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Explanatory Modelling of Factors Influencing Senior Citizen Telehealth Adoption in COVID-19 Pandemic

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Abstract

COVID19 crisis have caused profound changes in our society. A restricted way of living to limit possible widespread contraction has been the new norm. In healthcare, the center of this crisis, the traditional face-to-face consultation is shifting to a technologically backed system of telehealth. The objective of the rollout is to continue to provide basic healthcare service in the convenience and safety of the patients. In the Philippines, this is targeted to prioritize the most vulnerable age group of senior citizen given their needs and implications of quarantine measures. The depth of this transformation, however, is ravaging for senior citizens which are in customary and unfit for this dramatic technology shift. Given this, the objective of the study was to shed light on the significant factor for adoption. To achieve this, the study extended the UTAUT to formulate Health Crisis Technology Adoption Model which incorporates perceived trust and moderated by technological anxiety, resistance to change, and COVID-19 fear. Using Structural Equation Modelling (SEM), the study uncovered that behavioral intention to use telehealth is highly motivated by: low effort needed to use and learn it; support and motivation from important referent; perception of trustworthiness; time reduction and increase in service quality on healthcare as compared to traditional face-to-face checkups; and availability of instructions, trainings, and needed facilities to operate telehealth. The study also determined that COVID-19 fear dampen the conditional barriers or requirements for adoption while technological anxiety and resistance to change amplifies the needed perceived positive benefits from using telehealth.

Keywords: *COVID19, Teleheath, Technology Adoption, UTAUT, Structural Equation Modeling*

INTRODUCTION

Coronavirus disease 2019 (COVID-19) has been the most prevalent health crisis in the recent times (Center of Disease Control and Prevention, 2020). As of the writing of this paper, the global current total toll of COVID 19 cases is 504 million, with Philippines being the third highest contributor for Asia (University of Oxford, 2022). Among all, senior citizens are the most vulnerable age group with 8 of 10 deaths coming from them (Center of Disease Control and Prevention, 2020).

Given the timeline, current solutions focus in minimizing the person-to-person contact since the transmission is known to be via droplets (i.e., "social distancing", travel bans, quarantines, etc.). However, with this solution, profound changes in interaction have been introduced. For instance, in healthcare, the traditional face-to-face consultation is now shifting to telehealth (Schwamm et al., 2020). In this manner, provision of basic or routine healthcare services can still be acquired without the risk of exposure in a congested hospital setting (Smith et al., 2020). Globally, this has been a common practice pre-COVID-19 time but in developing countries this is yet to be adopted (Wang et al., 2020). In the Philippines, telehealth is starting to gain traction given the recognition

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and boost given by the Department of Health (Leochico, 2021). In this pressing time, this movement is ultimately targeted to senior citizens given their needs, vulnerability, and movement restrictions.

Despite the acknowledged benefits and viability in the current crisis, telehealth will only be useful if people will accept it. Looking on the research stream, there had been no study that looked on the adoption process of telehealth in the COVID-19 context. Understanding the priorities and needs of the senior citizens in this crisis will play a significant role on the implementation and usage of telehealth. This study was proposed to explore the constructs on how telehealth is adopted and how the dynamics of it will change considering a health crisis via an acceptance model. More so, the following specific objectives are proposed to support this goal: (1) To study the constructs affecting the behavioral intention and use behavior of telehealth in the Philippine Healthcare System, and (2) To assess the moderating effect of resistance to change, technological anxiety, and fear from COVID-19 in relation to the adoption process of telehealth in the Philippine Healthcare System.

LITERATURE REVIEW

Telehealth

Telehealth, as defined by WHO (2020), is the delivery of health care services remotely with the use of existing information communication technology. This is commonly used for consultations, diagnosis, evaluation, and education and is particularly valuable for those in remote areas, vulnerable groups, and ageing population (Al-aiad, 2020). The telehealth for the Philippines, being a developing country, is a perfect fit given the geographical orientation, limited healthcare providers, and resources (Leochico, 2021; de Guzman et al., 2020). With the use of telehealth, far-flung areas can be reached with a service quality of the metro (Buenaventura et al., 2020). The efforts to introduce it to the country has started last 2010 in which pilot study and implementation was tried. Unfortunately, up until early this year, the adoption of it is yet to be embraced and its implementation is still questionable given the lacking support by the government. Slow adoption rate is seen since the start of the pandemic (Tayag, 2020) – as reported in AHEAD Telehealth Policy eCongress. Despite being considered as the social media capital of the world, Filipinos are reluctant on adopting with this new technology. Clearly, a research that will explain the reason on a constructive and quantitative manner is needed to support the current efforts.

Unified Theory of Acceptance and Use of Technology

To answer the questions regarding telehealth adoption, the use of an acceptance model can be done. As previously stated, the success of any technology is dependent on whether it is accepted or not by probable users. For the last few decades, technology adoption has been the common theme amongst researches aiming to give insights on the crucial factors that will drive or halt adoption process. By definition, technology adoption is the choice of an individual to voluntarily accept new technology (Kamal et al., 2019). Several acceptance model has been formulated and verified differing on the variables and contextual application of it. One of the most established and verified adoption model is the Unified Theory of Acceptance and Use of Technology (UTAUT) which was developed by Venkatesh et al. (2003). This model was sorted from the eight previous adoption models which primarily includes four main factors for measurement of performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) regressed to behavioral intention (BI) and subsequent use behavior (UB). To tie up the objectives of this study, UTAUT was chosen to be the base model for the adoption with the following hypothesis:

H1, H3, H4: [PE, SI, FC] has a positive impact on senior citizen's BI to use telehealth

H2: EE has a negative impact on senior citizen's BI to use telehealth

To fit it with the scope, additional social factors critical to senior-citizen and pandemic was added. Specifically, these are perceived trust, technological anxiety, resistance to change, and COVID-19 fear. All in all, this study proposes eight factors to influence telehealth adoption of senior-citizens in this COVID-19 pandemic.

Perceived Trust (PT)

PT is the first factor that was added for this study. PT has been regarded as one of the most important antecedent towards any technology adoption (Bernardo & Tangsoc, 2019). Its significance is even more essential when resources, security, and interpersonal relations is involved. This goes same with healthcare as it is determined to be a key determinant of health information system (Kamal et al., 2020). PT is operationally defined as the intrinsic quality of technology and is usually assessed in relation to the quality measures of system, information, and service (Peeters, 2012). Previous studies of Zhou et al. (2019), Kamal et al. (2020), and Yamani, Long, & Itoh. (2020) all prove the importance of trust for healthcare technology adoption. Given that, it is proposed that:

H5: PT has a positive impact on senior citizen's BI to use telehealth

Technology Anxiety

Hoque & Sorwar (2017) define TA as the negative emotional response when they think about technology. This includes, but not limited, to feeling of 'fear', 'nervous', 'uneasy', 'worried', and 'confused' (Rusell et al., 2015). Previous studies generally suggest that TA have a negative moderating effect towards adoption of health information system (Kavandi & Jaana, 2020). For instance Cimperman et al. (2016) found TA moderates EE for BI for telehealth services. Same goes with Hoque & Sorwar (2017) and Kamal et al. (2020). Hence, TA was proposed for the study since it is expected that senior citizens might feel anxious from telehealth. The moderating effect will give better understanding on its role for adoption in this COVID-19 period.

Resistance to Change (RC)

RC is the repulsion to change of individual in an established setting (i.e., process, location, platform, etc.). The general consensus of previous studies suggest that RC limits BI at a certain degree (Hoque & Sorwar, 2017) and plays a critical role for health information technology (Kamal et al., 2020). More so, it is argued that senior citizens have high degree of RC (Dai et al., 2019). With this, senior citizens transition to telehealth is expected to be moderated by this.

COVID-19 Fear (CF)

Lastly, fear is an adaptive emotion of an individual to counteract with a potential threat. (Mertens et al., 2020). Usually, this is a process that will change individuals abilities, tendencies, and perception (Esterwood & Saeed, 2020). COVID-19, one of the biggest disease outbreak, caused tantamount of fear among people globally. Aside from physiological health concerns, this also posits psychological threats that can alter decision making of an individual (Pakpour & Griffiths, 2020). On the context of this study, it was expected that fear might play a role in altering the perception of other predictive factors for telehealth adoption. This and with the previous discussion, it is proposed that:

H6, H7, H8: [TA, RC, CF] has a negative moderating effect on senior citizen's BI to use telehealth

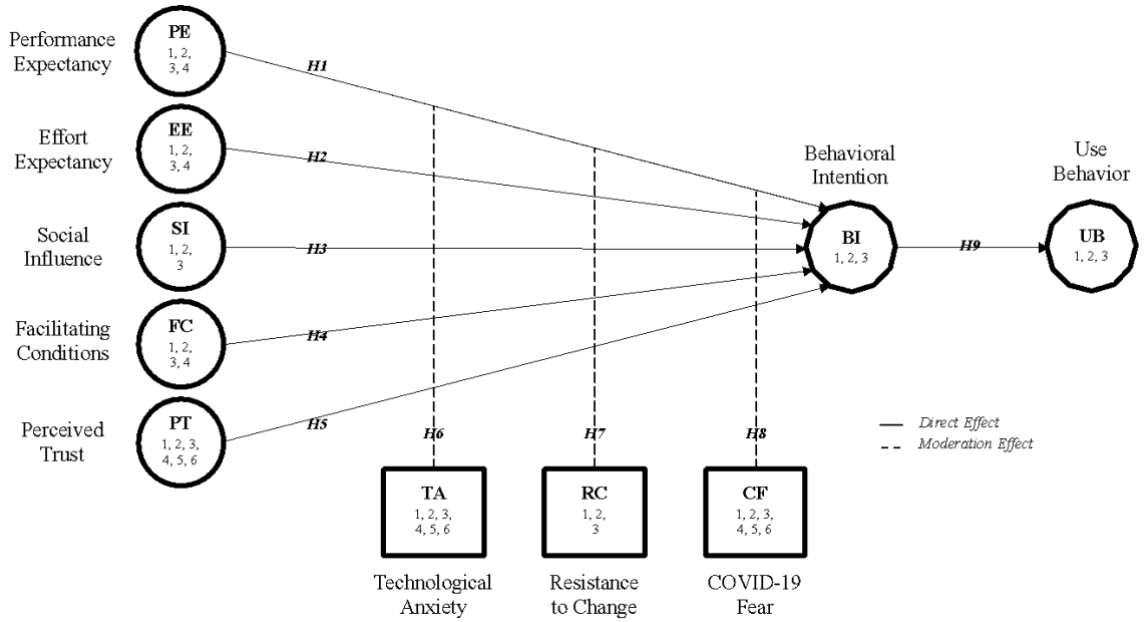

Figure 1. Health Crisis Technology Adoption Mode (HCTAM)

METHODOLOGY

A structured Google Forms questionnaire was developed for the data gathering process. This is divided into three parts, were the first two parts handled the confidentiality agreement and profile screening. The third part, constitute the primary questions carrying the hypothesis testing for the proposed model. These questions were curated from previous study that adapted UTAUT model of Venkatesh et al. (2012) which was rated using a seven-point Likert scale.

267 samples, based on the formula of Fox et al. (2009), were targeted to be the to be the baseline subjects for the study. The subjects used for the research were senior citizens that were actively seeking physical (face-to-face) check-ups in their chosen healthcare facility pre-COVID19 time and was able to try telehealth in the last six months. All of the samples were acquired via convenience snowball sampling with invite links shared to them. To counteract with the unstratified data from the sampling method, the second part of the questionnaire was used to screen the acceptable data. Data captured via Google Forms were initially exported to Microsoft Excel for structuring and formatting for further statistical test. The data analysis followed the two-stage where the first part focused on exploratory and descriptive analysis using IBM SPSS 26 software while IBM AMOS was used for the structural model development for the second part.

FINDINGS

Raw Data

Out of 322 questionnaires that was accomplished, only 291 (90.37%) was considered for the data analysis after verification from the subject profiling and data screening test. Though above the needed sample size of 267, all of the 291 data points were carried as the further elimination might be recommended on the factor analysis.

Structural Model

After the initial variable assessment, all the 10 original proposed constructs were established to be suited for the hypothesis testing. Considering all this, the model was examined on a 500 bootstrap resampling method to ensure the stability of the results. This was validated for 50 runs for consistency and confirmatory. The final global test results of the PLS-SEM bootstrap is shown in Figure 2.

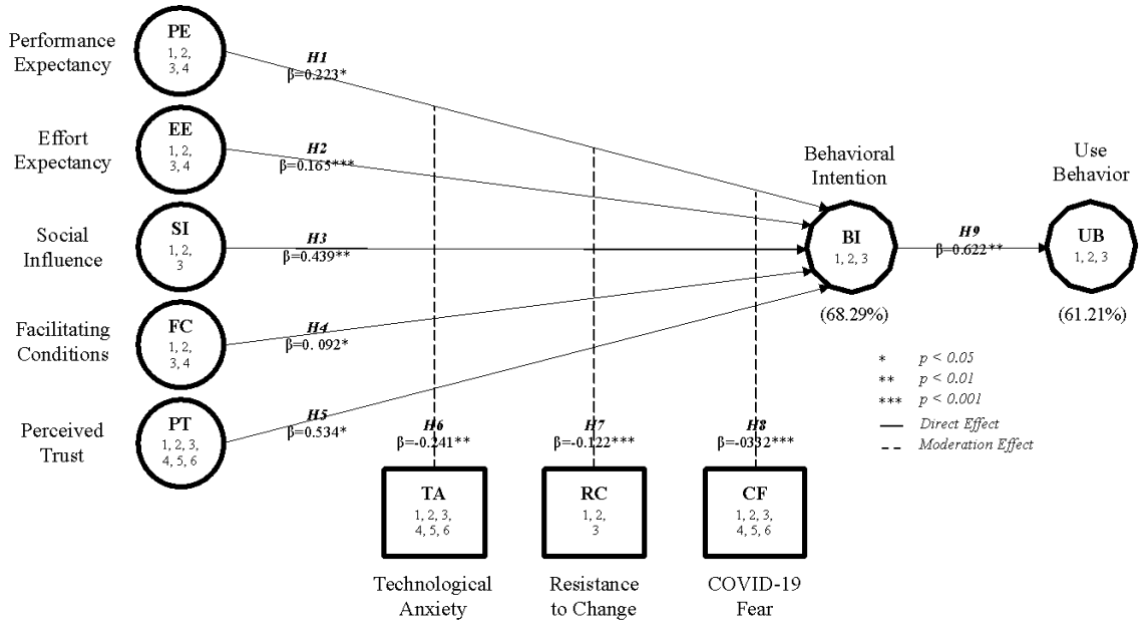

Figure 2. Structural Equation Modelling Results

The model was able to explain 68.29% of variation in BI to adopt telehealth by senior citizens. From the results, significant factors for BI as per importance are: EE, SI, PT, PE, and FC. For UB, BI was significant and was able to highlight 61.21% of variation. Also, for the moderating factors, all of which were determined to be negatively significant with both RC and CF confirmed with significance of $p < 0.001$ and TA at $p < 0.01$. Looking on the interaction level of moderations: TA amplifies EE, SI, and FC; RC dampen PE but amplifies EE; and CF amplifies PE and SI and dampen PT.

DISCUSSION

Effort Expectancy

EE was determined to be the most critical antecedent for BI to use telehealth. As senior citizen view telehealth easy to understand and to operate, the more they will be motivated to utilize it. EE being ranked as the top predictor shows that senior citizen is critical on the effort expenditure over any other functional benefits of telehealth. Appreciation of the performance is yet to be considered if the required effort to use it take a toll on them. This findings shows that telehealth should be designed with accordance to the current technological awareness of the users to make it more of a driver than a barrier for adoption. The level of understanding and experience of senior citizens should be considered in the process.

Social Influence

Following EE, SI was also found to be an influential factor for BI. With this results, telehealth system should consider strengthening the approval of significant referent of the senior citizens for them to be motivate to use the system. This is ideal since SI contributes higher than PE thus senior citizens value approval from other people over their own appreciation towards the functionality of telehealth. Aside from immediate circle, determination of the influential figure and making it as an ally point can strengthen the belief of senior citizens.

Perceived Trust

PT is also significant towards influencing BI for telehealth by senior citizen. The more faith the senior citizens have in telehealth, the higher possibility in using it. Given its significance, the main objective for this is to minimize the doubts in terms of information quality, security, and privacy. Since telehealth is relatively new in the Philippine context, and SI is at a higher importance, PT can be eminent via recommendations from trustworthy institutions or figures.

Performance Expectancy

PE is considered significant in influencing BI but at a lower extent. Telehealth should provide the services needed by senior citizens. Determination of the most opted healthcare service should be prioritized. More so, this services should not be limited to healthcare needs but also on other form of deliverables (e.g., provision of prescriptions, medical certificates, request, etc.) Adding the effect of the moderator, PE is amplified for the case of CF while dampened for RC. This means that people that is experiencing fear in COVID-19 actually demands more performance satisfaction before they adopt.

Facilitating Conditions

Lastly, FC is also significant to BI for telehealth adoption of senior citizens. This suggest that as senior citizen have the available resources to use the telehealth, the more likely they will use it. Telehealth system should look on skill building and knowledge reinforcement for the senior citizen. However, it should be taken in consideration the EE is the highest predictor for BI. This means that orientation of the supplemental FC should not be perceived as an added work for the senior citizens. Telehealth should be designed to empower the senior citizens and not belittling them.

CONCLUSION AND FURTHER RESEARCH

The goal of this study was to explain the factors that drives telehealth adoption and what is the moderating role of COVID-19 fear, technological anxiety, resistance to change via the proposed Health Crisis Technology Acceptance Model (HCTAM). The study uncovered that behavioral intention to use telehealth is highly motivated by: low effort needed to use and learn it; support and motivation from important referent; perception of trustworthiness; time reduction and increase in service quality on healthcare service as compared to traditional face-to-face checkups; and availability of instructions, trainings, and needed facilities to operate telehealth. The study also determined that COVID-19 fear dampen the conditional barriers for adoption while technological anxiety and resistance to change amplifies the needed positive benefits from using telehealth.

This study observed multiple limitations. First, the study was oriented as a response to the effect and restrictions from a health crisis (COVID-19). Given that it is formulated in a developing country, cross national study can be done to determine the consistency of the results. Second, for the subjects, the study focused on a very specific subset of telehealth users, specifically senior citizen. This was observed to be in line with the current purpose of telehealth in the Philippines. Future studies can consider other age group for cross comparison or for general view generation. Possible inclusion of acceptance of caregivers can also be added to capture the other subset of senior citizens.

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