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Full Length Research Paper

Using the healthcare information adoption model to predict the adoption of telecare

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This study explores the prediction of the healthcare information adoption model (HIAM) which was created first time by Huang (2010) with regard to telecare. This study collects 390 samples in Taiwan and uses structure equation modeling (SEM) to test research model. The results reveal that the model can be considered good-fit models. It can possibly be used as an alternative approach to deliberate on the suitable adoption and acceptance of health care IT (telecare). This study is conducted from the perspective of users in order to ascertain the critical factors that affect telecare users in their inclination toward health care IT. In sum, the research results reveal that it is necessary to increase the users' awareness of the threat of diseases in order to increase the acceptance of telecare by users (health care IT). Moreover, safety, accuracy, cost of usage, and privacy of telecare equipment should also be considered.

Key words: Telecare, healthcare information adoption model, healthcare information adoption model (HIAM).

INTRODUCTION

An increase in the incidence of chronic diseases and aging population (people over 65 years old) has led to a considerable demand for health care; concomitantly, medical care expenses have also increased. These are important issues that require active attention from countries worldwide (Koch, 2006; Li and Perkins, 2007; OECD, 2007). Owing to the development of medical technology, enhancement of the general educational level and income of the general public, and the increased demand for accessibility to health care, countries have escalated their efforts pertaining to the research and development on relevant health care information technologies (health care ITs) so that health care services can be brought to people's doorsteps in order to enhance their well-being; hope in people's life expectancy increased trend, but also have a quality, efficient, accessibility and independent life. This also alleviates the problem of soaring medical expenses (Chiasson et al., 2007; Haux, 2006; Monk et al., 2006; Zheng et al., 2007). In the backdrop of this global trend, Taiwan is faced with an aging community that is increasing faster than in other developed countries (proportionally, its current aging population has already exceeded 10% of its entire population). It is expected that Taiwan will take merely 24.5 years to double its aging population from 7 to 14% of the entire population; Sweden, 85 years; and Germany and UK, 45 years each. Given the advantages of telecommunication technology and medical care, the Taiwanese government has invested considerable efforts in facilitating long-term care and has enlisted telecare as a development project in the newly developing Taiwan service industry for 2008. This project has gained prominent focus in the process of national development in the newly developing service industry. It is expected that by 2010, the telecare market will do a business worth US$ 2.151 hundred million and that telecare will become a trend in the twenty-first century (Haux, 2006; Miller, 2007). However, in Taiwan, since the development of this technology is still in its initial stages, the behavioral intention (BI) to use is of greater importance.

User acceptance of new information technologies (ITs)/information systems (ISs) is a primary factor in the success of ITs/ISs (Gagnon et al., 2003). Similarly, with respect to health care, user acceptance is also a key factor if health care ITs are to be used consistently (Akesson et al., 2007; Fitzgerald et al., 2003; Schaper

and Pervan, 2007; Zheng et al., 2007). Furthermore, health care ITs such as telemedicine technology cannot be used if patients refuse to cooperate with physicians (Zheng et al., 2007). Additionally, since the health care system is patient-oriented, this study, unlike most relevant applications of technology acceptance model (TAM) in the field of health care, mostly employs health care professionals rather than the general public (Kim and Chang, 2007; Wilson and Lankton, 2004) as the subjects of research (Chau and Hu, 2002; Pare et al., 2006; Schaper and Pervan, 2007; Tabish et al., 2008; Wu et al., 2007; Zheng et al., 2007). Therefore, if the study is conducted from the perspective of users, it will help understand their needs and desires and render the overall evaluation system more comprehensive (Wilson and Lankton, 2004). As is indicated by relevant literatures, presently, there are very few evaluation studies on telecare, particularly those that deal with a comprehensive evaluation system and the user aspect (Koch, 2006).

Recent studies have revealed that TAM (Davis, 1989; Davis et al., 1989; Venkatesh et al., 2003) and HBM (Lajunen and Rasanen, 2004; Rosenstock, 1966; 1974; Sun et al., 2006) are used respectively in general information technology (IT) and health care, while the explanations and predictions provided for the adoption and acceptance of health care ITs by users is considerably developed, thereby underlining TAM and HBM as widely applied theoretical models. However, relevant studies (Chau and Hu, 2002; Kim and Chang, 2007; Raghupathi, 1997; Schaper and Pervan, 2007; Venkatesh et al., 2003; Zheng et al., 2007) have indicated that the application of TAM in health care is underdeveloped and that TAM should be developed by more empirical studies in healthcare. In addition, it is suggested that TAM should integrate other acceptance theories that include relevant human and social factors (Taylor and Todd, 1995; Venkatesh and Davis, 2000). On the other hand, a comparison between TAM and HBM reveals that the two constructs—perceived usefulness (PU) of TAM and the perceived benefits (PB) of HBM—are similar. Therefore, these two models are, in some aspects, complementary. Hence, if they are integrated to investigate the explanations and predictions of the acceptance and adoption of health care IT, a better explanation of other variables will be possible for the reference of technology developers and policy makers. Thus, this study will focus on telecare (Haux, 2006) - a twenty-first century trend - to explore the prediction of the usage of healthcare information adoption model (HIAM) that it was created first time by Huang (2010) employed in health care IT.

Telecare

Telecare is described as “the use of telecommunications by a home care provider to link patients or customers to one or more out-of-home sources of care information, education, or service by means of telephones, computers, interactive television, or some combination of each” (Koch, 2006). It can be used for the promotion of home health care and for the prevention and monitoring of diseases, unlike telemedicine that is primarily related to diagnosis and treatment. Furthermore, clinical applications are mainly used for chronic ailments on the elderly, and in the field of pediatrics. In particular, their use in chronic ailments (such as diabetes, congestive heart failure, and asthma) has been confirmed with significant effectiveness (Hebert et al., 2006; Koch, 2006; Moehr et al., 2006). Furthermore, the other advantages are that they provide cost benefits (Bott et al., 2007; Buysse et al., 2008; Jerant et al., 2001; Johnston et al., 2000; Puentes et al., 2007), improve the quality of life (Schopp et al., 2006), can be used in customer relationship management (CRM), resolve the problem of overcrowding in medical institutes that are perennially filled with chronic patients, and alleviate the problems of increasing medical expenses (Ammenwerth et al., 2003; Haux, 2006; Koch, 2006; Miller, 2007; Suleiman, 2001). Moreover, not only the providers but also patients, families, and community members should be further educated on telecare in order to generate clinical value for telecare (Moehr, 2006).

Presently, with respect to telecare, evaluation studies are few in number, particularly those with an evaluation framework of the integrated model (including legal, ethical, organizational, economical, clinical, usability, and technical aspects). Although there has been a marginally increasing trend of relevant studies in recent years, they are not adequate in number. Especially in Asian area, evaluation studies of the integrated model are fewer than other countries (Koch, 2006). Thus, this study focuses on Taiwanese people - its subjects of research- to investigate user’s prediction to telecare.

Technology acceptance model (TAM)

TAM (Davis, 1989; Davis et al., 1989) is developed from the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980, 1975) and is primarily comprised of five constructs - perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATT), behavioral intention to use (BI), and actual system use (AU). Of these, PU and PEOU are the most important factors required for accepting new ITs; further, PEOU affects PU and ATT affects BI directly. PU is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” and PEOU, as “the degree to which a person believes that using a particular system would be free from effort” (Davis, 1989).

Although research on technology acceptance has considerably developed in the area of ISs, TAM has

disregarded the social influence on technology acceptance. Therefore, relevant studies (Taylor and Todd, 1995; Venkatesh and Davis, 2000) suggest that TAM should integrate other theories of acceptance in order to incorporate relevant human and social factors and facilitate its predictive and explanatory power. In addition, the number of studies on TAM in the field of health care, particularly in medical informatics, is rather limited. As a result, TAM should be developed by more empirical studies in healthcare (Chau and Hu, 2002; Kim and Chang, 2007; Raghupathi, 1997; Schaper and Pervan, 2007; Venkatesh et al., 2003; Zheng et al., 2007).

Relevant studies on the application of TAM in health care include: Chau and Hu (2002), which included 408 physicians as its subjects and evaluated their BI with respect to telemedicine technology. A comparison of the integrated Davis' TAM, the theory of planned behavior (TPB), and the integrated model reveals that TAM might be better than TPB in examining personal technology acceptance.

Wilson and Lankton (2004) used three theoretical models of IT acceptance (TAM, the motivational model, and the integrated model) to investigate the acceptance of provider-delivered e-health by 163 patients. This study indicates that future research should consider using other methods or constructs in order to develop a better model. In addition, based on three items that measure the need for health care - number of physicians consulted, number of visits during the past six months, and the existence of chronic diseases, - this study discovers that the assumption that "patients with more health care need will have higher acceptance of e-health" is not adequately validated. Further, this study suggests that future studies should investigate the important factors that influence the acceptance of e-health by patients.

Health belief model (HBM)

HBM (Rosenstock, 1966, 1974) is consisted of four constructs - perceived disease threat (PDT), perceived benefits (PB), perceived barriers of taking action (PBTA), and cues to action (CUES) of individuals, which act as triggers that stimulate people to take action (Strecher and Rosenstock, 1997). PB refers to a reduction in the risk of contracting illnesses and other nonhealth benefits, and PBTA refers to beliefs about costs or negative aspects of a course of action. PDT includes perceived susceptibility (one's subjective perception of the risk of contracting a health condition) and perceived severity (feelings concerning the seriousness of contracting an ailment or of leaving it untreated). Additionally, CUES, which act as triggers that stimulate people to take action, can be categorized into two groups: internal cue (such as physical discomfort and appearance of symptoms) and external cue (such as doctor's advice, encouragement from friends and relatives, and media education). HBM is commonly used in studies on health behaviors, particularly in explaining or predicting health-related behaviors (Lajunen and Rasanen, 2004; Sun et al., 2006).

RESEARCH MODEL AND HYPOTHESES

The BI and the usage of technology share a strong and significant causal relationship, and can be used to predict the actual usage (Cheng et al., 2006; Davis et al., 1989; Mathieson, 1991; Sheppard et al., 1988; Venkatesh and Morris, 2000). A meta-analysis of 87 studies reveals an average correlation of approximately 0.50 between behavioral intention and actual usage (Sheppard et al., 1988). Therefore, it is justifiable to use BI as a dependent variable to interpret the acceptance of telecare. Agarwal and Prasad (1999) also argued that for a survey-based research design, behavioral intention is more appropriate than actual usage as "it is measured contemporaneously with beliefs." On the other hand, Ajzen (1985) proposed the theory of planned behavior (TPB). He regarded that BI is a prerequisite for action and that only ATT cannot directly predict behavior. In contrast, only BI enables accurate predictions (Ajzen, 1985, 1989, 1991). Hence, the research model underlying this study is shown in Figure 1.

Based on TRA by Fishbein and Ajzen (1975), it is believed that if the attitude of an individual toward behavior is more positive, his/her BI is relatively stronger. On the contrary, when the attitude of an individual toward behavior is more negative, his/her BI is relatively weaker (Ajzen and Fishbein, 1980, 1975). Furthermore, assumptions 1 to 3 are obtained from relevant studies (Davis, 1989; Davis et al., 1989; Legris et al., 2003) based on TAM:

H_1: An individual's ATT and BI with respect to telecare are found to be positively associated.
H_{2a}: PEOU has a direct effect on the ATT of telecare.
H_{2b}: PEOU has a direct effect on PU.

As is indicated in HBM (Rosenstock, 1966, 1974), the stronger the PB, the perceived susceptibility, and the perceive severity, the easier it would be for one to take action (DeWit et al., 2005). The stronger the PBTA, the more difficult it would be for one to take action. These two cues would positively affect the chances of action; therefore, assumptions 3 to 6 are obtained from relevant studies (Lajunen and Rasanen, 2004; Rosenstock, 1966; 1974; Sun et al., 2006) based on HBM.

Furthermore, the healthcare information adoption model (HIAM) obtained from the integration of TAM and HBM helps obtain the assumption 3:

H_3: The stronger the perceived usefulness and benefits (PUB) of telecare, the stronger is the ATT of telecare.
H_4: The stronger the PDT (which includes perceived

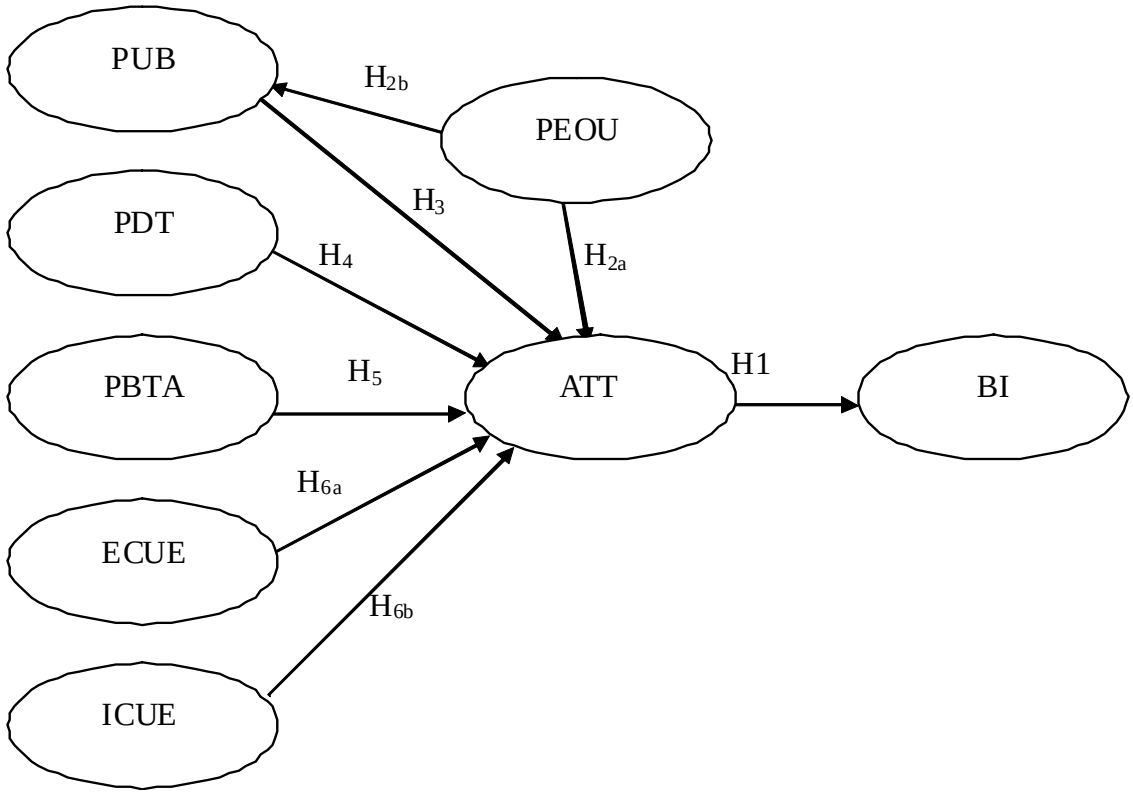

Figure 1. Healthcare information adoption model (HIAM) (research model and hypotheses); perceived ease of use (PEOU), perceived usefulness and benefits (PUB), perceived disease threat (PDT), perceived barriers of taking action (PBTA), external cues to action (ECUE), internal cues to action (ICUE), attitude toward using (ATT), behavioral intention to use (BI).

susceptibility and perceived severity), the stronger is the ATT of telecare.

H_5: The stronger the PBTA of telecare, the weaker is the ATT of telecare.

H_6: The stronger the CUES, the stronger is the ATT of telecare.

H_{6a}: The stronger the external cues to action (ECUE), the stronger is the ATT of telecare.

H_{6b}: The stronger the internal cues to action (ICUE), the stronger is the ATT of telecare.

METHODS

Research design and data collection procedures

This study indicates that since telecare is in its incipient stages in Taiwan, a convenience sample is used in order to deal with the fact that most people have little knowledge of telecare, for which the effectiveness of the questionnaire might be undermined. Furthermore, this study states that telecare can be mainly used in the promotion of home health care, in the prevention and monitoring of diseases, and for older population. The general public aged over 15 years, who visited the Taiwan International Senior Lifestyle and Health Care (SenCARE 2010) exhibition, were selected as the subjects of this research. This exhibition is the largest exhibition to be ever held in Taiwan, and it focuses on a comprehensive spectrum of resources for senior citizens. It is sponsored by the Taiwan External Trade Development Council (TAITRA) and supported by the Telecare Industry Alliance, Taiwan. The exhibition showcases products and services for physiological monitoring (including telecare), emergency aid products and services, healthcare facilities, etc., which is considered to be most benchmarking. A total of 390 valid copies of a questionnaire were obtained with females accounting for 50.3% of the respondents. Most of them were age group of 35 to 44 years (amounting to 33.3%), followed by the age groups of 45 to 54 and 55 to 64 years (amounting to 31.8% and 12.6% respectively). In terms of the educational level, 54.1% of the subjects had completed university and graduate schools (amounting to 36.4 and 17.7% respectively), and the average monthly income ranged between US$ 1,536 and 2,458.

Measures of the constructs

This study is based on the definition as well as on the constructs related to TAM (Davis, 1989; Davis et al., 1989) and HBM (Rosenstock, 1966, 1974). The healthcare information adoption model (HIAM) comprises eight constructs: perceived ease of use (PEOU), perceived usefulness and benefits (PUB), perceived disease threatens (PDT), perceived barriers of taking action (PBTA), external cues to action (ECUE), internal cues to action (ICUE), attitude toward using (ATT), and behavioral intention to use

Table 1. Fit indices for measurement and structural models.

Fit indices	Recommended value	Measurement model	Structural models
NFI	≥0.9	0.96	0.95
NNFI	≥0.9	0.96	0.95
CFI	≥0.9	0.96	0.96
IFI	≥0.9	0.96	0.96
RFI	≥0.9	0.94	0.94
PNFI	≥0.5	0.86	0.86
PGFI	≥0.5	0.62	0.62
RMSEA	≤0.1	0.08	0.09

(BI). The operationalization and sources of measurement items in this study are shown in Appendix A. All evaluation items employ a five-point Likert-type scale for measurement, where 1, 2, 3, 4, and 5 indicate “strongly disagree,” “disagree,” “fair,” “agree,” and “strongly agree,” respectively.

Data analysis methods

A confirmatory factor analysis (CFA) is employed to examine the reliability and validity of the measurement model. Furthermore, the structural equation modeling (SEM) technique is employed to interpret the causal model, by using LISREL 8.7 as the instrument of information analysis. Each of the impact coefficients has been estimated by using the maximum likelihood estimates method, while the model’s overall appropriateness of fit is evaluated by using the following eight indicators: normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), incremental fit index (IFI), relative fit index (RFI), parsimony normed fit index (PNFI), parsimony goodness of fit index (PGFI), and root mean square error of approximation (RMSEA).

RESULTS

Reliability and validity of the measurement model

In this study, the measurement model includes 33 indicators describing 8 latent constructs (PEOU, PUB, PDT, PBTA, ECUE, ICUE, ATT, and BI). As suggested by Hu and Bentler (1999), the overall model fit was assessed by eight goodness-of-fit indices: NFI, NNFI, CFI, IFI, RFI, PNFI, PGFI, and RMSEA. The results of CFA are presented in Table 1. The goodness-of-fit indices suggested that the measurement model was a good fit to the data. Therefore, we further evaluated the psychometric properties of the measurement model in terms of reliability, convergent validity, and discriminant validity.

CFA was used to examine the reliability and validity of the measurement model. The internal consistency of the measurement model was assessed by using Cronbach’s alpha and construct reliability (Table 2). The construct reliabilities (ranging from 0.79 to 0.92) and alpha coefficients (ranging from 0.79 to 0.91) of all the seven constructs were higher than the benchmark of 0.6, as suggested by Bagozzi and Yi (1988). The average variance extracted (AVE) measures the amount of variance in the specified indicators accounted for by the latent construct. Higher variance extracted values occur when the indicators are truly representative of the latent construct. The variance extracted value is a complementary measure for the construct reliability value. Table 2 showed that among the AVEs of the measures (ranging from 0.5 to 0.7), all of the constructs had a variance extracted value that were higher than the recommended level of 50%. This demonstrated high internal consistency and, thereby, the reliability of each construct.

The construct validity includes convergent and discriminant validities. Convergent validity can be assessed by examining the loading and their statistical significance through t-value. The results of the test of convergent validity are also presented in Table 2. The results reveal that all the values of standardized factor loadings of indicators in each construct ranged from 0.56 to 0.89, which was higher than the suggested level of 0.50 (Hair et al., 2006). Furthermore, they were statistically significant at $p < 0.01$ (t-value > 2.58). Hence, all indicators were significantly related their specified constructs, verifying the posited relationships among the indicators and latent variables. The convergent validity of the measurement indicators is supported. In addition, a discriminant validity test was performed to establish the distinction among the constructs used in this study. Thus, we followed the method suggested by Hair et al. (2006) by pairing these two latent constructs and subjecting them to two models of CFA. The first model allowed the correlation between the two constructs to be estimated (unconstrained), while in the other model, the correlation between the two constructs was set at 1 (constrained). We then used the chi-square difference test to compare the first and second models. All the chi-square difference values were statistically significant at $p < 0.01$. Hence, the discriminant validity is confirmed. In summary, the measurement model demonstrated adequate reliability, convergent validity and discriminant validity.

Table 2. Reliability and validity results.

Category	Standardized factor loading
Perceived ease of use (0.86, 0.87, 0.7) [a]	
PEOU1	0.70
PEOU2	0.83
PEOU3	0.78
PEOU4	0.80
Perceived usefulness and benefits (0.88, 0.87, 0.6) [a]	
PUB1	0.73
PUB2	0.78
PUB3	0.83
PUB4	0.64
PUB5	0.86
Perceived disease threat (0.79, 0.79, 0.5) [a]	
PDT1	0.57
PDT2	0.76
PDT3	0.72
PDT4	0.73
Perceived barriers of taking action (0.92, 0.91, 0.7) [a]	
PBTA1	0.82
PBTA2	0.80
PBTA3	0.84
PBTA4	0.85
PBTA5	0.72
PBTA6	0.80
External cues to action (0.85, 0.85, 0.5) [a]	
ECUE1	0.56
ECUE2	0.72
ECUE3	0.80
ECUE4	0.80
ECUE5	0.59
ECUE6	0.69
Internal cues to action	
ICUE	-
Attitude toward using (0.89, 0.88, 0.7) [a]	
ATT1	0.89
ATT2	0.84
ATT3	0.83
Behavioral intention to use (0.91, 0.91, 0.7) [a]	
BI1	0.88
BI2	0.82
BI3	0.86
BI4	0.80

[a] Values in parentheses for constructs indicate construct reliability, Cronbach's alpha, and AVE, respectively.

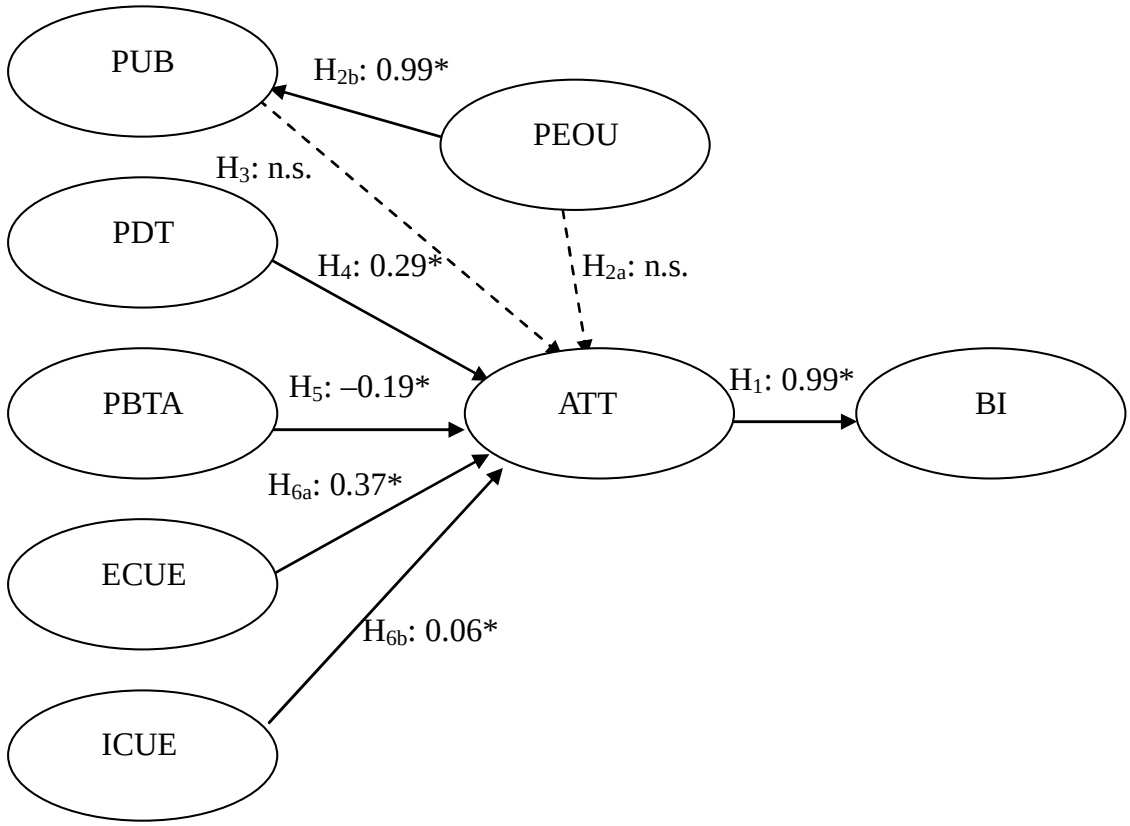

Figure 2. The results of structural model; perceived ease of use (PEOU), perceived usefulness and benefits (PUB), perceived disease threat (PDT), perceived barriers of taking action (PBTA), external cues to action (ECUE), internal cues to action (ICUE), attitude toward using (ATT), behavioral intention to use (BI). *Path coefficient is significant at the 0.05 level. n.s. insignificant at the 0.05 level (path coefficient is obtained from this study).

Structural model

The SEM technique is used to interpret the causal model. The structural model was a good fit to the data, the variance explained that with respect to the model—HIAM—the R^2 value of the behavioral intention to take action were 0.981; the value was higher than 0.5, which implies that the model has adequate favorable explanatory power.

Figure 2 indicates the structural relationship of the model, and it also demonstrates the standardized path coefficients that refer to the significant structural relationship among the tested variables. As is evident in the results of HIAM shown in Figure 2, ATT (standardized path coefficients = 0.99) significantly and positively affects BI (H_1); PEOU (H_{2b}: standardized path coefficients = 0.99) significantly and positively affects PUB; PBTA (H_5: standardized path coefficients = –0.19) significantly and negatively affects ATT; PDT, ECUE, and ICUE (H_4, H_{6a}, H_{6b}: standardized path coefficients are 0.29, 0.37, and 0.06, respectively) significantly and positively affect ATT. Since the impacts of PEOU (H_{2a}) and PUB (H_3) on ATT are not yet statistically significant, it is supposed that H_1, H_{2b}, H_4 to H_6 are supported, while the same does not hold for H_{2a} and H_3.

DISCUSSION

The purpose of this study is to explore the prediction of the healthcare information adoption model (HIAM) with regard to telecare. The primary results are recapitulated thus.

The model reveals that ATT and BI with respect to telecare is positively and significantly associated, and the result is consistent with those of relevant past studies (Ajzen and Fishbein, 1980; Chau and Hu, 2002; Davis, 1989; Davis et al., 1989; Fishbein and Ajzen, 1975; Legris et al., 2003; To et al., 2008). In addition, the results of the analysis using the HIAM reveal that the most critical factor that affects ATT is ECUE, followed by PDT and PBTA. The other approach deliberating on user acceptance, which affects telecare, shows that the acceptance of telecare (health care IT) is most influenced by important people (medical care personnel, media, and family), followed by PDT and PBTA. In other words, for

policy makers, it is necessary to increase the awareness about the threat of diseases (including the susceptibility and severity of disease) through medical care personnel, media, and the family of users so as to increase the user acceptance of telecare (health care IT) and effectively facilitate its use. On the other hand, it is necessary to enhance the usefulness and ease of use of telecare in order to highlight the user acceptance of telecare. It is also necessary to indicate the safety and accuracy of equipment as well as the expenses and privacy of users.

Finally, this study has discovered that the HIAM model can be considered good-fit models and can be used as important future references for relevant researchers, developers of technology, and policy makers.

This study is conducted from the perspective of users in order to ascertain the critical factors that affect telecare users in their inclination toward health care IT. This is helpful in appreciating the needs and desires of users or patients such that the integral evaluation system can be rendered more comprehensive (Koch, 2006; Wilson and Lankton, 2004).

In sum, the research results reveal that it is necessary to increase the users' awareness of the threat of diseases in order to increase the acceptance of telecare by users (health care IT). This can be achieved by focusing on medical care personnel and media. Further, it is also necessary to consider the safety and accuracy of the equipment as well as the expenses and privacy of users, in order to facilitate the use of telecare, which can be used as an important future reference for technology developers and policy makers. Unlike general IT that merely focuses on enhancing PU and PEOU, health care IT can be used as a reference for other approaches that deliberate on decision making as well as on the acceptance of telecare by users.

The results of this study demonstrate that the healthcare information adoption model (HIAM), is good-fit model. The results of this research can help enhance the understanding pertaining to the relationship and reference of other important user variables in the choice of telecare by relevant researchers, technology developers, and policy makers.

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APPENDIX

Appendix A. Measuring items used in this study.

Categories	Measure
Perceived ease of use (Davis, 1989; Davis et al., 1989)	
PEOU1	I find that using telecare is simple.
PEOU2	I find that telecare is easy to learn.
PEOU3	I find that telecare is easily understandable and clear.
PEOU4	Overall, I find that using telecare is convenient.
Perceived usefulness and benefits (Davis, 1989; Davis et al., 1989; Huang, 2010; Rosenstock, 1966; 1974)	
PUB1	I find that using telecare is helpful in monitoring health.
PUB2	I find that using telecare makes me safer in my daily life.
PUB3	Telecare can enhance my level of convenience in accessing medical care service.
PUB4	Telecare can enhance the quality of my life.
PUB5	Overall, I find telecare highly useful.
Perceived disease threat (Rosenstock, 1966; 1974)	
PDT1	I find that I can fall ill easier than others.
PDT2	I find that I can suffer from high blood pressure, diabetes, heart disease and other chronic diseases in the future.
PDT3	I find that my health is deteriorating.
PDT4	I find that I can suffer from high blood pressure, diabetes, heart disease, and other chronic diseases in the future and could be forced to change my previous way of life.
Perceived barriers of taking action (Rosenstock, 1966; 1974)	
PBTA1	For me, the cost of telecare is a very heavy burden to bear.
PBTA2	I am concerned that telecare is not adequately secure and that it might lead to the leak or abuse of my personal information.
PBTA3	I am concerned that telecare would violate my privacy.
PBTA4	I am concerned that the accuracy and reliability of the instruments of telecare are not high enough.
PBTA5	I am concerned that I might forget to use the telecare equipment.
PBTA6	I am concerned that I might be too busy to use the telecare equipment.
External cues to action (Rosenstock, 1966; 1974)	
ECUE1	Relatives encourage and support me to use telecare.
ECUE2	Friends encourage and support me to use telecare.
ECUE3	Medical care personnel encourage and support me to use telecare.
ECUE4	Media endorses the use of telecare.
ECUE5	I have always obtained health-related information from TV, newspapers, and other media.
ECUE6	I have always obtained health-related information from the Internet.
Internal cues to action (Rosenstock, 1966; 1974)	
ICUE	How many times did you fall sick in the last three months?
Attitude toward using (Taylor and Todd, 1995)	
ATT1	I like using telecare.
ATT2	Overall, I consider telecare to be just right.
ATT3	In my old age, using telecare would be ideal.
Behavioral intention to use (Taylor and Todd, 1995)	
BI1	Overall, I am highly willing to use telecare.
BI2	If necessary, I would use telecare often.
BI3	In my old age, I am willing to use telecare.
BI4	In my old age, I would use telecare often.