

Technology-Mediated Health Activities: An Exploratory Study on Older Adults

Full papers

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Abstract

This research aims to investigate how older adults make use of technologies for health-related activities. We conceptualize technology-mediated health activities as two distinct behaviors, namely 'Health Decision Support' and 'Health Management'. Drawing on prior research at the intersection of older adults' health IT acceptance, we explore how technology-related beliefs, individual differences in IT, and health-related factors jointly determine these two activities. Based on an empirical study among adults aged 60 and above, our study contributes to research on consumer health IT by 1) exploring a target group that might benefit most from eHealth, 2) by revealing that these eHealth behaviors are differently determined, and 3) by re-examining the important roles health related factors play in eHealth acceptance.

Keywords

E-Health, Consumer Health IT, Older Adults, Acceptance, Use

Introduction

Consumer health information technologies (CHITs) reflect "computer-based systems that are designed to facilitate information access and exchange, enhance decision making, provide social and emotional support, and help behavior changes that promote health and well-being" (Or and Karsh 2009, p. 550). Today's available CHIT applications consequently offer a broad spectrum of capabilities, ranging from information retrieval facilitating health knowledge (i.e., symptoms and treatments) and health-related decision support (i.e., physician review platforms), health management (e.g., exercise reminders and diaries) to health data collection (e.g., personal health records, FitBit).

In parallel to the evolutions of CHITs, most developed economies face a significant shift in their age structure through steady increase of elderly people (OECD 2007). As diseases, such as chronic illnesses, usually increase with age, the demographic change poses a tremendous challenge for healthcare systems (Robert-Koch-Institut 2006). Older adults consequently constitute a segment that might benefit of these technological advancements most as healthcare needs usually increase with age. Given that CHITs aim to support individuals in taking active control of their health, senior's acceptance and use could potentially enhance their well-being while saving resources in healthcare systems (Eysenbach 2001).

Consequently, unfolding these potentials is dependent upon the extent older adults make use of CHITs. Yet, as literature reviews on CHITs (Or and Karsh 2009), on older adults (Wagner et al. 2010), and at the intersection of older adults and CHIT (Li 2015; Ma et al. 2015) indicate, only a handful of studies targeted at older adults' CHIT acceptance and use have been conducted. Prior research reports, for instance, that seniors with higher healthcare needs are more likely to look up for health information on the Internet (Choi 2011) and their abilities to retrieve informational health contents from the web can be greatly enhanced through dedicated training interventions (Chu et al. 2009). Most existing studies are directed towards acceptance and use of specific health-related systems, such as telehealth wellness kiosks (Demiris et al. 2013), mobile health services (Guo et al. 2013), remote patient monitoring systems (Giger et al. 2015), or specific patient systems offering encyclopedic contents, communication and appointment

functionalities (Or et al. 2011; Wilson and Lankton 2004). These studies reported that CHIT acceptance and use is most often predicted by seniors' usefulness and ease of use beliefs towards the system. In addition, some studies further observed seniors' general and IT-related traits and report that while 'resistance to change' and computer anxieties act as inhibitors (Guo et al. 2013), self-efficacy beliefs can enhance senior's acceptance and use of CHITs (Chu et al. 2009). Those studies were either targeted at the general population or specifically at patients of higher ages thereby implicitly implying a healthcare need. Only a few studies, however, explicitly addressed health-related factors, such as healthcare need or health knowledge, in seniors' CHIT acceptance and use (Or et al. 2011; Wilson and Lankton 2004).

Taking these insights together, it seems that older adults' acceptance and use of CHITs is dependent on seniors' technology beliefs, individual differences in terms of IT-related traits, and health-related factors. The joint interplay of these factors in older adults' CHIT acceptance and use, however, has been rarely addressed. Most importantly, prior research investigated seniors' acceptance and use of a specific CHIT system from an overall perspective. Yet, CHITs can actually offer a broad variety of functionalities ranging from informational contents to self-monitoring and self-management capabilities, whereby each functionality has a specific purpose that supports dedicated health-related activities. For instance, seniors might solely use CHITs to support their health-related decisions by obtaining health information from the web or by finding physicians next to them; others might additionally make use of CHITs to collect their health data for self-monitoring purposes (Or and Karsh 2009). Thus, investigating seniors' engagement with CHITs from aggregated and system-centric perspective limits our understanding for what older adults actually employ CHITs and, in turn, which factors determine those different types of CHIT use.

To address these shortcomings, we aim to offer a new perspective on CHIT usage and further seek to integrate those determinants of older adults' CHIT acceptance as reported in prior research. In this study, we propose CHIT-mediated activities related to 'Health Decision Support' and 'Health Management' and seek to understand how the interplay of technology-related beliefs, individual differences in IT, and health-related factors jointly predicts these two activities.

The paper proceeds as follows: In the following section, we propose our conceptualization of CHIT-mediated activities and our research model with its according hypotheses. We then outline our methodological research approach and results from the data analysis. After that, we discuss how our research contributes to our understanding on older adults' CHIT acceptance and usage, derive practical implications and discuss our study's limitations.

Research Model and Hypotheses Development

As outlined above, today's available CHITs offer a broad spectrum of functionalities, such as encyclopedic contents, communication and appointment scheduling functions, physician reviews, exercise reminders, or personal health records. Independent of specific systems, these functionalities generally assist in dedicated health-related activities. Whereas seniors can support their health-related decision making by obtaining knowledge about diseases and symptoms, they can likewise use CHITs for health management purposes by self-monitoring and self-managing their own health (Or and Karsh 2009).

In order to capture these two basic activities involved in using CHITs, we draw upon the concept of 'System Use-Related Activity' proposed by Barki et al. (2007). The concept reflects a set of behaviors individuals undertake when using technologies and thereby takes into account what individuals actually do when using technologies (Barki et al. 2007; Sun and Teng 2012). Adapting this concept to the health context, we propose 'Health Decision Support' and 'Health Management' as two CHIT-mediated activities. Whereas **Health Decision Support (HDS)** denotes obtaining health-related information and support for health-related decision making with technologies, **Health Management (HM)** refers to technology-assisted self-monitoring and self-management of one's own healthcare regimen.

To understand how these two CHIT-mediated activities are determined, prior research informs that technology-related beliefs, individual differences in IT, as well as health-related factors can influence seniors' acceptance and use of CHITs. We found two studies that generally depict these factors in their research models. The Technology Acceptance Model (TAM) based studies of Wilson and Lankton (2004) and Klein (2007) hereunto serve as the blueprint of our research model given that TAM is of high value when applied to older adults (Chen and Chan 2011). These TAM-based blueprint studies incorporated the following factors important of older adults' technology and CHIT acceptance, namely technology beliefs

(i.e., usefulness and ease of use beliefs), individual differences in IT behavior (i.e., computer self-efficacy and personal innovativeness in IT), as well as health-related factors in terms of healthcare need and health knowledge. Our resulting research model is outlined in Figure 1 below. We briefly outline the proposed factors and derive hypotheses about their roles in determining older adults' Health Decision Making and Health Management activities next.

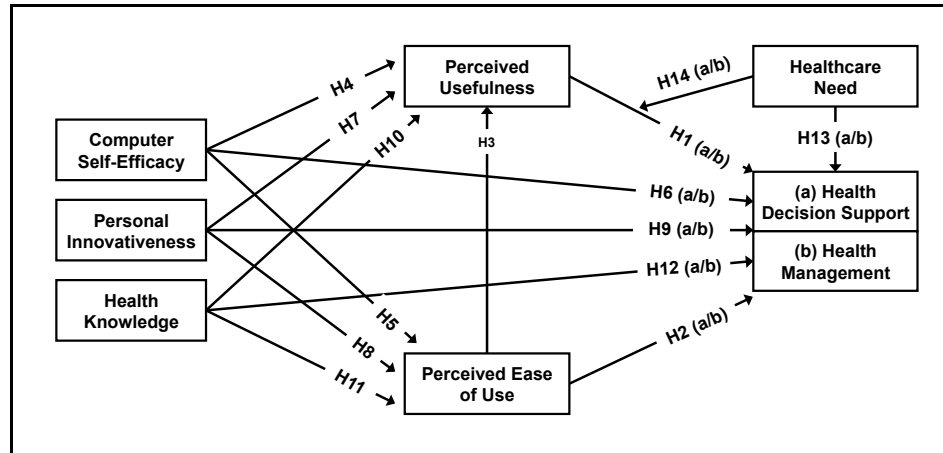


Figure 1. Research Model

TAM basically posits that Perceived Usefulness and Perceived Ease of Use jointly predict technology acceptance (Davis et al. 1989). **Perceived Usefulness (PU)** reflects judgements about how a given technology increases one's performance, while **Perceived Ease of Use (PEOU)** captures one's expectations about the extent to which a given technology is free of effort (Davis et al. 1989). Plenty of research demonstrated the effects of these factors in various settings (King and He 2006). In their review, Chen and Chan (2011) reflect that these constructs constitute the most critical factors for older adults' technology use as they often consider novel technologies as irrelevant and unnecessary for their daily life leading them to reject technologies. The authors echo that these beliefs are likewise derived from their perceptions about the efforts with which the technologies can be used (Chen and Chan 2011). The above outlined studies on older adults' CHIT acceptance and use likewise reported these highly influential roles. Drawing on the basic premises of TAM (Davis 1989), we hypothesize that:

H1-H3: PU positively affects activities of (a) HDS and (b) HM (H1 a/b); PEOU positively affects the activities of (a) HDS and (b) HM (H2 a/b); PEOU positively affects PU (H3).

Computer Self-Efficacy (CSE) is defined as the "judgment of one's capability to use a computer" (Compeau and Higgins 1995, p. 192) and originated out of Social Cognitive Theory (Bandura 1982). CSE has been found to be a strong predictor of older adults Internet use (Lam and Lee 2006; Niehaves and Plattfaut 2014) and their CHIT acceptance (Chu et al. 2009). Acting as a determinant of behavioural control, CSE generally influences technology acceptance, both, directly and indirectly via PEOU and PU (e.g., Agarwal and Karahanna 2000; Compeau et al. 1999; Venkatesh 2000). Thus, if older individuals perceive themselves as able to make use of technologies, they likely form more positive perceptions about the usefulness of technologies for health-related purposes, perceive technologies as more easy to use for their health-related activities, and are more likely to make use of these technologies. We hypothesize:

H4-H6: CSE positively affects PU (H4); CSE positively affects PEOU (H5); CSE positively affects activities of (a) HDS and (b) HM (H6 a/b)

Personal Innovativeness in IT (PIIT) is defined as "the willingness of an individual to try out any new information technology" (Agarwal and Prasad 1998, p. 206) and has its roots in innovation diffusion theory (Rogers 2003) by reflecting one's general 'openness to experience' (Powell 2013). The tendency of being innovative has been recognized to play an important role in one's comparatively early appropriation towards novel technologies (Agarwal and Prasad 1998; Agarwal and Prasad 1999). Research provides evidence that PIIT contributes to novel and innovative uses of technologies (Wang et al. 2013) and increases individuals' attempts to innovate with IT (Magni et al. 2011). As PIIT has been frequently found

to predict acceptance directly and indirectly (Agarwal and Prasad 1998; Jackson et al. 2013; Lewis et al. 2003; Yi et al. 2006), we hypothesize that:

H7-H9: PIIT positively affects PU (H7); PIIT positively affects PEOU (H8); PIIT positively affects activities of (a) HDS and (b) HM (H9 a/b)

Health Knowledge (HKnow) reflects “the extent of knowledge and understanding of personal health problems” (Wilson and Lankton 2004, p. 243). Albeit Wilson and Lankton (2004) argued in their study that health knowledge did not predict acceptance, their reported results indicate a correlation with effort perceptions towards using CHITs. Kitchens et al. (2014) analyzed the quality of health-related search results and found that certain keywords related to preventive health topics tend to produce results of lower quality. Understanding the health-related informational contents of and interactions with CHIT applications thereby might influence usefulness and ease of use expectations. In addition to that, Health Knowledge has been found to directly determine the use of an Internet-based system offering functions for self-care (Or et al. 2011). These findings lead us to hypothesize:

H10-H12: Health Knowledge positively affects PU (H10); Health Knowledge positively affects PEOU (H11); Health Knowledge positively affects activities of (a) HDS and (b) HM (H12 a/b)

Healthcare Need (HNeed): Individuals, and especially older adults, can greatly differ in their healthcare needs (Klein 2007). As outlined above, healthcare need constitutes an important variable in the context of CHITs that reflects the frequency and diversity of physician visits and the presence of a chronic disease (Wilson and Lankton 2004). Despite its importance, however, empirical studies reported mixed results about its influence on CHIT acceptance and use. Wilson and Lankton (2004) did not detect any effects of healthcare need on TAM variables, whereas Klein (2007) reported mixed direct effects depending on the functionality a CHIT system offers. Choi (2011) reported that older adults with higher healthcare needs were more likely to use the Internet for health-related activities, such as looking up for health information or to communicate with health providers. In a related study, Liang and Xue (2013) observed that a health-related disability plays a moderating role in how people make judgments and decisions about using online health information. We therefore propose the following hypotheses related to older adults' Healthcare Need:

H13-H14: Healthcare Need positively affects activities of (a) HDS and (b) HM (H13 a/b); Healthcare Need positively moderates the relationship of PU and activities of (a) HDS and (b) HM (H14 a/b).

Methodology

To test the model and its hypotheses, we conducted a quantitative field survey in the United States among the general population of seniors aged 60 and above. Our questionnaire is primarily based on established instruments and adapted –if necessary– to our research context. As our dependent usage measures are not constrained to a certain system but rather assess the activity involved in using CHITs, we developed two novel usage measures (Wu et al. 2015). The questionnaire was extensively discussed and pre-tested with three researchers and 15 adults of the target group. Only minor adjustments have been made to improve the understanding and clarity of the items. The final instrument is depicted in Table 1 below.

Access to the target group has been frequently shown to be difficult (e.g., Heart and Kalderon 2013) and using an online-survey might attract rather technology-savvy older adults causing potentially biased results. Therefore, we employed a convenience sampling method using a paper-and-pen based field survey approach that has been shown to be successfully in gathering data from the target group (e.g., Guo et al. 2013). Like other studies before (e.g., Chu et al. 2009), we collected data randomly at public places such as senior citizen centers, adult schools, and pedestrian zones in the second half of 2015.

While collecting data, we ensured the participants for anonymity and that there are no ‘wrong’ or ‘right’ answers for the survey questions asked (Podsakoff et al. 2003). We received 234 surveys in total, and removed those datasets with respondents being younger than 60 years or due to missing data. The remaining 156 surveys constitute the basis of our analysis. 63% of the respondents were female, the average age was 72 years old (Min: 60; Max: 101; SD: 7), 62% were married, and most respondents reported an annual household income between 50 and 150k USD. The educational level is for 45% a post-graduate study and for 35% a graduated college degree.

Construct	Items	Scale	Reference
PU	3 items; e.g., 'I believe using computer-technologies by my own will support critical aspects of my own healthcare.'	7-point; 'strongly agree – disagree'	Adapted from Venkatesh et al. (2003)
PEOU	3 items; e.g., 'I believe computer-technologies are easy for me to use, when using them for health-related purposes.'		
PIIT	4 items; e.g., 'Among my peers, I am usually the first to try out new computer- technologies.'		Wilson and Lankton (2004)
Health Knowledge	2 items; e.g., 'I understand my health problems and how to care for them.'		
CSE	10 items; e.g., 'I could use an unfamiliar computer-technology if there was no one around to tell me what to do as I go.'	10-point; 'not at all confident – totally confident'	Compeau and Higgins (1995)
Health Need	1) Number of face-to-face physician visits in last 6 months 2) Number of different physicians visited in last 6 months 3) Presence of a chronic disease (yes/no)	–	Wilson and Lankton (2004)
Health Decision Support	1) 'I personally use the Internet to look up information about health related topics' 2) 'I use computer-technology to research healthcare providers before making a decision to seek medical care'	7-point; 'not at all – very often'	New measures based on the concept of Barki et al. (2007).
Health Management	1) 'I personally use a computer-technology application to manage my healthcare regimen' 2) 'I currently use a computer-technology that automatically collects health data about myself'		

Table 1. Measurement Instrument

Data Analysis and Results

We analyzed the data using partial least squares (PLS) with the software SmartPLS 3.0 (Ringle et al. 2015). Analysis consequently involved the common two-step procedure of Chin (1998).

Results of the measurement model assessment are reported in Table 2 below. All latent variables have been measured with reflective items. Indicator reliability required items to be significant and loadings above 0.70 (Chin 1998) resulting in dropping one item of PIIT and the chronic disease variable of health need. All other items are significant with values of at least 0.833. All constructs' values for Cronbach's Alpha (CA) and Composite Reliability (CR) exceed the threshold of 0.70 and values for Average Variance Extracted (AVE) exceed the minimum of 0.50 (Fornell and Larcker 1981) suggesting good reliability. Discriminant validity was assessed by observing that each item loads highest on its designated construct (i.e., cross-loadings) (Chin 1998) and by ensuring that the square roots of AVEs are greater than the correlation (Fornell and Larcker 1981). The heterotrait-monotrait (HTMT) ratio (Henseler et al. 2015) with highest value of 0.767 is below the threshold of 0.850 and further ensures discriminant validity.

		Discriminant Validity										
Construct	CR	CA	AVE	1	2	3	4	5	6	7	8	
1 PU	.975	.961	.928	.963								
2 PEOU	.968	.951	.911	.746	.954							
3 CSE	.968	.963	.753	.504	.566	.868						
4 PIIT	.958	.934	.884	.442	.522	.680	.940					
5 Health Know.	.918	.823	.849	.355	.361	.343	.212	.921				
6 Health Need	.916	.867	.846	.185	.132	.040	.068	-.002	.920			
7 HDS Activity	.892	.757	.805	.555	.498	.397	.415	.378	.185	.897		
8 HM Activity	.876	.720	.780	.543	.567	.344	.450	.208	.207	.564	.883	

Table 2. Psychometric Properties of the Measurement Model

As our data collection approach required us to gather self-reported data from a single source at one point of time and place, common method bias (CMB) might be a concern (Podsakoff et al. 2003). Applying Harman's single factor test indicated that only 42% of the variance accounted to one factor thereby indicating that CMB is not of greatest concern in our study (Podsakoff et al. 2003). As our control variables (age, gender, income, education) did not exert any significant effects on both dependent variables (i.e., both technology-mediated health activities), we excluded these from further analysis.

Since the psychometric properties provided satisfactorily support for reliability and validity of the measurement model, we analyzed the results of the structural model as depicted in Table 3.

Health Decision Support (R ² 41.1%)	Health Management (R ² 44.3%)	Perceived Usefulness (R ² 57.2%)	Perceived Ease of Use (R ² 38.9%)
H1a: PU (.355**)	H1b: PU (.267**)	H3: PEOU (.653***)	H5: CSE (.321**)
H2a: PEOU (-.011 ^{ns})	H2b: PEOU (.338***)	H4: CSE (.091 ^{ns})	H8: PIIT (.262*)
H6a: CSE (-.011 ^{ns})	H6b: CSE (-.142 ^{ns})	H7: PIIT (.022 ^{ns})	H11: HKnow (.195**)
H9a: PIIT (.175 ^{ns})	H9b: PIIT (.251**)	H10: HKnow (.084 ^{ns})	
H12a: HKnow (.187*)	H12b: HKnow (-.011 ^{ns})		
H13a: HNeed (.119 ^{ns})	H13b: HNeed (.133 ^{ns})		
H14a: PU x HNeed (.148*)	H14b: PU x HNeed (.194**)		

Table 3. Results of the Structural Model

Results indicate that our research model explains about 41% of the variance of activities related to Health Decision Support and 44% related to Health Management, 57% of usefulness perceptions towards CHITs and 39% of ease of use perceptions. PU exerts a strong, significant effect on both CHIT-mediated activities supporting our hypotheses (H1 a/b). In contrast, PEOU has only a significant effect on Health Management, supporting H2b and rejecting H2a. Moreover, PEOU poses a strong, significant impact on PU giving support for H3. CSE significantly influences PEOU (H5) but does not determine PU (H4) and CHIT-mediated activities (H6 a/b). Mixed results are found for the influence of PIIT as the factor affects PEOU (H8) and activities related to Health Management (H9b) but not on Health Decision Support (H9a) and PU (H7). Health Knowledge constitutes a significant determinant of PEOU (H11) and Health Decision Support (H12a) but not of PU (H10) and Health Management activities (H12b). Concerning older adults' Healthcare Need, we found no direct effects (H13 a/b), but support for its moderating effect between PU and both CHIT-mediated activities (H14 a/b). We discuss our findings and their implications next.

Discussion

Given the constant evolutions in consumer health IT and the potentials these technologies hold to older adults in improving their well-being while saving resources in the healthcare system, this study sought to understand how older adults' make use of CHITs. We discuss our findings and contributions for theory and practice as well our study's limitations in this final section.

Theoretical Implications

As illustrated above, research on older adults' CHIT acceptance and use is scarce leading to a limited understanding how older adults actually make use of CHITs. We proposed 'Health Decision Support' and 'Health Management' as two CHIT-mediated activities and explored how technology-related beliefs, individual IT differences, and health-related factors determine these two activities. Based on an empirical study of 156 subjects aged 60 and above, we can derive three important contributions to literature.

First, our research contributes to literature by focusing explicitly on older adults and providing a deeper understanding of their CHIT-related behavior. Based on our findings, our research confirms and extends the observations of Chen and Chan (2011) and others (e.g., Guo et al. 2013; Or et al. 2011) that older adults' usefulness and effort perceptions constitute the major determinants of their CHIT acceptance. An important and distinct finding is, however, that these perceptions determine CHIT-related activities differently. We thereby extend the work of Klein (2007) who examined how effort and usefulness beliefs

differently determine individuals' dedicated intentions to use a patient portal for communication and/or information purposes. Klein (2007) reported a non-significant effect of effort beliefs (i.e., PEOU) on intentions to use the given portal for both –information and communication– purposes. In our study, PEOU does not directly affect Health Decision Support activities, but does directly determine Health Management activities. A potential explanation for our finding that contrasts the study of Klein (2007) is that as most older individuals' already make use of the Internet to obtain general information, they are quite familiar with that type of activity and do not perceive it as difficult (which might likewise hold true for communication activities as in Klein (2007)). In contrast, activities of Health Management require higher interactions with these technologies that go beyond those rather simple information and communication activities with which most individuals are already familiar today.

Similar to these varying effects of PEOU are those effects related older adults' personal IT innovativeness trait (i.e., PIIT) in our study. Like PEOU, PIIT does not directly determine technology usage for health decision support, while it exerts strong effects on health management with technologies. These patterns indicate that PEOU and PIIT are most likely to predict CHIT-related activities that go beyond those with which seniors are already familiar from more general contexts and, thus, seniors do not perceive such technology-mediated health activities as extra-ordinary. Given the constant evolutions in the field of CHITs that result in novel technologies such as Personal Health Records (e.g., HealthVault), mobile applications for exercises or wearable devices (e.g., FitBit), older adults with higher general interests in technologies tend to engage in such health management activities comparatively early before they are becoming mainstream to their contemporaries and consequently do not perceive them as difficult to use. Thus, our study further extends the study of Guo et al. (2013) who found 'resistance to change' as an inhibitor of older adults' mobile health acceptance. In contrast to resistance, PIIT originates out of the broad trait 'openness to change' and thereby acts as a complementing, yet contrary and enabling trait.

Second, we re-examined the role of health-related factors –Health Knowledge and Healthcare Need– in CHIT acceptance. Concerning the role of Health Knowledge, mixed results have been reported in prior research. While Wilson and Lankton (2004) did not find any effects of Health Knowledge, Or et al. (2011) reported a direct effect on the use of a self-management health tool. Our study makes two important contributions about the role of Health Knowledge. First, we found that health knowledge has varying effects dependent upon the type of technology-mediated health activity as it only affects activities of Health Decision Support. Thus, older individuals who believe that they possess less knowledge about how to care for their own health are less likely to make use of technologies for obtaining health related decision support. Second, Health Knowledge constitutes a direct determinant of older adults' ease of use beliefs. In our study, these effort beliefs are not solely determined by perceptions about the technology per se but additionally by distinct knowledge of the health domain. As such, health knowledge can be seen as both, an enabler and inhibitor of older adult's CHIT-mediated activities.

In addition to Health Knowledge, we further explored the role of Healthcare Need in overall CHIT acceptance and use given that prior research often neglected its explicit role. Research that incorporated healthcare need as an explicit factor, however, reported mixed results and detected either no influence (Wilson and Lankton 2004) or found varying influences depending upon the purpose a technology is used for (Klein 2007). Although we did not observe direct relationships between Healthcare Need and technology-mediated health activities in our study, we found that Healthcare Need acts as moderator between PU and these CHIT-mediated activities. Thus, our research extends prior studies (Klein 2007; Wilson and Lankton 2004) by revealing that Healthcare Need is an important situational factor. Older adults perceive CHITs as more useful when they have an acute healthcare need.

Our third contribution refers to our conceptualization of CHIT usage. Prior literature examined CHIT acceptance most often with an overall system-bound measure, such as the intention to generally use a remote patient monitoring system (Giger et al. 2015), to use a mobile health application (Guo et al. 2013), or to use a patient system albeit offering a broad variety of capabilities ranging from encyclopedic contents to dedicated self-management functionalities (Or et al. 2011; Wilson and Lankton 2004). Thus, with the exception of Klein (2007), prior research investigated CHIT acceptance mostly in a 'black box' like manner (Burton-Jones and Straub 2006) thereby neglecting that each functionality of a CHIT system has a specific purpose, that, in turn, might be predicted by different factors. In this study, we observed two activities involved in using technologies for health-related purposes, namely 'Health Decision Support' (i.e., obtaining health information and support) and 'Health Management' (i.e., self-monitoring and self-

management of one's healthcare regimen). We thereby contribute to research on CHIT acceptance and use by 1) arguing that these measures give greater insights into for what CHIT are actually used for and 2) by revealing that the activities are indeed determined differently as discussed above. Although further research is required, it is likely that engagement in these different health-related activities might subsequently lead to different outcomes (Wu et al. 2015). For instance, Health Decision Support activities might result in increased health literacy, while Health Management activities might lead to increased adherence to medical treatments, exercises or awareness about one's own health status.

Practical Implications

We can further derive important practical implications from our findings. First of all, we observed that older adults actually make use of CHITs, not only for informational activities but likewise employ innovative CHITs for managing their health. In order to attract seniors towards CHITs, the usefulness of the systems and applications have to be clearly communicated, especially in dependence of their healthcare needs. Thereby, managers need to be aware that seniors' usefulness beliefs are highly determined by their effort perceptions and that such effort perceptions likewise influence older adults' use of technologies that go beyond basic information retrieval and involve higher interactions with CHITs. To address older adults' beliefs about efforts involved in using CHITs, we observed that the factors of computer self-efficacy, health knowledge and individual innovativeness have to be taken into account. To address potential negative perceptions about the efforts required to use CHITs, even most basic CHIT training interventions have been shown to be highly successful for older adults (Chu et al. 2009).

Limitations

Notwithstanding the contributions and implications derived from our study, one has to take the limitations of our research into account when interpreting the results. First of all, we acknowledge that our study has weaknesses stemming from the employed methodological approach. We surveyed older adults at public places and institutions and thereby potentially mitigated those individuals, who are less outgoing or have severe physiological issues forcing them to stay at home. Moreover, we measured all factors at one time, which might have primed the participants (Podsakoff et al. 2003). As we conceptualized CHIT usage as an activity-related concept, we employed self-assessed usage measures that involve subjective judgments and individuals often tend to over- and underestimate their usage behavior (Burton-Jones and Straub 2006). From a theoretical perspective, we see our study best positioned as an exploratory research acknowledging that we incorporated only those factors important at the intersection at CHIT acceptance and older adults' general technology use. Furthermore, we employed only two types of technology-mediated health-related activities, leaving out additional activities such as social support.

Conclusion

Motivated by the demographic change and constant evolutions of consumer health technologies, our research aimed to investigate how older adults make use of technologies for health-related activities. We conceptualized CHIT-mediated activities as two distinct behaviors. While 'Health Decision Support' activities reflect health-related information retrieval supporting health-related decisions, 'Health Management' activities depict using technologies for the active management of one's healthcare regimen and health data collection. Based on an empirical study among 156 subjects aged 60 and above, our research has shown that technology-related beliefs, individual IT differences, and health-related factors determine these two types of elderly's CHIT-mediated activities in a different manner. We thereby contribute to research on older adults' CHIT acceptance and use and derived important practical implications. Identifying those factors driving older adult's CHIT usage is of high importance as such knowledge can facilitate establishment of acceptance and use of CHIT among senior users, support the development of appropriate CHIT applications targeted at silver citizens, and should ultimately facilitate achieving the desired outcomes of CHIT (Or and Karsh 2009).

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