terms of mobile applications usage.

## Social Influence

Social influence can be defined as the process by which the presence or actions of others modify an individual's attitudes, beliefs or behaviours. Social influence is also defined as the extent to which an individual believes a person should use new systems and new technologies (Venkatesh et al., 2003). The four areas of social influence are compliance, compliance and adherence, and minority influence which are used in a study. In this study, social influence was used to support users around consumers among young adults using the M-health app. Social influence was employed to encourage customers to use M-health applications from those around them (Alam, Hu, & Barua, 2018).

## Facilitating Conditions

The measure to which society believes infrastructure can be utilized to adopt new technologies is referred to as the facilitating condition. In UTAUT, facilitating refers to how satisfied an individual feels that the authoritative and specialized foundations needed to utilize the proposed framework are set up (Ghalandari, 2012). Based on the context of this study, the facilitating conditions have a direct impact on the use of M-health apps that can help push adults toward a healthy lifestyle. In addition, Dwivedi et al., (2016) also discovered that facilitating conditions had an impact on M-health application uptake. According to Alam, Hoque, Hu, & Barua (2020), their studies presented the facilitating conditions have a positive effect on the intentions of consumers to use M-health applications

## Health Consciousness

Health consciousness has been defined and conceptualized as the willingness to take health actions (Hsu, Chang, & Lin, 2016). According to Nagaraj (2021), this concept has been modified as a wellness-oriented lifestyle that describes the extent to which individuals care about healthy lifestyle practices such as nutritious food intake, physical exercise and their living environment. The degree to which health concerns are interwoven into a person's regular activities is consistently characterized as health awareness. (Jayanti & Burns, 1998). Health consciousness is the most significant predictor to adopting health apps, while M-Health literacy and health information orientation did not directly influence the adoption of M-Health apps.

## Research Hypotheses

The literature review highlighted that independent variables like effort expectancy, performance expectancy, social influence, facilitating conditions and health consciousness do affect the intention to use M-health application. Therefore, the study planned to 312 respondents will examine the level of effect among these variables. Based on the literature discussed, the hypotheses of this study were summarized in the following manner:

H1    There is a positive relationship between effort expectancy and intention to use the M-health application

H2    There is a positive relationship between performance expectancy and intention to use M-health applications

H3    There is a positive relationship between social influence and intention to use the M-health application

H4    There is a positive relationship between facilitating conditions and intention to use the M-health application

H5    There is a positive relationship between health consciousness and intention to use the M-health application

## Research Framework

A research framework is illustrated as shown in Figure 1 to investigate the connection between the effort expectancy, performance expectancy, social influence, facilitating conditions and health consciousness to intention to use M-health application. The independent variables are effort expectancy, performance expectancy, social influence, facilitating conditions and health consciousness. The dependent variable is the intention to use M-health application.
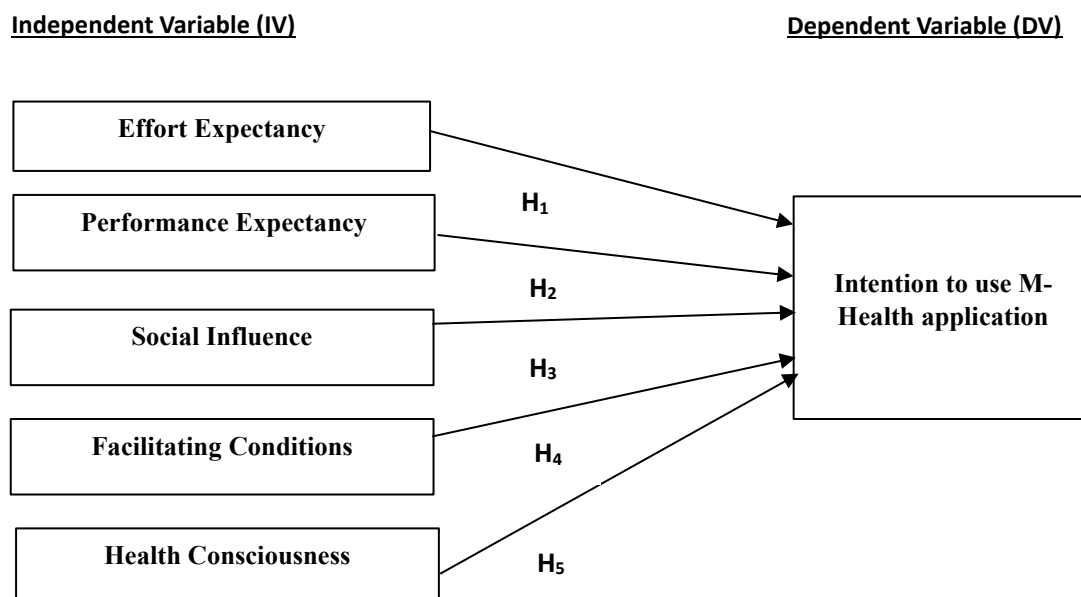
## METHODOLOGY

### Research Design

As a result, rather than a causal design, a correlational research design will be used in this study. This study employed a cross-sectional survey method to collect information concerning the exposure to the intention to use mobile health applications. In this study, it was important to gather data relating to M-health and to collect detailed information about the adoption of mobile health applications among young adults in Malaysia.

### Data Collection

Google form was used to develop the online questionnaire. The weblink for the online questionnaire was then distributed via social media platforms, such as Facebook, and WhatsApp and through personal contacts of the researchers. 320 respondents have participated in this study.

### Sampling

Owing to the sampling frame's unavailability, the non-probability technique was used in this study using purposive sampling. The researcher selected Malaysian adults who are above 18 years old, and who are expected to understand the concept of "M-health application". The purposive sampling technique was suitable for this study because the respondents must fulfil certain criteria to be screened as respondents. A non-probability sampling techniques are suitable for studying theoretical impact based on conceptual frameworks (Hulland et al., 2017; Hayat, Ngah, Hashim, Dahri, Malik, & Rahayu, 2019).

### Data Analysis

The data in this study will be evaluated using the Smart PLS 3 for analysis of the partial least square structural equation modelling (PLS-SEM) technique. When numerous constructs are unobservable, SEM is a valuable tool in the behavioural and social sciences. SEM assists researchers in determining the one-dimensionality, dependability and validity of each concept. As a result, PLS-SEM was utilized for data analysis in this study to answer the research questions and objectives.

**FINDINGS**

Table 1: Frequency Analysis (n=312)

| Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| **Gender** | | |
| **Male** | 156 | 50.0 |
| **Female** | 156 | 50.0 |
| **Age** | | |
| **18-22 years** | 140 | 44.9 |
| **23-27 years** | 142 | 45.5 |
| **28-32 years** | 30 | 9.6 |
| **Race** | | |
| **Malay** | 161 | 51.6 |
| **Chinese** | 86 | 27.6 |
| **Indian** | 52 | 16.7 |
| **Others** | 13 | 4.2 |
| **Highest Education** | | |
| **SPM** | 40 | 12.8 |
| **Diploma** | 78 | 25.0 |
| **Degree** | 179 | 57.4 |
| **Master's degree** | 11 | 3.5 |
| **Doctoral** | 4 | 1.3 |
| **Residential** | | |
| **Urban** | 144 | 46.2 |
| **Suburban** | 67 | 21.5 |
| **Rural** | 101 | 32.4 |
| **Religion** | | |
| **Muslim** | 160 | 51.3 |
| **Buddha** | 49 | 15.7 |
| **Hindu** | 86 | 27.6 |
| **Christian** | 12 | 3.8 |
| **Others** | 5 | 1.6 |

Most respondents were young adults in Malaysia where the number of respondents is the same female (50%), and the remaining respondents (50%) were male. Regarding their age, the age of the respondents varied between 23 and 27 years has the largest number of respondents (45.5%), aged between 18 and 22 years (44.9%) and last of them aged from 28 and 32 years (9.6%). As for the respondents' ethnicity, most were Malay (51.6%) compared to Chinese (27.6%), Indian (16.7%), and others (4.2%). In terms of education, more than half of the respondents held a degree (57.4%) while (25%) being diploma. Only (1.3%) of respondents were doctoral. Only (12.8%) of SPM and master (3.5%). In terms of Residential area, more than half of the respondents held an urban (46.2%), with (21.5%) being suburban. Only (32.4%) of respondents were rural. Lastly, the descriptive analysis revealed that most of the respondents Religion, most were Muslim (51.3%) compared to Buddha (15.7%), Hindu (27.6%), Christian (3.8 %) and others (1.6%).

**Result of Descriptive Analysis**

The mean scores and standard deviations of the variable are shown in Table 2. The factors are considered low if the mean score is from 1.00 to 1.99 and high if the mean score is from 2.00 to 4.00. Table 2 shows result of descriptive analysis.

Table 2: Descriptive Analysis

| Variables | Items | Mean Score (M) | Standard Deviation (SD) |
|---|---|---|---|
| Effort Expectancy | Learning how to use mobile health applications is easy for me. | 4.08 | 1.128 |
| | My interaction with mobile health applications is clear and understandable. | 4.03 | 1.137 |
| | It is easy for me to become skilful at using mobile health applications. | 4.01 | 1.125 |
| Performance Expectancy | The mobile health application is useful to support critical aspects of my healthcare. | 3.90 | 1.232 |
| | The use of the mobile health application will enhance the effectiveness in managing my healthcare. | 4.00 | 1.102 |
| | Using the mobile health application will improve my productivity. | 3.88 | 1.186 |
| | Overall, the mobile health application will be useful in managing my healthcare. | 3.98 | 1.105 |
| Social Influence | I am interested in trying to use the mobile health application when influenced by close acquaintances. | 3.85 | 1.261 |
| | I am easily influenced to try using the latest mobile health application. | 3.81 | 1.161 |
| | I followed to use this mobile health application from a social media influencer. | 3.81 | 1.216 |
| Facilitating Conditions | I have the resources necessary to use mobile health application. | 3.90 | 1.192 |
| | I know necessary to use the mobile health application. | 3.84 | 1.110 |
| | The mobile health application is compatible with other technologies I use. | 3.86 | 1.156 |
| Health Consciousness | Using the mobile health application is appropriate for my current situation. | 3.96 | 1.149 |
| | Using the mobile health application is convenient for me in all parts of my life. | 4.00 | 1.073 |
| | I believe that using this mobile health application is a good fit for the way I manage my health. | 3.95 | 1.110 |

| | | | |
|---|---|---|---|
| Intention | I intend to use a mobile health application to consult health issues when needed in the future. | 3.99 | 1.173 |
| | I plan to use a mobile health application to consult health issues when needed in the future. | 3.93 | 1.153 |
| | I am willing to tell others about the good aspects of the mobile health application. | 3.94 | 1.183 |
| | I would recommend this mobile health application to others. | 3.98 | 1.144 |
| | I will tell my family and friends about my good experiences using the mobile health application. | 3.91 | 1.208 |

This study included 312 respondents and examined the mean and standard deviation on descriptive analysis for the dependent variable, Intention to use M-health application, and independent variables, effort expectancy, performance expectancy, social influence, facilitating conditions and one extra constructs, health consciousness of the questionnaire.

The mean score obtained from a descriptive analysis is shown in Table 2. To summarize, the highest mean score for an independent variable, effort expectancy (4.0406± 1.02964), followed by performance expectancy, (3.9399± 1.04125), social influence (3.8237± 1.07884), facilitating conditions (3.8675± 1.03679), and health consciousness (3.9712± 1.00919). Thus, the mean score of the dependent variable is intention (3.9500± 1.04451).

## Result of Convergent Reliability

Table 3: Convergent Reliability

| Constructs | Items | Loadings | AVE | CR |
|---|---|---|---|---|
| Effort Expectancy | EE 1 | 0.912 | 0.830 | 0.936 |
| | EE 2 | 0.913 | | |
| | EE 3 | 0.908 | | |
| Performance Expectancy | PE1 | 0.877 | 0.812 | 0.945 |
| | PE2 | 0.926 | | |
| | PE3 | 0.910 | | |
| | PE4 | 0.889 | | |
| Social Influence | SI1 | 0.885 | 0.794 | 0.921 |
| | SI2 | 0.886 | | |
| | SI3 | 0.903 | | |
| Facilitating Conditions | FC1 | 0.891 | 0.809 | 0.927 |

| | | | | |
|---|---|---|---|---|
| | FC2 | 0.903 | | |
| | FC3 | 0.904 | | |
| Health Consciousness | HC1 | 0.902 | 0.826 | 0.934 |
| | HC2 | 0.914 | | |
| | HC3 | 0.910 | | |
| Intention To Use M-Health Application | MH1 | 0.893 | 0.794 | 0.951 |
| | MH2 | 0.897 | | |
| | MH3 | 0.897 | | |
| | MH4 | 0.879 | | |
| | MH5 | 0.890 | | |

The measurement model can be confirmed valid and reliable if the loading is higher than 0.5, the average variance extracted (AVE) is higher than 0.5, and the composite reliability is higher than 0.7, respectively (Hair et al., 2017). Table 3 clearly illustrates that all the requirements to establish convergent validity have been fulfilled; hence, the study concludes that convergent validity was not a problematic issue for the study. The summary of convergent validity for the measurement model was summarized

**Result of Discriminant Validity**

Table 4: Discriminant Validity

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Effort Expectancy | 0.793 | | | | | | |
| 2.Facilitating Conditions | 0.725 | 0.899 | | | | | |
| 3.Health Consciousness | 0.714 | 0.837 | 0.818 | | | | |
| 4.Intention to Use M-Health Application | 0.733 | 0.839 | 0.848 | 0.891 | | | |
| 5.Performance Expectancy | 0.812 | 0.821 | 0.816 | 0.818 | 0.789 | | |
| 6.Social Influence | 0.733 | 0.811 | 0.791 | 0.792 | 0.820 | 0.891 | |

In terms of the Hybrid Technology Multi Thread criterion, the values should not be more than 0.9 (Franke and Sarstedt, 2019). Table 4 demonstrated the discriminant validity established from the HTMT criterion, given that all values are less than 0.9 are established. It can be concluded that the respondents understood that the given constructs are distinct. These validity tests have shown that the measurement items are valid and reliable.

**Result of Direct Hypothesis**

Table 5: Direct Hypothesis

| | Relationship | Std Beta | Std error | P value | Confidence LL | Interval UL | VIF | Decision |
|---|---|---|---|---|---|---|---|---|
| **H1** | Effort Expectancy | 0.079 | 0.050 | 0.058 | 0.000 | 0.167 | 3.093 | Not Supported |
| **H2** | Performance Expectancy | 0.153 | 0.073 | 0.018 | 0.021 | 0.271 | 3.298 | Supported |
| **H3** | Social Influence | 0.108 | 0.078 | 0.081 | -0.018 | 0.248 | 3.934 | Not Supported |
| **H4** | Facilitating Condition | 0.273 | 0.080 | 0.000 | 0.142 | 0.399 | 3.244 | Supported |
| **H5** | Health Consciousness | 0.352 | 0.081 | 0.000 | 0.204 | 0.475 | 3.202 | Supported |

Table 5 shows the structural model for collinearity issues should be checked by examining the variance inflation factor values of all sets of predictor constructs in the structural model (Hair et al., 2017). As shown in Table 5 all values for the VIF of each sample construct are smaller than 3.3, as advocated by Diamantopoulos and Siguaw (2006). The present analysis confirms that collinearity was not a problem and can progress to the testing of hypotheses.

The research hypotheses may be supported if the beta values are in accordance with the hypothesis's direction, t-values, and p-value. In terms of confidence interval, which is lower level (LL) and upper level (UL), it should not straddle or overlap at zero between the LL and UL (Hair et al., 2018). In the present analysis, a bootstrapping approach with resampling of 5,000 was used, in which the findings for the direct effect show that five hypothesized relationships were supported, and one hypothesized relationship was not supported. Table 5 below shows that the first hypothesis, effort expectancy was not related to intention (ß = -0.079, t = 0.050, LL = 0.000, UL = 0.167, p < 0.058). The second hypothesis, performance expectancy was positively related to intention (ß = 0.153, t = 2.102, LL = 0.021, UL = 0.271, p < 0.018). Next, third hypothesis, social influence was not related to intention (ß = 0.108, t = 1.398, LL = -0.018, UL = 0.248, p < 0.081). This is followed by the fourth hypothesis, facilitating condition was positively related to intention (ß = 0.273, t = 1.080, LL = 0.142, UL = 0.399, p < 0.000). Lastly, the fifth hypothesis, health consciousness was positively related to intention (ß = 0.352, t = 4.332, LL = 0.204, UL = 0.475, p < 0.000). Table 5 below indicates that fourth direct hypotheses developed for the model were significant; thus H2, H4, and H5 were accepted, and two hypothesis was not supported; thus, H1 and H3 were rejected.

**DISCUSSIONS & RECOMMENDATIONS**

The purpose of this study was to identify the factors on the intention to use M-health applications among young adults in Malaysia; effort expectancy, performance expectancy, social influence, facilitating conditions, and health consciousness. The results of this study

indicate that there is a significant relationship between the independent and dependent variables. The findings of this study show that each variable is a strong predictor of intention to use M-health applications among Malaysian young adults. Correspondingly, the fourth direct hypotheses developed for the model was significant; thus H2, H4, and H5 are accepted, and two hypotheses were not supported; thus, H1 and H3 are rejected.

The recommendation is future research should expand the geographic coverage of the study concerning the population and distribution of the questionnaire. The current study only focused on the registered use of mobile health applications among young adults in Peninsular Malaysia. Moreover, the second recommendation is most of the respondents in this study are Malaysian young adults only aged from 18 to 32 years. Third, future research could extend the work of this study by using other study designs, such as an experimental study with an intervention tool to examine the causal relationships between the predictors and intention.

Besides that, future research could use multiple informants to enhance the validity of the research findings as well. Furthermore, it suggested for future study to explore the effect of other psychological capital regarding personal resources such as optimism and hope as a moderating role in strengthening the positive relationship intention to use M-health application. Finally, future work should examine whether adding other factors related to the intention to use mobile health will increase young adults' interest in M-health and in turn improve the advanced model of the research framework.

**CONCLUSION**

The study tested a model that included five key dimensions in effort expectancy, performance expectancy, social influence, facilitating conditions and health consciousness to achieve this goal. The proposed model developed in this study yielded useful results, such as the observation that effort expectation is positively related to intention and performance expectancy is similarly related to the intention. Social influence, on the other hand, was found to have a beneficial impact on intention. Facilitating conditions, on the other hand, were found to have a favourable impact on intention. However, it was discovered that health consciousness is favourably related to intention. The results showed that most of the hypotheses examined had a high statistical significance. Based on the statistical findings of this investigation, it can be inferred that the model developed in this study has more predictive ability than the baseline model.

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