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**THEORY DEVELOPMENT AND PILOT TESTING OF A NEW SURVEY
INSTRUMENT ON USABILITY BY OLDER ADULTS**

by

MERIAM F. CABORAL-STEVENS

A dissertation submitted to the Graduate Faculty in Nursing in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

2015

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This manuscript has been read and accepted for the Graduate Faculty in Nursing in satisfaction of the dissertation requirement for the Degree of Doctor of Philosophy

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ABSTRACT

THEORY DEVELOPMENT AND PILOT TESTING OF A NEW SURVEY INSTRUMENT ON USABILITY IN OLDER ADULTS

by

Meriam Caboral-Stevens

Adviser: Martha V. Whetsell, PhD, RN

An aging population and the use of technology are two pervasive phenomena that are burgeoning simultaneously. The confluence of these phenomena may present challenges for the older adults that could prevent a successful interface. Barriers and challenges can be addressed by examining the interface between older adults and technology. Usability is described as how well and how easily a user without formal training can interact effectively with the system. A review of the literature shows paucity in nursing theories on usability and the use of technology among older adults. This paper describes the development of a conceptual model - Use of Technology for Adaptation by Older Adults and/or those with Low or Limited Literacy (U.S.A.B.I.L.I.T.Y.) based on diverse theoretical perspectives. The conceptual model attempts to explain and measure the effect of health-related web sites' design on older adults (and those with low or limited literacy) in terms of their ability and desire to use the web sites to gather health information. The conceptual model identifies four determinants of web site usability: *(1) perceived control, (2) perceived user experience, (3) efficiency and (4) learnability*. Perceived user experience and perceived control determinants examine the user component, whereas efficiency and learnability determinants evaluate the system component, whereas. A U.S.A.B.I.L.I.T.Y. Survey[©] was developed due to the

paucity of well-validated usability questionnaires that measure all of the four determinants of usability in the conceptual model. Panel of experts evaluated the face and content validity of the new survey. A quantitative, descriptive study was conducted to test the internal consistency of the newly developed survey instrument. The study reported that the total-item correlation coefficient of the instrument was 0.96.

Key Words: usability, older adults, instrument development, theory development

DEDICATION

This dissertation is wholeheartedly dedicated to my parents, Eduardo Caboral and Maria Farinas-Cabral, who are now with God. Even though they are no longer with us, I know they are watching over me and are very happy for this moment. Wish you were here to celebrate this very special occasion with me. I know someday we will meet again. I miss you both so much and I love you forever!

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Chapter One

INTRODUCTION

Background

Globally, an aging population and the upsurge in the use of technology are two pervasive phenomena that are burgeoning simultaneously (Hudson, 2014). The confluence of these phenomena may present challenges to the older adults that could prevent successful interface. Barriers and challenges can be addressed by examining the interface between older people and technology.

Statistics

Aging population

By 2050, 89 million Americans will be older adults, more than doubled the projected 42 million in 2010 (Centers for Disease Control and Prevention [CDC], 2013). This translates to one in every five of the population are older than 65 (United States Department of Health and Human Services [USDHHS], 2012). At the same time, a shift in the population demographics within minority groups replacing Caucasians as the predominant race is forecasted (CDC, 2013). Recent data showed that 21% of the population are members of racial or ethnic minority groups, including 10.3% non-Hispanic blacks/African-Americans (CDC, 2013). It is projected that between 2012 and 2030, the number of blacks/African-Americans will increase by 104% compared to 54% Caucasians (USDHHS, 2012). Besides the changing population demographics, the shift in social technology is constantly and rapidly advancing.

Internet use by the overall population

Ownership and use of technology in the US is accelerating across all age groups as products and services become more affordable (Rainie & Poushter, 2014). Statistics show that

91% of Americans own cellphones and smartphones; that two in every five US households only have wireless phones, and about 87% use the internet (Rainie & Poushter, 2014; Pew Research Center, 2014a). The National Telecommunications and Information Administration (NTIA) (2011) survey shows that digital use is closing the racial chasm as well. Blacks/African-Americans are reported to be the largest growing internet users (56%) behind Asians and Caucasians (67% and 66%, respectively), however, only 30% of blacks/African-Americans have access to the internet (Pew Research Center, 2014b). Similarly, the use of the internet is increasing among older adults (Pew Research Center, 2014a).

Computer use by Older Adults

Although, older adults are not considered “tech-savvy,” they are now the fastest growing internet users in the US (Pew Research Center, 2014a). There are two different types of older adults who use technology: (1) the younger (mid-to-late 60’s), highly education and more affluent seniors, and (2) the older (70 years and older), less affluent who have significant disabilities (Pew Research Center, 2014a). The first group views digital technology as an asset whereas the second group is largely disconnected from digital tools and services (Pew Research Center, 2014a). Despite this disconnect, adoption to the world of technology by older adults continues to deepen (Pew Research Center, 2014a). It is estimated that about 59% of US adults aged 65 and over use the internet or email (Pew Research Center, 2014a). Likewise, 71% of older adults go online every day or almost every day, and 11% report that these older adults go online three to five times per week (Pew Research Center, 2014a). A review of literature on the use of technology by older adults reported that older adults can successfully assimilate the use the computer into their everyday lives when given the opportunity and training (Cresci, Yaranhi & Morrell, 2010).

Older adults over the age of 50 who actively use the internet are called “cyberseniors” (McMellon & Schiffman, 2002); these individuals use the computer and the internet for professional and personal purposes (Wagner, Hassanein & Head, 2010). Nowadays, due to the economic instability, adults over the age of 50 comprise the largest segment of the workforce (Wagner, Hassanein & Head, 2010). Older adults are opting to remain in the workplace, past the traditional retirement age, where the use of computer or the internet on a daily basis is required to perform most jobs (Wagner, Hassanein & Head, 2010). On a personal level, older adults use the internet to communicate with family and friends through email and social networking, shopping, banking, hobbies, and getting the news (Nurkka, Kujala & Kemppainen, 2009; Rainer, 2010; Wagner, Hassanein & Head, 2010). Studies have also shown that an increasing number of older adults are searching the internet for health information (Rideout, 2005; Fox & Jones, 2009; Cohen & Stussman, 2010). Seeking health information increases patient engagement to participate in making decisions regarding their health (Rainie, 2010; Xie, 2009; Tak & Hong, 2005). Therefore, the internet is a promising tool for older adults who are seeking health information.

Challenges faced by older adults with computer use

Despite this increasing use of computer or the internet by older adults, there are several challenges that exist with their use of technology (Charness & Boot, 2009; Pew Research Center, 2014a). One main challenge is not having internet access at home (Pew Research Center, 2014a). Additional challenges include changes associated with aging and loss of control. Compared to younger adults, older adults have different concerns when it comes to using technology (Charness & Boot, 2009).

Changes associated with aging

Although the process of aging varies by individual, there are changes that occur with chronological aging that could interfere with their use of technology. Chronological aging is associated with physical and cognitive changes, which starts to become noticeable by 45 years of age (Hawthorn, 2000; Butler & Sellbom, 2002; Wagner, Hassanein & Head, 2010; Pew Research Center, 2014a). Cognitive changes include shorter attention span (selection, divided and automated response), decline in memory (short term, working and long term), and impaired learning ability (Hawthorn, 2000; Charness & Boot, 2009). Progressive visual impairment as well as slower processing of visual information begins in the early forties (Hawthorn, 2000; Charness & Boot, 2009). Like vision, hearing declines with age and approximately 20% of those between 45-54 years old begin to have some form of hearing impairment (Hawthorn, 2000; Charness & Boot, 2009). Psychomotor skills also vary by age and certain medical conditions. Complex motor skills required to complete computer tasks may diminish (Charness & Boot, 2009). These changes that occur with aging may affect the interface between older adults and the computer system.

In addition to the functional and cognitive changes seen with aging, onset of chronic illness occurs (CDC, 2013; USDHHS, 2012). Older adults have at least one chronic illness and half of the older adults have two (CDC, 2013; Pew Research Center, 2013). Chronic illnesses account for most of the country's health care expenditures (CDC, 2013). At the same time, chronic illness significantly affects an older adult's functional capacity, quality of life (QOL), and psychosocial well-being, which can negatively impacts outcomes including loss of control (CDC, 2013; Hodges, 2009).

Loss of control

Control processes are integral to a functioning human system (Roy, 2009). An individual's perception of control plays a significant role in successful aging (Infurna, Gerstorf, Ram, Schupp & Wagner, 2011; Jacelon, 2007). The aging process can be a restrictive force (McMellon & Schiffman, 2002). The changes - physical and cognitive - that occur with aging could be beyond anyone's control. This loss of control is further exaggerated with significant events including diagnosis of chronic illness. Living with chronic illness is independently associated with health-related activities, which include searching the internet to gather health information about their diagnosis or to read about others' personal experiences in a similar situation (Pew Research Center, 2013). A person who utilizes the internet for their own health benefit applies all the attributes of PC, hence becoming an empowered patient. Older adults who empower themselves by using the computer or the internet regain part of the lost control associated with aging (McMellon, & Schiffman, 2002). Therefore, having a good perception of control is important because loss of control can lead to further deterioration and eventually ill health (Bailis, Segall, Mahon, Chipperfield & Dunn, 2001; Wallston, Wallston, Smith & Dobbins, 1987). One way that older adults empower themselves to regain part of the lost control associated with aging is by using the internet (McMellon, & Schiffman, 2002). The use of the internet or the web is a popular way of accessing information (Cohen & Stussman, 2010)

Use of technology for health information

Access to online health information is increasing in popularity. Of the nearly 45% US older adults living with one or more chronic conditions, 72% reported searching the internet (Pew Research Center, 2013). This empowers older adults to request for more information from their

healthcare providers in order to assist them make decisions regarding their care (Alicea-Plana, Neafsey & Anderson, 2011; Stoop, van't Riet & Berg, 2004; Rainie, 2010).

Information technology offers an alternate method of communicating health information to increase patient's knowledge thus facilitating health behavior change, which could inconceivably enhance health outcomes, including a more engaged patient (Wallington, 2008; Ryan, Pumilia, Henak, & Chang, 2009). Changes that occur with aging, as previously described in the preceding section, may affect the interface between the user and the computer system. A user's perception of a given technology is affected by their awareness of the fact that technology will or will not allow them to complete a task (Dillon & Morris, 1999). Human factor and cognitive ergonomic specialists assert that age-related changes must be considered in order to ensure that the demands of technology fit the user's capabilities (Charness & Boot, 2009). Usability refers to the fit between the user and technology.

Usability

Usability is the "perception of how consistent, efficient, productive, organized, easy to use, intuitive, and straightforward it is to accomplish tasks within the system" (McGee, Rich & Dumas, 2004, p.909). In other words, it is the degree by which the user can easily and effectively use a product that meets their needs and goals (Koochang & du Plessis, 2004). For a system to be truly usable, it must be "compatible with the characteristics of human perception and action, but, most critically, with user's cognitive skills in communicating, understanding, memory, and problem solving" (Bernard, Hammond & Long, 1981). Furthermore, the users' perceived usability of the system is far more significant than the ease of use and product efficiency. Thus, the design and content of the web sites should be guided by the user's input (Birru & Steinman, 2004). Visual

appeal may play an important role in increased rating toward perceived usability (Phillips & Chaparro, 2009).

PROBLEM STATEMENT

Problem #1:

Technology can help facilitate a person's engagement with their care but it can also become a hindrance if it cannot easily and effectively meet their goals and needs (Demiris, Finkelstein & Speedie, 2001). An important problem to address is how to make software designs user friendly for older adults. Despite the surge in e-health information, numerous web sites are not always user-friendly and reliable for older adults, which lead to concerns about the quality of information being disseminated to these users (Sherson, 2002; Oermann & Wilson, 2000). The systems and designs of most educational interventions available on the web may not be appropriate to older patients and/or those with low or limited literacy. A Healthy People (HP) 2020 initiative is to increase the number of health-related websites that follow the established usability guidelines particularly for older adults (USDHHS, 2014). Conducting regular usability evaluation of health-related web sites on older adults and/or those with low or limited literacy may help identify problems or flaws in the system and design (USDHHS, 2014).

Problem # 2:

Another goal of HP 2020 is to increase internet access to everyone, across all age group (USDHHS, 2014). Although an increasing number of older adults are the fastest growing computer and internet users, cognitive and functional limitations related to aging may inhibit their quick adoption of the use of technology (Wagner, Hassanein & Head, 2010). Likewise, African-Americans (AA) are among the fastest growing minority group that use the computer or internet, however only few have access to the internet at home (NTIA, 2011). Statistics have also shown

that AAs and Hispanics are the two minority groups that have the highest rate of low literacy (Kutner, Greenberg, Jin, & Paulsen, 2006). Literacy level is one of the main barriers to learning that can affect how educational tools are received by patients (Aruffo & Gardner, 2000). Additionally, challenges in delivering information are exaggerated as society becomes more culturally and language diverse (Fox & Jones, 2009; McCarthy, et al., 2002). A major problem is whether technology will become part of the current armamentarium of care of older minority adults and/or those with low or limited literacy.

PURPOSES

The purposes of this quantitative, descriptive study are to: 1) develop a conceptual model on the usability of health web site by older adults and 2) develop and test a newly developed U.S.A.B.I.L.I.T.Y. instrument for its internal consistency.

THEORETICAL/CONCEPTUAL FRAMEWORK

Presentation of the Conceptual U.S.A.B.I.L.I.T.Y. Model[©]

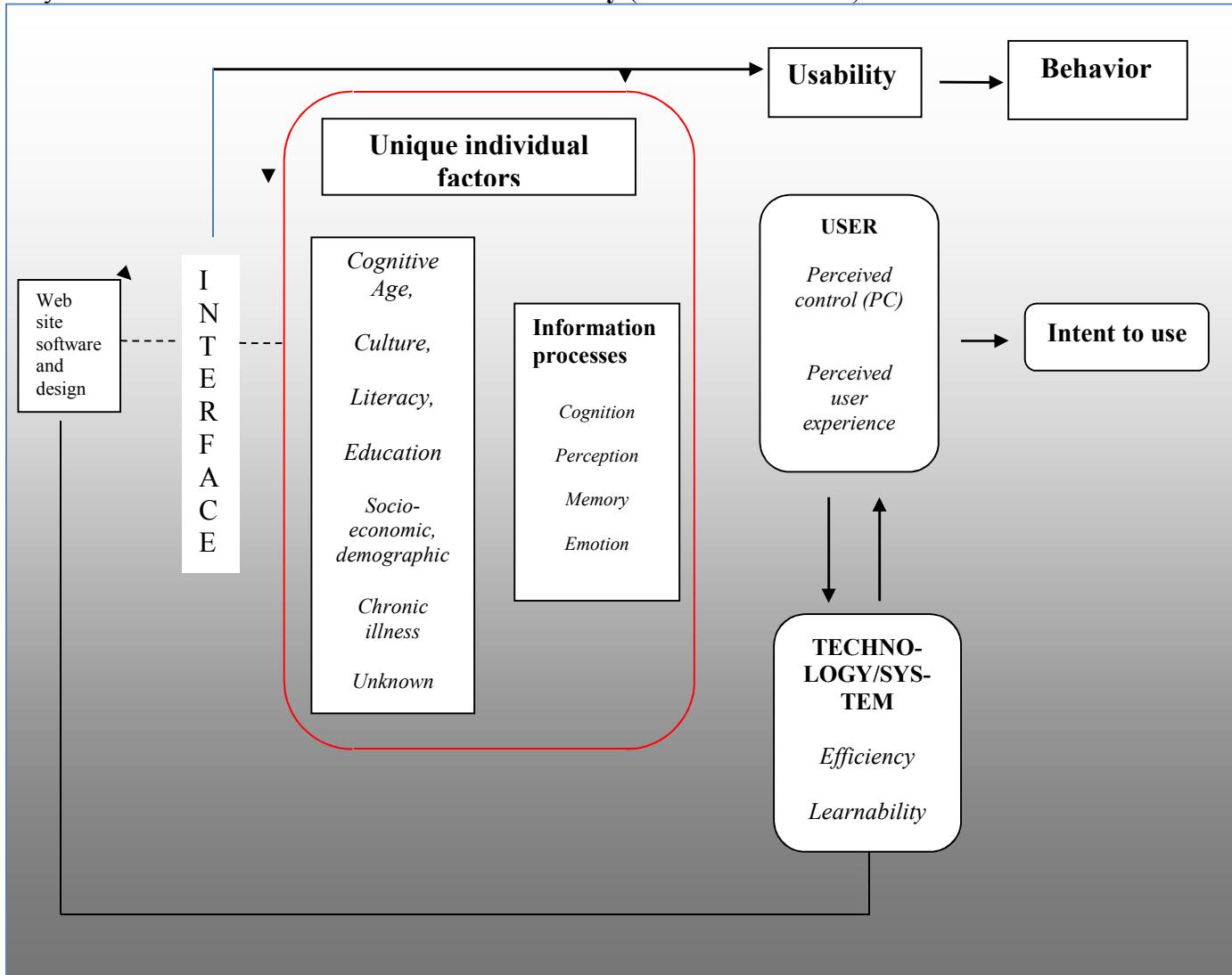
A review of the literature revealed paucity in nursing theory related to the use of technology by older adults and/or those with limited literacy. Therefore, this researcher derived a conceptual model that will guide the present study. In conceptualizing usability in older adults, diverse theoretical and conceptual perspectives have been integrated in developing the derived model. The theoretical and conceptual perspectives used in the conceptual model were from the Roy Adaptation Model (Roy, 2009), the Technology Acceptance Model (Davis, 1989), and the Theory of Planned Behavior (Ajzen, 1991). Figure 1 depicted the pictorial representation of the conceptual model. This conceptual U.S.A.B.I.L.I.T.Y. (The Use of Technology for Adaptation by Older Adults and/or those with Limited Literacy) Model[©] attempts to explain and measure the usability of health-related Web sites' design on older adults (and those with low or limited literacy)

in terms of their ability and intent to use the Web sites to gather health information. The conceptual model identifies four determinants of Web site usability: (1) perceived control (PC), (2) perceived user experience (UX), (3) efficiency and (4) learnability. Table 1 presented the definitions of these determinants.

Table 1. Four determinants of the U.S.A.B.I.L.I.T.Y. Model[©] and their definitions

U.S.A.B.I.L.I.T.Y. determinants	Definitions
Learnability	How easy it is to learn the system and to get information from the system
Efficiency	How much effort is required to use the system and how useful the system is in meeting the user's needs and goals
Perceived User Experience (UX)	How pleasant it is to use the system and how satisfied the user is on the quality of the systems' design
Perceived Control (PC)	How much control the user has to choose and to decide how to proceed with the information received from the system

Figure 1. Pictorial representation of the derived model – The Use of Technology for Adaptation by Older Adults and/or those with Limited Literacy (U.S.A.B.I.L.I.T.Y.) Model[©]



DEFINITION OF TERMS

African-American

African-American was defined for the purpose of this study based upon the USDHHS (2005) definition as “a person having origins in any of the black racial groups or Africa.” Identification of race was based on self-report by the participants.

Cognitive age

Cognition was the interpretation of information from the outside world through the senses. It was defined as the ability of the mind to manage and process information (Spanoudis & Kyza, 2009). Human cognition was dynamic and to great extent predisposed biologically but was greatly predetermined by one's experience (Spanoudis & Kyza, 2009). Cognition can be measured by the person's cognitive age. Cognitive age was described by Barak & Schiffman (1981) as having four dimensions (feel-age, look-age, do-age, and interest-age) and they noted that cognitive age captured different aspects from chronological age. The cognitive age was measured using Barak & Schiffman (1981) survey.

Older adult

The term "older adult" had a wide age range of definition from "over 40" on the lower end to "over 75" on the higher end based upon the context of use (Wagner, Hassanein & Head, 2010). Older adult was operationally defined for the purpose of this study as those 55 years of age and over.

Technology

Technology was defined as, "any tool or system that contains a microprocessor chip (Charness & Boot, 2009). Technology was the computer system designated for the purpose of viewing the health web site.

Usability

The standard definition of usability based on the International Organization for Standardization (ISO) 9241-11 was the "extent to which, a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (Bevan, 2006). It was also, "how well and how easily a user, without formal training, can

interact with an information system of a website” (Benbunan-Fich, 2001, p.151). In this quantitative, descriptive study, usability was defined based on the four determinants identified in the conceptualized U.S.A.B.I.L.I.T.Y. Model[©] - learnability, efficiency, perceived user experience (UX) and perceived control (PC). A survey instrument was developed due to the lack of well-validated instruments that contain the constructs used to define usability in this study. The developed U.S.A.B.I.L.I.T.Y. Survey[©] was used to operationally define usability in this study.

RESEARCH QUESTION

The research question for the study was, “what is the usability of a health web site by older African-American adults?”

ASSUMPTIONS

A number of factors could influence the results of research studies that were beyond the control of this researcher. Therefore, the research design and methodology employed in this study assumed the following:

1. Older adults would have difficulty navigating any computer system due to limitations (functional or cognitive) related to aging.
2. Older adults would struggle to try to catch up with the ever-accelerating changes in technology.
3. Older adults would not be afforded the opportunity to learn to use technology by their family members because of their age.
4. Older adults would not be interested in learning new ideas.
5. The derived model and survey could be adapted to the general population.
6. Healthcare providers do not have time to assess older adults’ ability to use the technology during clinic visits.

7. Educational websites were developed with the help of healthcare professionals who are experts in their related fields.
8. Websites were expected follow established usability guidelines.
9. If a website was considered usable by those with low or limited literacy, those with higher literacy would easily be more adaptable.

DELIMITATIONS

Delimitation were factors that could affect the findings of the research project. The subjects included African-Americans who were 55 years and older at the time of enrollment. This quantitative, descriptive study recruited subjects from a single cardiology clinic in an urban institution in NY. No previous computer experience was required to participate in the study. Only one health website was used as the educational tool to test usability. Only subjects who were diagnosed with heart failure were recruited to participate in the study.

SIGNIFICANCE OF THE STUDY

This quantitative, descriptive study provides several research endeavors. First, findings from this study will provide support on the use of technology in the care of older adults. Secondly, nurses must become more actively involved in the iterative development of educational programs by conducting usability testing. Third, this study is one of the very few studies on usability in older adults, and with low or limited literacy. Fourth, the findings from this study may have potential health significance for policy as it relates to the use of technology with older adults. Fifth, this quantitative, descriptive study will add to the body of nursing knowledge particularly in the field of nursing informatics, which plans, designs, and tests technology-based educational and interventional tools. Lastly and probably the most significant one is that this study will add to the body of nursing science in theory and instrument development.

CHAPTER SUMMARY

In summary, the use of information technology has increased tremendously over the past decades. The internet plays a crucial role in connecting people of all ages to the news, information and health resources, to name a few. Older adults are becoming the fastest growing internet users in the U.S. This chapter presented background information, the purpose, research questions, assumptions, the significance of this study, definition of terms, assumptions and the conceptual model that guided this study. A visual pictorial representation of the conceptual model was also presented.

Chapter 2

REVIEW OF THE LITERATURE

Usability

Usability refers to the degree (extent) by which the user and the system through their interface “communicate” clearly and effectively without misunderstanding (Benbunan-Fich, 2001). It is key to the acceptance of technology by its users (Jaja, Pares-Avila, Wolpin, & Berry, 2010). The term usability came from the field of cognitive ergonomics, which is a branch of human-computer interaction (HCI) that is concerned with the interface between human cognition and software design (Kools, 2007). It is also about the relationship between the user and the system, as well as the process of adjusting the software or product design towards how the users process the information (Chou & Hsiao, 2007; Kools, 2007). Human computer interaction examines the relationship between humans and computer system (Faulkner, 1998). Understanding the user requires understanding their information processes and capabilities including cognition, memory, vision, hearing, touch and motor skills ((Hassenzahl & Tractinsky, 2006). Further, computer system is structured based on what it can do for the user and how it might best communicate with the user (Faulkner, 1998). Usability testing is a method to evaluate this interface between the product and the user.

Usability testing/evaluation

Usability testing measures the effectiveness and efficiency of a product to the user, and the user’s satisfaction with the use of the product (Barnum, 2011). It is the “activity that focuses on observing users working with a product, and performing tasks that are real and meaningful to them” (Barnum, 2011, p. 13). Additionally, it follows HCI principles concentrating on (1) the user and their tasks, and (2) the iterative development and empirical measurement of the system (Levi

& Conrad, 2008). This fits the two approaches of usability evaluation - summative and formative. Formative evaluation is conducted during the iterative development of the design while summative evaluation is performed after the product has been released (Tullis & Albert, 2008). The two methods differ in that summative evaluation employs scientific method whereas formative testing does not have established metrics to date (Farrelly, 2009). Usability testing can be conducted from a well-controlled usability laboratory to a temporary space or from a remote location (Farrelly, 2009). Similarly, conducting usability testing can produce both qualitative and quantitative data (Farrelly, 2009). The terms usability testing and evaluation will be used interchangeably in this study because studies have been inconsistent in their use of these terms.

Usability studies of health web sites in older adults

Usability testing or evaluation is evolving in nursing research. Most usability studies in nursing were on the use of technology in clinical documentations, and medication management. However, there are several usability studies on interventions designed to promote healthy behavior, and to increase knowledge and skills with chronic illnesses from other disciplines. This portion of the review of literature is to present the review of the literature on usability studies from nursing and other disciplines on the use of educational programs or interventions in older adults.

Non-nursing studies

Ammann et al (2013) evaluated the website usability, tailored advice acceptability, and physical activity behavior change of a website-delivered, computer-tailored physical activity (PA) intervention. The computer-tailored physical activity intervention was developed based on the theory of planned behavior and theory of change. Website usability was measured using a 22-item survey on website layout and website ease of use. Physical activity level was measured using the Active Australia Survey and PA advice acceptability was measured using a 13-item survey on PA

advice content and PA advice delivery. A total of 863 subjects were divided into three age groups: younger working aged (19-44 years of age), older working aged (45-79 years of age) and retired aged (60-89 years of age). Two hundred eighty-eight subjects completed all the measures. The study reported that the oldest age group increased their PA compared to the other two groups. In addition, a significant difference was noted on time spent on the website ($F=8.44$, $p<0.01$), younger age-group spent significantly less compared to middle age-group and old age-group (10.6 minutes vs. 13.6 minutes, 16.3 minutes, respectively). The study also did not show any differences in website usability and tailored advice acceptability (Ammann, Vandelanotte, de Vries & Mummery, 2012).

A non-randomized pilot study was conducted by Bossen et al (2013) to investigate the preliminary effectiveness, feasibility and acceptance of the developed Join2move in 20 older patients, between 50 and 80 years of age, with knee and/or hip osteoarthritis. Join2move, a fully-automated web-based intervention, was a nine-week self-paced physical activity program in which the patient's favorite recreational activity was gradually increased over time. Weekly assignments and evaluation forms (pain and performance) were posted for the patients to complete. Primary outcomes of the study were physical activity, physical function and self-perceived effect. The secondary outcomes included feasibility and acceptability, program usage and user satisfaction. The study found that the physical activity scores increased from baseline although it did not statistically significant ($p=0.3$). There were some minor flaws noted, which included difficulty in completing the introduction and the users' inability to edit or undo actions annoying. But overall, older adults found the intervention easy to use, and satisfaction with the program was high (Bossen, Veenhof, Dekker, & de Bakker, 2013)

Burns and colleagues (2013) proposed to assess and improve the usability of an asthma educational site called “AsthmaWise.” Combined usability testing was conducted using samples of end users, a cognitive walk-through of the site by an independent health researcher and assessment of readability. The educational site was designed using Moodle and consisted of six modules on asthma self-management skills. The sample consisted of 13 participants aged 55 years and older with a diagnosis of asthma, who have used the internet and were willing to be recorded during usability testing. Usability testing was performed using the “think aloud” method and the session was recorded using Morae Recorder 3.2.1 (TechSmith, Okemos, MI). The Perceived Health Website Usability Questionnaire (PHWSUQ) for Older Adults was used to assess the overall opinions of the participants. The study reported a PHWSUQ score of 67% indicating some usability issues that needed to be addressed. Of the three domains of the PHWSUQ, satisfaction was the highest (70%) whereas usefulness received the lowest score of 61%. An independent health researcher that performed the cognitive walkthrough of the website identified inconsistencies across the site. The readability of the website was Flesch-Kincaid Grade Level above nine (target of 8) in 14 pages and Flesch Reading Ease Score was below 60 (target was between 60 and 70). This study showed that involving both the end users and experts in usability testing is an essential part of the design process (Burns, Jones, Iverson and Caputi, 2013).

A usability study was performed by Or and Tao (2012) to evaluate computer-based self-management system interface among 55 older adults with chronic illness using a paper prototype approach. The two usability evaluation methods used were the heuristics method and the end-user testing with think aloud, audio recording, videotaping, and interviewing. Three evaluators conducted the hermeneutic evaluation, whereas 50 of the participants performed end-user testing. Heuristic evaluation revealed a few usability problems related to system navigation, information

search and interpretation, information presentation and readability. Usability metrics used to determine the overall usability of the system included task completion rate and time, frequency of error and frequency of help, satisfaction, perceived usefulness, and perceived ease of use. Study participants were able to perform predesigned self-management tasks and they expressed positive responses about the usability of the system interface. Ninety-three errors were made by 45 of the participants in the “access the history page” task. Similarly, 56% of the participants needed help a total of 60 times with the task (Or & Tao, 2012).

Ruiz and colleagues (2011) pilot tested a Self-management Internet-based Program for older adults with overactive bladder (OAB-SMIP). A single-group, pre and post-test study design was performed to evaluate the usability of this program in 25 older adults and outcomes, including knowledge, self-efficacy, perception of bladder condition and health-related QOL. The OAB-SMIP intervention consisted of three multimedia combined e-learning tutorials with social networking components delivered over 6 weeks. At the end of 6-weeks, in addition to the pre-post measures the participants were asked to complete an 18-item usability survey about the program’s multimedia and social networking features, level of engagement, readability of written materials, overall satisfaction, ease of use and narration. The study found that 88% of the participants reported that the elearning program was easy to use and 96% found the written materials easy to read. The study also showed that after 6-weeks of intervention, the participant’s knowledge, overall self-efficacy, and health-related quality of life scores significantly improved ($p<.001$, respectively). Similarly, the patient’s symptoms of OAB improved based on 2 measures: the OABq symptom bother scale and the patient perception of bladder condition, $p<.001$ (Ruiz, Tunuguntia, Cifuentes, Andrade, Ouslander & Ross, 2011).

A mixed-method usability evaluation of a clinical decision support tool for osteoporosis disease management at the point of care was conducted by Kastner and colleagues (2010). Guided by the usability framework of Kushniruk and Patel, usability testing was conducted on all three components of the tool – the Best Practice Recommendation Prompt (BestPROMPT), the Risk Assessment Questionnaire (RAQ), and the Customized Osteoporosis Education (COPE) sheet. The evaluation of the paper-based BestPROMPT sheet was conducted by physicians from the greater Toronto area. This study showed that physicians viewed the BestPROMPT relatively easy to use, and they liked that the tool could provide customized recommendations identified from the RAQ. The second usability testing round evaluated the electronic RAQ on 19 patients at risk for osteoporosis (men \geq 65 years of old and postmenopausal women). Seventy-nine percent of the participants thought the RAQ was easy to read and understand but was difficult to initiate. The third usability evaluation of the paper-based COPE sheet was conducted on eight patients at risk for osteoporosis. The participants reported that they were able to understand and describe sections of the COPE sheet (Kastner, et al., 2010).

The views of older people and care providers on the usability and acceptability of a balance training website to prevent falls was evaluated by Nyman & Yardley (2009). Guided by Goal Theory, a “balance training” website was developed to encourage older people to undertake strength and balance training. The website was used to tailor the advice to be more personally relevant to the individual. Sixteen older people aged 60 years and over, and 26 sheltered housing wardens were interviewed. The audio recorded interview with older people had two parts: first they interacted with the tailored balance training website and encouraged to “think aloud” their thoughts, and then were subjected to the semi-structured interview. The “think aloud” data were coded under three headings: usability, reasons for inputs into the interactive sections, and reactions

to the advice. The website was well-received with only one usability problem, the subject's inability to complete the action plan calendar. The study showed that the website is usable despite one usability problem to correct the action plan calendar. Older people selected the strength and balance training activities they enjoyed most or were interested in. Some older adults suggested that the website would be enhanced with more graphics and color (Nyman & Yardley, 2009).

Pino (2009) conducted usability testing on a prototype software application for cognitive training designed for people with mild to moderate Alzheimer's disease. Six patients between the ages of 78-87 were recruited to participate in four test sessions. Cognitive training refers to a standardized set of tasks related to aspects of cognition that were practiced regularly. The main objective of cognitive training is to slow down cognitive deterioration by stimulating spared cognitive functions. The exercises required different types of interaction. The testing session was performed on a laptop, and interface interaction and facial expression were video recorded. A five-point Likert scale was utilized to assess user satisfaction. Of the six participants recruited only three completed the tests. The following performance measures included the number of participants having successfully completed the task, time to complete the exercise, number of errors due to manipulation, number of incorrect answers to the exercise and number of verbal or physical help requests. User satisfaction, content analysis and nonverbal communications were the subjective measures collected. Verbal and non-verbal behaviors suggested that participants enjoyed the activity. Additionally, improvement in some performance measures, time, manipulation error and help requests, improved throughout the session. However, the study showed that even though the participants were quite satisfied with the software, the prototype was not entirely adapted to users with Alzheimer's disease. This exploratory study has identified how

usability testing methods should be adapted to the needs of the end users with cognitive impairment (Pino, 2009).

Henkemans and colleagues (2008) conducted a usability study of an adaptive computer assistance developed to improve self-care and health literacy of older adults. The computer assistant was developed to supervise diabetics' self-care by monitoring the patient's electronic diary. The assistant had applied cooperative feedback or a directive feedback style. Cooperative feedback had a coaching feature, which offered explanations and educated the patient; this feedback style was oriented towards user satisfaction and long-term development. The directive feedback had a brief reporting instruction feature; this feedback style was geared towards quick and efficient problem solving. The experiment was conducted in a laboratory setting with 28 older adults, between the ages of 61- 75, without diabetes type II engaged in scenarios reflecting normal and health-critical situations. The study aimed to evaluate whether older adults in general can make use of the computer assistant, as well as to compare the adaptive computer assistant with a fixed one, in relation to its usability and its contribution to health literacy. The study reported that overall, little efforts were required in performing the scenarios suggesting that the assistant was easy to use. Although, the adaptive assistant was more time-efficient than the fixed assistant ($F(1,27) = 5.24$, $p=0.03$). Working with the interface and receiving feedback from the assistant enhanced the participant's knowledge of diabetes although not statistically different from the fixed assistant ($F(1,25) = .097$, $p=.76$). The study concluded that older adults were able to use the adaptive computer assistant, and it had a positive effect on health literacy thus being a potential support to diabetes' self-care (Henkemans, Rogers, Fisk, Neerincx, Lindenbergh & van der Mast, 2008).

Hill-Briggs and colleagues (2007) conducted a pilot study on the acceptability and usability of lower-literacy diabetes and cardiovascular disease education in 30 urban AAs with type 2 diabetes with below average or average literacy. The education consisted of one 90-minute group education session and reading materials were included in the participants' binders. The content areas covered in the education were facts about diabetes and heart disease, targets for control of blood sugar, blood pressure and cholesterol, and self-care management behaviors. Literacy was assessed using the Wide Range Achievement Test Reading subtest. After one-week of attending the educational session, satisfaction with accessibility and usefulness of educational materials and class were evaluated using a nine-item scale from 0 to 5. The study showed that both groups rated the education session and reading materials as highly acceptable and usable, as well as effective for knowledge acquisition. Counter intuitively, findings showed that those with below average literacy rated the amount of new information learned slightly higher than average literacy participants (Hills-Briggs, 2007).

In 2007, Charron-Prochownik and colleagues conducted a process evaluation and evaluated the patient's experience in completing the Disease Self-management Assessment Report Tool (D-SMART) on 290 diabetic patients (mean age of 58 years with $31\% \geq 65$ years old). The D-SMART is a data collection tool, integrated into the telephonic and computer system that assesses diabetes health status, knowledge, self-confidence, and barriers and self-care behaviors. The process was evaluated by the actual time of administration, which was generated by the system. The patient's experience was measured by the patient's self-reported understanding of the content, usability of technology and overall satisfaction with the system. The study showed that 94% of the patients reported satisfaction with the D-SMART. However, older adults were less likely to be satisfied

with the system ($r = -0.196$, $p=0.003$). There was no difference noted in the mean satisfaction between those using the computer versus the telephonic system (Charron-Prochownik et al., 2007).

A usability testing was conducted by Ostergren & KArras (2007) to evaluate ActiveOptions interface with its users. ActiveOptions was a website that provided searchable database of nearby exercise programs. The goal of the website was to keep older Americans stay physically active by providing information on senior-friendly exercise programs. Eleven participants (from 55 years and over) were recruited to perform usability testing. Test session was videotaped, and focused on the screen and the participant's hands. One of the test administrators interacted with the participant while another one took notes. Both the notes and the videotape were reviewed and analyzed to determine difficulties with the interface. Findings from the study included: struggle with scrolling, ability to change the type and font size, and disorientation when using the links. The study concluded that despite established guidelines for specified users, usability testing could uncover remaining problems (Ostergren & KArras, 2007).

A colorectal cancer (CRC) screening decision aid was developed and investigated as to whether it could increase patient interest and increase intent to ask their health care provider about screening (Kim, Whitney, Hayter, Lewis, Campell, Sutherland . . . & Pignone, 2005). A two-round usability testing was conducted to evaluate and revise the content and format of the computer-based decision aid. Eighty patients 50-75 years of age were recruited, and a before-after uncontrolled trial was conducted. The study showed that 6-months after viewing the decision aid there was an increased intent to ask providers for screening (2.8 to 3.2, difference, 0.4, $p<0.0001$, paired t-test), and an increased interest in being screened (mean score before – 3.2 and mean score afterwards – 3.5, difference 0.3, $p=0.01$, paired t-test). Further, 60% of the patients stated

readiness to be tested and 43% completed the screening test. Most of the patients reported increased knowledge and found the aid to be useful (Kim, et al., 2005).

Nursing studies

A qualitative study by Alicea-Planas and colleagues (2011) was conducted to solicit information regarding what it was like to learn about and their experience with the Next Generation Personal Education Program (PEP-NG). The PEP-NG was a web-based program designed to educate older adults and their healthcare providers about the dangers of adverse drug interaction arising from self-medication. Nineteen participants with hypertension were interviewed and content analysis was performed for data analysis. Four themes were noted from the content analysis: 1) climbing the mountain of awareness, 2) in need of attention, 3) adjustment made, as needed, and 4) provider matters (Alicea-Planas, Neafsaey & Anderson, 2011).

Johnston and colleagues (2009) developed a set of integrated information and communication tools to support collaborative management for older patients with chronic obstructive pulmonary disease (COPD). A four-phase development process guided by the user-centered design principles throughout was performed. Phase 1 was to identify specific patient self-management education and support needs and to elicit perception of how tools may have or have not increased their confidence. The second phase was to conduct usability testing on existing Internet tools for exercise, diet and symptom monitoring, and the developed paper prototypes of desktop and PDA Web interfaces. Based on the findings from Phases 1 and 2, Palm Treo 650 was the chosen mobile device for primary data collection. Phase 4 involved field usability testing in the home of three participants, age ranged from 69-81 years, with COPD with a simultaneous audio and visual recording of the session. The participants were asked to complete six sequential tasks and were asked to “think aloud” during the session. At the end of the testing session, participants

were asked 13-item questionnaire and semi-structured interview. The results of the field usability testing showed that the integrated tool was relatively easy and quick to learn, efficient to use, with minimal errors and high level of user satisfaction (Johnston et al., 2009).

The Tailored Interventions for management of Depressive Symptoms (TIDES) program was designed to provide tailored, computer-based education on self-care strategies for depressive symptoms in persons living with HIV/AIDS (Lai, Larson, Rockoff, & Backen, 2008). A cross-sectional study was conducted in 22 persons living with HIV/AIDS (69% of the subjects were AAs) to assess the acceptance of the prototype and to explore the relationships among the system acceptance factors. The systems acceptance factors included perceived ease of use, perceived usefulness, behavioral intent to use (BI), internal (individual beliefs about their ability to perform task using a computer) and external factors (facilitating conditions). This study utilized several standardized instruments: the REALM scales, the Morisky Non-Adherence scale, the Beck Depression Inventory scale and the TAM scale. The study reported a positive correlation between BI and four factors: PU ($r=0.61$), PEOU ($r=0.61$), internal control ($r=0.59$) and external control ($r=0.46$). Conversely, a negative correlation was seen between BI and these three factors: computer anxiety ($r = -0.80$) tailoring path ($r= -0.35$) and depressive symptoms ($r= -0.49$). The study showed evidence of acceptability of the HIV TIDES by persons living with HIV/AIDS (Lai, Larson, Rockoff, & Backen, 2008).

Guided by the Transtheoretical model, Nahm and colleagues (2008) performed an exploratory study on 44 patients with heart failure who were participants in the Medicare Coordinated Care Demonstration (MCCD) project that used only the telemonitoring component. This single group study design was performed to examine their readiness to use an eHealth program and to assess specific needs of patients with HF that can be addressed by the program. A

short prototype version of a Web-based module called “Congestive Heart Failure” was developed for this study. Participants were then interviewed on their readiness to use the internet, confidence in using an eHealth program, confidence in learning health information using Web-based learning modules, learning needs for eHealth program, and perceived usability for the prototype. Most participants reported that the program was easy to use. Overall, confidence in using web-based health modules (7.6 ± 3.2 , range, 1-10) and telemonitoring devices (27.1 ± 18.9 , range, 3-30) were high on both online users and non-users. The PHWSUQ score was high (mean of 57.3 ± 10.7), range of 7-70). There was no difference in confidence for using online learning modules between Caucasians and AAs (Nahm, Blum, Scharf, Friedmann, Thomas, Jones & Gottlieb, 2008).

In 2008, Atack and colleagues conducted a triangulation approach of usability testing of an online patient education project (PEPTalk). The PEPTalk was a website tailored specifically to store text and video information for patients. The main purpose of the study was to perform usability testing of the web design and materials of the PEPTalk. Secondary aims were to measure user satisfaction and ease of learning in using the PEPTalk and to explore the website’s impact on health. Convenience sample of eight patients (ages 40-69) from three clinics (head and neck, diabetes and breast cancer) were recruited to participate in the study. The mixed method data collection included the “think-aloud” usability testing process, interview, and survey; participants were asked to share their thoughts out loud while working through the web site. The session was audio taped and the mouse-tracking movements were observed and recorded. The Perceived Health Web Site Usability Questionnaire (PHWSUQ) was the survey used to measure patient satisfaction with the system. The overall PHWSUQ mean score was 86.5 out of 100, which indicated that participants were highly satisfied with the web site. During the interview, they expressed that the website has potential to become a valuable resource for health information and it

empowered them to provide self-care. From the observational data, however, half of the patients needed a fair amount of coaching in navigating the site. The authors concluded that integrating systems into clinical practice could be an important step in nursing practice (Atack, Luke & Chien, 2008).

A usability testing of three-health promoting web sites was conducted by Nahm and colleagues (2004) on older adults. Site A was a commercially run site, Site B was a government-run site, and Site C was run by a nonprofit organization. The study used two usability assessment methods: hermeneutic evaluation and modified usability testing. Hermeneutic evaluation was performed by four experts in gerontology and web usability. The modified usability testing was conducted on 10 seniors using the following methods: observation, a think-aloud method, audio taping and interviewing. Experts identified that the web designs were inappropriate to older adults because of the following reasons: font too small, too much information on one page, and instructions not clear. Older adults preferred simple design with clear instructions. Additionally, they also needed instructions on how to search for credible health information online. Perceived usability reported Site B received the highest mean Satisfaction (24.5) and Ease of Use (14.9) dimensions, whereas Site C received the highest mean score for Usefulness dimension (17.8). Therefore, some methods of usability testing might need to be modified for older adults based on their specific needs.

Chapter Summary

This chapter presented the review of the literature on usability studies of computer-based educational programs and interventions in older adults. After this review of the literature, usability testing is still an evolving field in nursing research as apparent from the paucity of studies found. Likewise, there is a need for single standardized usability survey/questionnaire as evident by the

number of survey questionnaires being developed by each researcher for their own studies.

Available usability tools were designed toward evaluating younger users with the exception of the Nahm's Perceived Health Web Site Usability Questionnaire. In addition, current usability tools do not include the construct of perceived control, therefore the need for new instrument that includes this construct needs to be developed and validated.

Chapter 3

METHODOLOGY

This chapter presents the methodology used to conduct this study and is divided into the following sections: design, protocol, website measure, instruments, demographic and clinical information, and statistical analysis.

Design

This was a quantitative, descriptive study design. The 30-minute interactive patient education web site used in this study was provided by Medline Plus. Subjects were asked to view and navigate the website, and to complete the survey afterwards.

Ethical consideration

Approvals from the Institutional Review Boards (IRB) of the Graduate Center and the institution where the study was conducted were obtained prior to initiation of this quantitative, descriptive study. Individuals involved in the research study were required to complete all the Human Subjects Protection requirements including the Conflict of Interest and Health Insurance Portability and Accountability Act (HIPAA) courses.

Sample

This quantitative, descriptive study design was conducted to determine the reliability and validity of the newly developed U.S.A.B.I.L.I.T.Y. Survey[©]. After consultation with the statistician, 25 subjects were considered sufficient to test the correlation coefficient of the newly developed instrument. Subjects recruited in this study consisted of:

Inclusion criteria

- Males or females,
- 55 years of age and over;

- Confirmed diagnosis of heart failure (HF) from an echocardiogram report performed within one year or coronary angiography performed within two years if echocardiogram is not available;
- Must be able to speak, read and understand English; and
- Must be willing to give informed consent.

Exclusion criteria

- A diagnosis of significant and untreated major psychiatric conditions (e.g. severe depression, suicidal ideations, etc.);
- A diagnosis of Alzheimer's dementia or any acute illness at the time of screening;
- Significant visual and hearing impairment despite using prescription eyeglasses and hearing aids; and
- Significant musculoskeletal dysfunction which could prevent them from working on a computer.

Setting

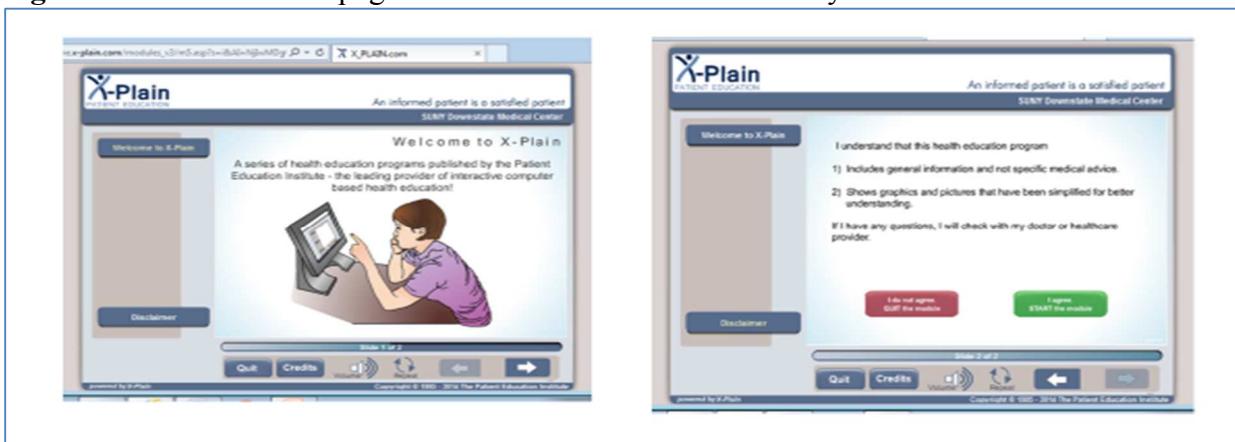
Subjects for this quantitative, descriptive study were recruited from the cardiology clinic of an urban institution in NY. Subjects who signed the informed consent were asked to view an interactive educational website by X-Plain in a single room with a computer within the cardiology office of the institution. All subjects used the same computer system for consistency. This environmental factor was considered in order to decrease threat to the internal validity of the research design.

Protocol

This quantitative, descriptive study was conducted to determine the correlation coefficient of the newly developed U.S.A.B.I.L.I.T.Y. Survey[©]. Thirty subjects were recruited for the purpose

of this study. Subjects were recruited from a cardiology clinic of an urban teaching institution in NY. Potential subjects were identified by one of the nurse practitioners (NP) of the clinic and the introduction was done by the same NP. After the introduction, explanation of the purpose of this study was given to the potential subjects and the informed consent was given to read. All questions were answered before the subject signed the informed consent. After the informed consent was signed, the subject was taken to the designated room where the computer system was located. Before opening the web link, demographic information, the cognitive age and the REALM were obtained or administered first. After which, the link to the website was opened by this researcher. The Disclaimer page would appear first for the subject to agree before starting the interactive tutorial video (Figure 2). The volume of the system was adjusted at the same time by this researcher. After the Disclaimer page was checked off, the “Congestive Heart Failure” video was started and the subject was allowed to navigate the system on their own. This researcher remained in the room with the subject as an observer. The purpose of an observer was to assist in case the subject asked for help or if this observer noticed that the subject was struggling through the navigation for more than 10 minutes. For most of the time, this observer was busy doing other activities while the subject was navigating through interactive web site. After the subject finished watching the interactive web site, the subject was given the U.S.A.B.I.L.I.T.Y. Survey[©] to complete and this observer would leave the room for few minutes to allow the subject to answer the survey.

Figure 2. The Disclaimer page of the interactive tutorial video by X-Plain



Website Measure

The web site used in this study was provided by X-Plain. This interactive audio-visual program can be found in Medline Plus, a health web site that presented interactive health tutorials for patient education with different conditions (Patient Education Institute, 2009). The “Congestive Heart Failure” link was the education tutorial chosen for this study (Figure 2). The study link provided by the company was: http://online.x-plain.com/client/run_LinkCPD_v5.asp?c=3094&p=logs_suny0212&d=ct129105. The initial screen was the tutorial page, in which the user was told by the observer to choose the “start self-playing tutorial.” The program consisted of nine modules labeled as introduction, heart, heart failure, heart failure symptoms, causes, diagnosis, treatment options, lifestyle changes, and a summary. The menu for these modules were located on the left hand corner of the screen (Figure 3). However, the program advanced from one module to the next until the last module except during the question portion. There were several questions included in the tutorial that the participants must answer correctly (Figure 4). If the participant answered the question incorrectly they were redirected back to the same question until they responded correctly to the question. This entire tutorial program was 30 minutes in length.

Figure 3: The initial screen page of the video tutorial

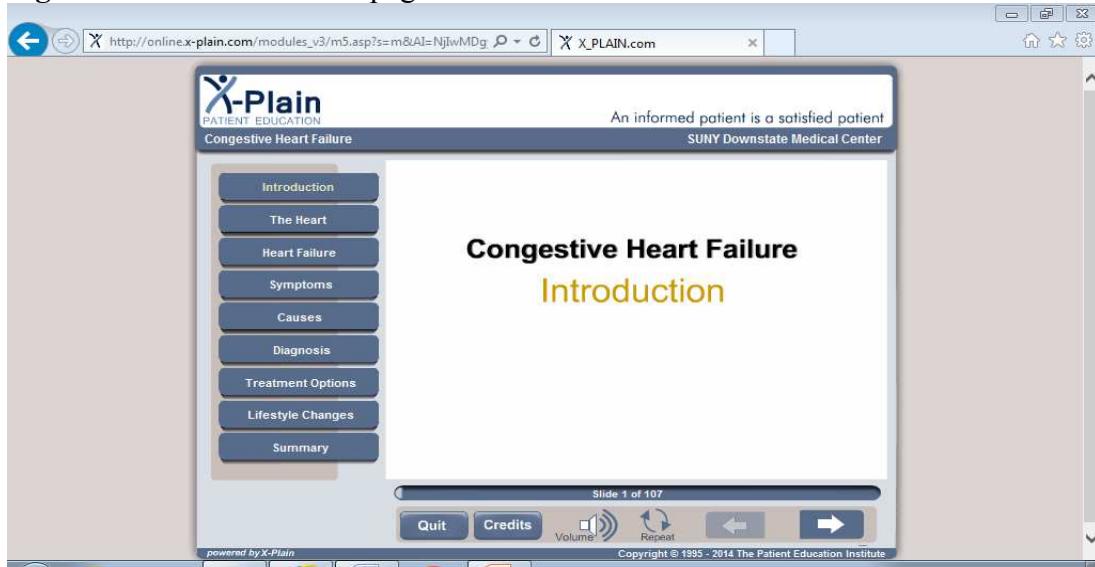
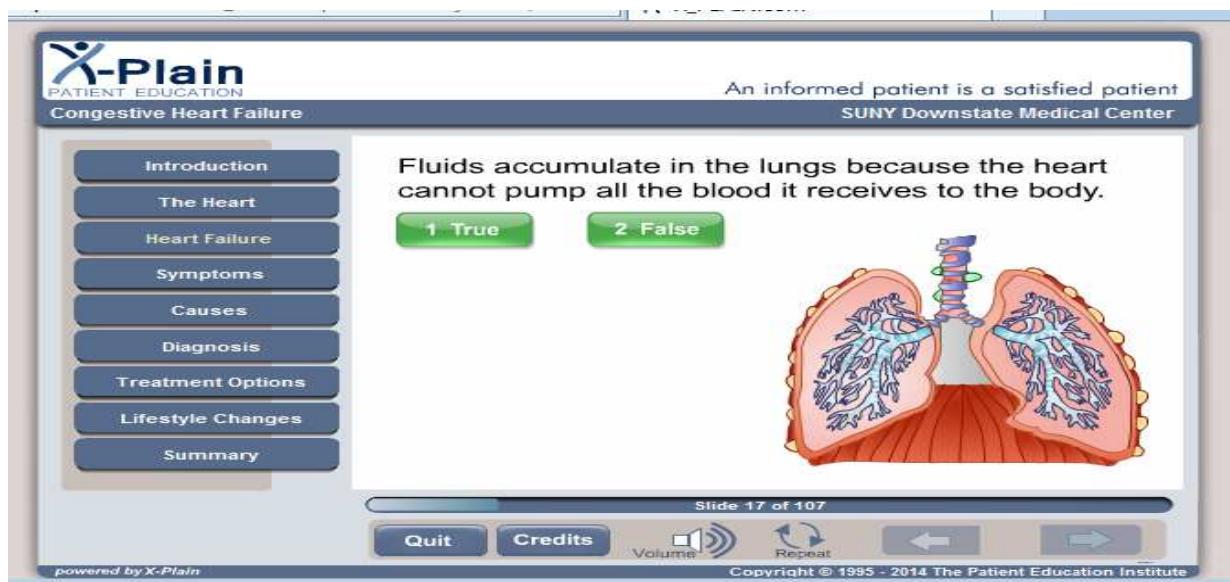


Figure 4. Sample question found in the tutorial video that is answered by the participants



Demographic and clinical information

Since user-centered technique was regarded in usability research, individual differences should be taken into considerations when assessing human-computer interface. The following socio-demographic variables were collected in this quantitative, descriptive study:

1. Age – only patients aged 55 and over were recruited. An increasing number of internet users were older adults, and in order to decrease the potential variability in computer competence that can be seen among varied age groups (Pew Research Center, 2014a). In addition, the prevalence of HF was high in this age group (Lazzarini, Mentz, Fiuzat, Metra, O'Connor, 2013).
2. Gender - male and female in order to determine whether there was a difference between genders in their use and acceptance of the website as well as to determine whether there were differences between genders in their adaptation processes.
3. Racial background – Since the educational video focused on HF, African-Americans were chosen due to their increased propensity to HF with worse outcomes (Yancy, 2005). In addition, AAs were also among the fastest growing internet users in the country (Pew Research Center, 2014a).
4. Educational background – determines whether education had any influence in the patients' use or acceptance of technology.
5. Literacy skills – was collected in order to determine the literacy range of the subjects recruited in this study and to determine whether literacy could be a modifying factor in this study.
6. Computer user classification – novice user, knowledgeable intermittent or expert/frequent user (Faulkner, 1998). The individual's level of expertise with computer use may influence usability. This included the average number of hours per day or per week the subjects use the computer. Computer user classification were defined as:

- a. Novice users – were participants who had no prior experience or have very limited experience with computer or internet use.
- b. Knowledgeable intermittent users– were participants that used computers intermittently, and could maintain semantic knowledge of the task performed and of computer concepts.
- c. Expert users– were participants who were well versed in both semantic and syntactic aspects of the computer system. They had extensive background in the use of the computer or the internet and used the internet or computer several hours per day either at work, at home or in school, and performed daily tasks using the computer or internet (Faulkner, 1998).

Clinical variables collected were those pertinent to the participants' diagnosis of HF and most of these information were obtained from their medical record:

- 1. Echocardiogram report – performed within the past 12 months to document the LV systolic function and to establish eligibility to participate in the study.
- 2. B-type natriuretic peptide (BNP) – a point-of-care diagnostic test to assess the degree of fluid (volume) in the left ventricle (Cabral & Mitchell, 2009). This provided additional confirmation of HF diagnosis during admission.
- 3. New York Heart Association Classification (NYHA-FC) – a subjective measure to determine the functional capacity of the patient at the time of enrollment.

This was part of the HF assessment care (The Criteria Committee of New York Heart Association, 1994).

- a. NYHA-FC I – patients with no limitation in physical activity. Ordinary activity did not produce symptoms of undue dyspnea, fatigue, or angina.
- b. NYHA-FC II – patients with slight limitation in physical activity. Ordinary physical activity produced fatigue, dyspnea or angina.
- c. NYHA-FC III – patients with marked limitation in physical activity. They were comfortable at rest but less than ordinary physical activity causes dyspnea, fatigue or angina.
- d. NYHA-FC IV – patients who were unable to carry out any physical activity without symptoms. They were symptomatic even at rest and symptoms increased with physical activity.

Instruments

Usability Questionnaire

This researcher developed a U.S.A.B.I.L.I.T.Y. Survey[©] because of the paucity of measurement tools that contained the four determinants that defined usability in this study. The usability determinants on the conceptual U.S.A.B.I.L.I.T.Y. Model[©] consisted of the 1) user component - perceived user experience and perceived control, and 2) system component - learnability and efficiency. There were 25-items in this new and the answers were in a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The efficiency portion of the new U.S.A.B.I.L.I.T.Y. Survey[©] was composed of nine item ease of use (4 –items) and usefulness (5-items) of the website. The perceived UX contained six-items that measured user satisfaction and the quality of the web site. The four learnability items were adapted from other usability questionnaires available in public domain including the Technology Acceptance Survey. Perceived control was sub-divided into 3-item attitudinal control and 3-item cognitive control questions that

assessed all facets of PC: cognitive, behavioral and decisional control. The score ranged from 25 to 121 with the score of 98 and above indicating a good “fit” or interface between user and the system. This score was based on item 21 of the survey that was reverse coded. The results of the survey signify that the higher the usability score, the higher the probability that the older adult would intend to use the technology. The reliability and validity of this newly developed instrument is reported in the result portion of this dissertation.

Some of the efficiency and user experience items in this new instrument were adapted with permission from the Perceived Health Web Site Usability Questionnaire (PHWSUQ) (Nahm, Resnick & Mills, 2006) and the Post-study e-Health Usability Questionnaire (PSHUQ), available in public domain (Fruhling & Lee, 2005). These two instruments were chosen because they were developed for use in older adults (PHWSUQ) and in the use of e-Health (PSHUQ), and both instruments have established baseline reliability and validity (Nahm, Resnick & Mills, 2006; Fruhling & Lee, 2005). The PHWSUQ used construct validity and alpha correlation coefficient to evaluate the psychometric properties of the instrument. Its construct validity was examined by comparing the results from the PHWSUQ with the findings from the heuristic evaluation; whereas the reliability of the instrument was reported as an alpha coefficient of each subscale and the overall range scale ranged from .64 to .93 (Nahm, Resnick & Mills, 2006). The reported reliability of the PSHUQ was Cronbach alpha greater than .90, content validity for the survey was examined by panel of experts (Fruhling & Lee, 2005).

Literacy

Rapid Estimate of Adult Literacy in Medicine –R. The Rapid Estimate of Adult Literacy in Medicine- R (REALM-R) was an 8-item word recognition test designed to rapidly screen potential literacy problem (Bass, Wilson & Griffith, 2003). The test was a shortened version of the

REALM, a well-validated and reliable tool although too long to administer. The revised version can be administered in less than 2 minutes. The words included were osteoporosis, allergic, jaundice, anemia, fatigue, directed, colitis, and constipation. A correct response was given if the participant correctly pronounced the word. Scores on REALM-R ranged from 0-to 8. A score of 6 or less was considered at risk for poor literacy.

Reliability and validity. The REALM-R had demonstrated a Cronbach alpha of 0.91. The part-whole correlation between the REALM and the REALM-R was 0.72. It also correlated with the Wide Range Achievement Test-Revised (WRAT-R). The test had been validated only in English (Bass, Wilson & Griffith, 2003).

Cognitive Age

Barak & Schiffman cognitive age. Cognitive age was measured utilizing Barak & Schiffman's (1981) four dimensions: feel-age, look-age, interest-age and do-age). Cognitive age was computed as the numerical average of the decade midpoints of the four subcomponents with the higher the number the older the cognitive age (Barak & Schiffman, 1981).

Reliability and validity. Reliability of the cognitive age was measured using test-retest, Guttman's Lambda test and a split test reliability. The test-retest coefficient was .88; Guttman Lambda and Spearman-Brown split half reliability tests were .86 and .85, respectively.

Statistical analysis

The data was analyzed using the SPSS Version 19 (Chicago, Inc.). Descriptive statistics were used to determine baseline socio-demographic, clinical characteristics of the cohort and measure of web site usability. Face and content validity was conducted to examine the validity of this newly developed instrument. Correlation coefficient analysis was performed to determine the reliability of this newly developed U.S.A.B.I.L.I.T.Y. Survey[©].

Chapter 4

PRESENTATION OF THE DATA

This portion will first discuss the development of the conceptual model and the development of the U.S.A.B.I.L.I.T.Y. Survey[®]. It is followed by the presentation of the results of the study. The validity and reliability of the newly developed instrument will also be reported.

DEVELOPMENT OF THE CONCEPTUAL MODEL

Theoretical/conceptual rationale

A review of the literature found paucity in nursing theory related to the use and acceptance of informational technology among older adults and/or those with limited literacy. Therefore, this researcher developed a conceptual model that guided this present study. The Roy Adaptation Model (RAM), a widely used theory in nursing, was chosen to provide the frame of the conceptualized model. The RAM assumed that the interaction between humans and their environment would result in adaptation (Roy, 2009). The use of technology represented this interaction between humans and the environment. There were two widely known theories that could predict use or acceptance of technology - the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology. The Technology Acceptance Model (TAM) was one of the earliest and simplest models specific to predicting the use of technology in the context of organizational environment (Davis, 1989). The TAM identified two specific determinants - perceived ease of use and perceived usefulness that can predict technology use (Davis, 1989). Other model specific to behavior was the Theory of Planned Behavior (TPB), a theory adapted from the Theory of Reasoned Action (TRA). The construct of perceived behavior control from the TPB was abstracted into the conceptualized model (Ajzen, 1991). The TPB was chosen because it was based on the Theory of Reasoned Action, in which the TAM was also adapted from. The

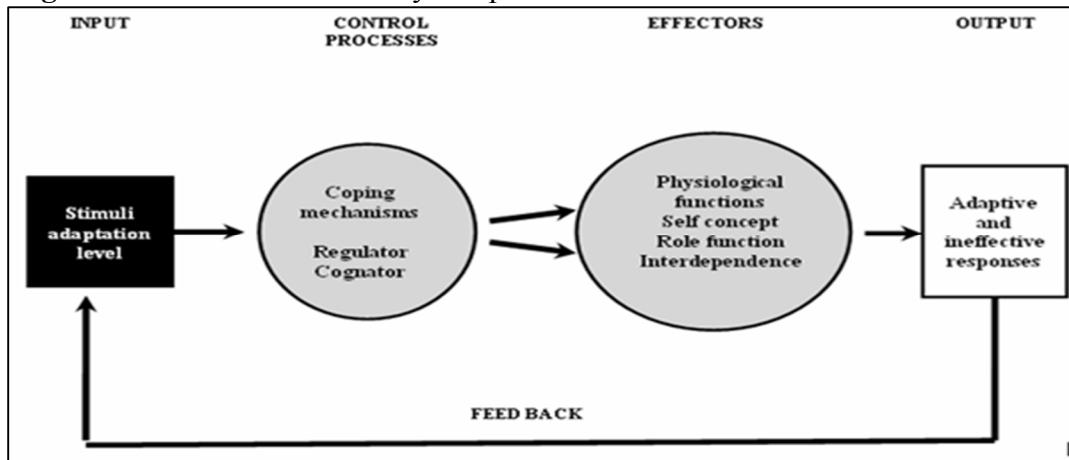
conceptualized model called, The **U.S.A.B.I.L.I.T.Y.** Model[©] was derived as a result of the integration of the RAM, the TAM and the TPB (Figure 1).

Conceptualization of the U.S.A.B.I.L.I.T.Y. model

Roy Adaptation Model

The Roy Adaptation Model was the nursing theory chosen to serve as the frame for the conceptualized model because the theory can be applied to older adult's use of technology as a form of an adaptive behavior, whether they were effective in completing the task or not, adaptation occurred (Figure 5). Roy (1980) stated that a person was an open living system that continually receives external stimuli from the environment and adaptation occurs depending on whether the individual can respond effectively to the stimuli. She described a person as having the ability to use their control processes to adapt with the changing environment. Individual adaptive processes included perception, cognition, learning, information processing, emotions, and memory. These processes produced responses carried out through the effectors, which lead to effective or ineffective adaptation (Roy, 2009). The use of technology by older adults could become the mediator in their adaptation to a new stage of life.

Figure 5. Schematic of the Roy Adaptation Model.

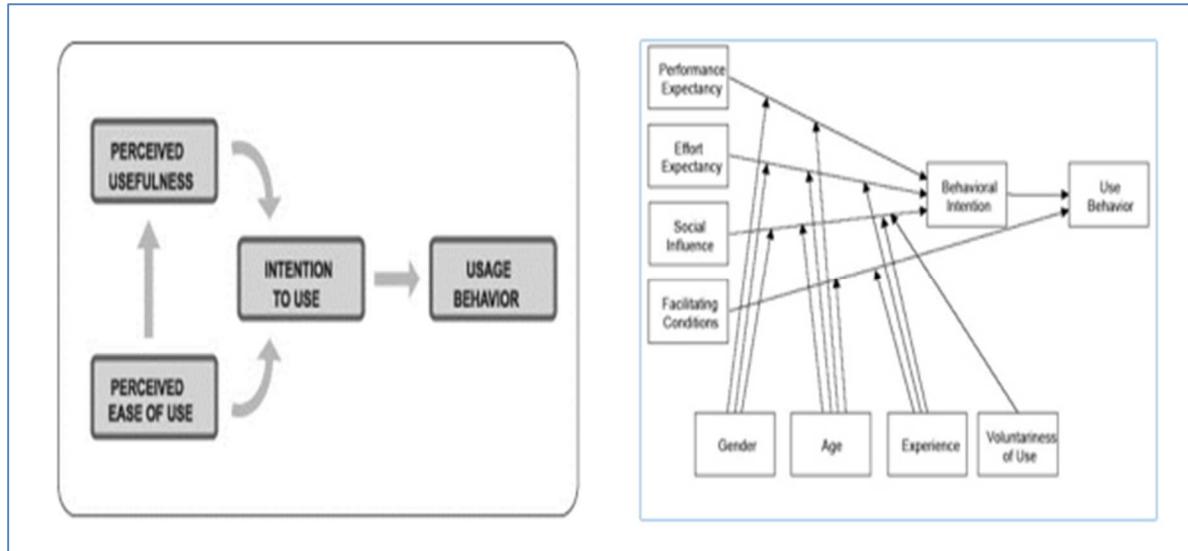


Technology Models

The two technology models that were widely known related to the use and acceptance of technology were the Technology Acceptance Model (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology by Venkatesh and colleagues (2003). The Technology Acceptance Model was developed by Dr. Fred Davis for his dissertation at the Massachusetts Institute of Technology. The central theme of this theory was that two specific determinants would predict a person's intention to use the system (Davis, 1989). The two determinants were perceived ease of use and perceived usefulness (Davis, 1989). Perceived usefulness (PU) was the degree by which a user believed that using the system would enhance his/her performance, whereas perceived ease of use (PEOU) was defined as the "degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Perceived usefulness was considered by Davis (1989) as the most important variable to predict technology acceptance followed by perceived ease of use. Limitations of the TAM were that it could only predict behavior once the user has had the opportunity to use the system, and it does not offer feedback from the user, which could lend in the redesign of the system. Similar to the TAM was the United Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al (2003), which aimed to explain the users' intention to use and their actual usage behavior based on four constructs. The four constructs in the UTAUT included performance expectancy (equivalent to PU), effort expectancy (equivalent to PEOU), social influence (equivalent to subjective norm in the TPB) and facilitating condition (Venkatesh, Morris, Gordon & David, 2003). Gender, age, experience and voluntariness to use are moderating factors that may impact the four constructs on usage intention and behavior (Venkatesh, Morris, Gordon & Davis, 2003). Figure 6 depicts both of these models.

However, in developing the conceptualized model, this researcher chose the TAM to integrate into the developed conceptual model.

Figure 6. Technology Acceptance Model by Davis (1989) on the left and the United Theory of Acceptance and Use of Technology by Venkatesh et al. (2003) on the right.



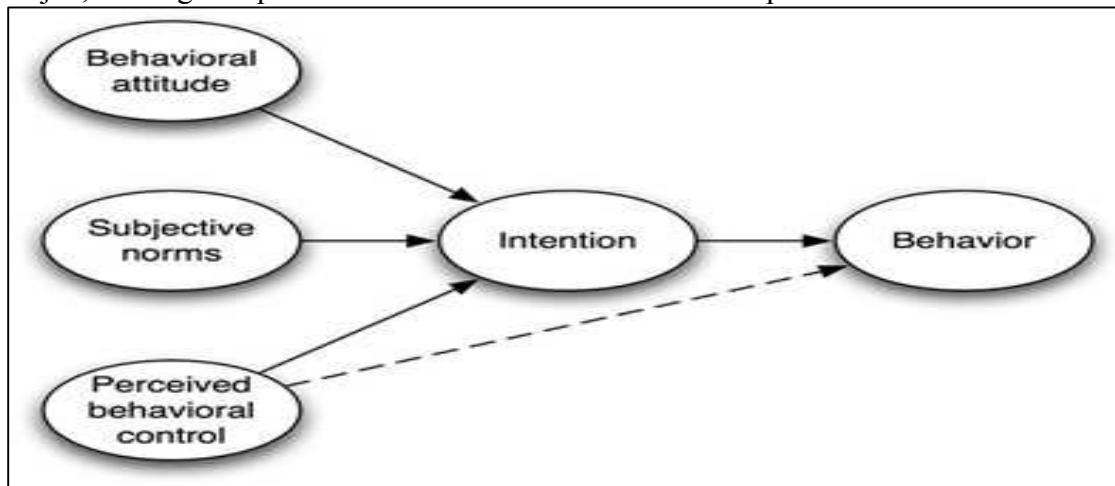
Theory of Planned Behavior

The TAM was adapted from the Theory of Reasoned Action (TRA), which infused how the users' beliefs and attitudes were linked with the user's intention to perform (Fishbein and Ajzen, 1975). The TRA provided the underlying principles for the flow of causality from the external stimuli (website design) through user perceptions about technology and to the actual usage of the technology (Fishbein & Ajzen, 1975). Theory of Planned Behavior (TPB), which extended the TRA, has added the construct of perceived behavioral control. It was believed that perceived behavioral control can predict intention and behavior in the acceptance and actual usage of technology (Ajzen, 1991). The construct of perceived control was considered integral to integrate into the conceptualized model because control as mentioned earlier plays an important part in

successful aging (Infurna, Gerstorf, Ram, Schupp & Wagner, 2011; Roy, 2009; Jacelon, 2007).

Using technology could empower older adults, which could regain their sense of control.

Figure 7. Theory of Planned Behavior by Azjen. Adapted with permission from Dr. Azjen, although no permission was needed because it is on public domain



U.S.A.B.I.L.I.T.Y. MODEL[©]

The conceptual model, The **Use of Technology for Adaptation by Older Adults and/or those with Limited Literacy** (U.S.A.B.I.L.I.T.Y.) was derived from the integration of the RAM, the TAM and the TPB (Figure 1). The Roy Adaptation Model (RAM) provided the frame for the conceptualized model. The two determinants from the TAM and the construct of perceived behavior control from the TPB were integrated into the conceptualization of the U.S.A.B.I.L.I.T.Y. Model[©]. This conceptual U.S.A.B.I.L.I.T.Y. Model[©] has the following assumptions:

1. When a person turns on a device, he/she interfaces with the system and design, and operates in an environment of learning.
2. The person affects the state of the machine by manipulating the controls.
3. The person processes the information in front of him/her based on their own unique individual factors.

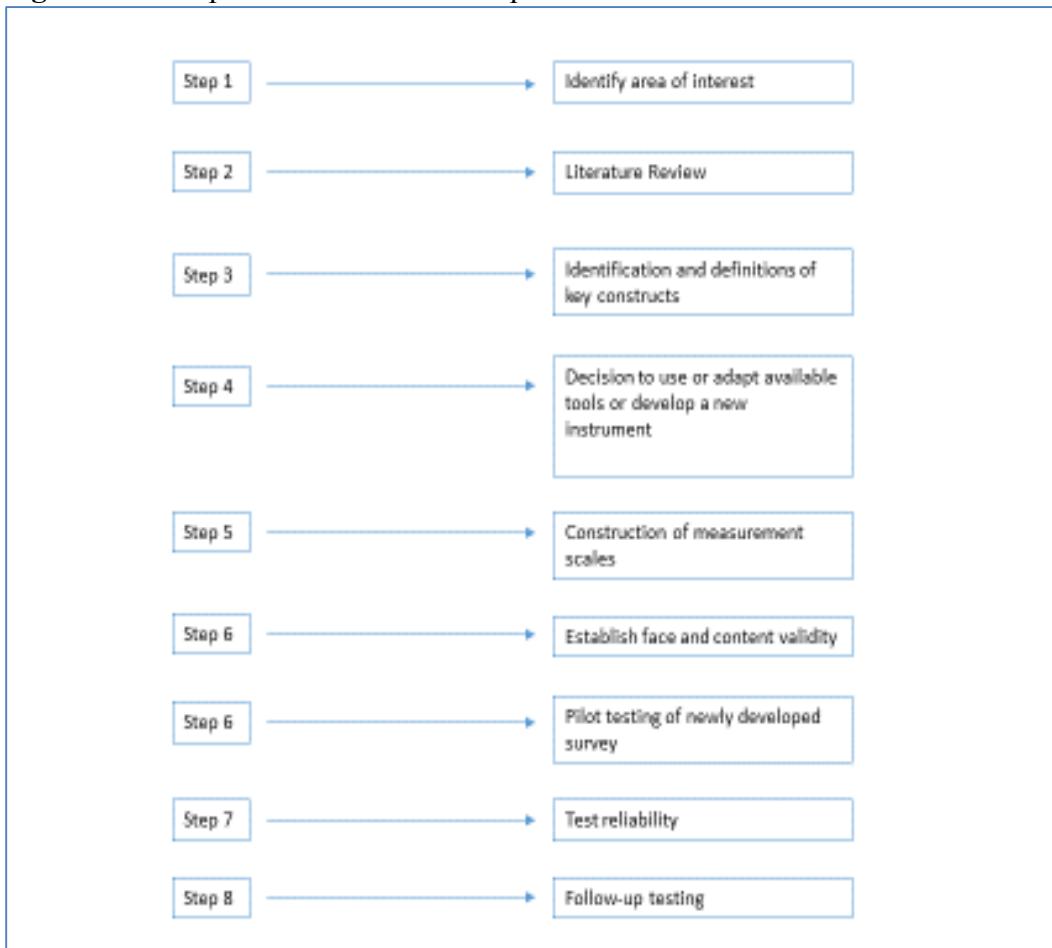
4. Interface between the person and the system is influenced by four determinants: efficiency, learnability, perceived user experience and perceived control.
5. The person's perceived usability of the website would either lead to their intention to use or not to use the technology.

INSTRUMENT DEVELOPMENT

Process of instrument development

Figure 8 depicted the eight steps of instrument development utilized in this study. The steps provided the process used in constructing the newly developed U.S.A.B.I.L.I.T.Y. Survey[©].

Figure 8. 8-Steps of instrument development.



U.S.A.B.I.L.I.T.Y. Survey[©]

The conceptual U.S.A.B.I.L.I.T.Y. Model[©] had identified four usability determinants: efficiency, learnability, user experience and perceived control. Three of these determinants – efficiency, learnability and user satisfaction were constructs that were used in most existing usability questionnaires. This researcher developed the U.S.A.B.I.L.I.T.Y. Survey[©] based on paucity of psychometric tools that included the PC construct as part of the usability definition. Existing usability questionnaires assessed items that were standard and specific to websites or organizational environment. This newly developed survey measures both the user and the system as it relate to behavior outcome. The developed U.S.A.B.I.L.I.T.Y. Survey[©] consisted of a 25-item in a Likert scale with scores ranging from 1 (strongly disagree) to 5 (strongly agree). The scores ranged from 98-121 with scores 98 and above indicating a good “fit” or interface. The scores of the survey indicated that the higher the score the higher the probability that the older adult will intend to use the technology. This succeeding portion will discuss the four determinants of the new instrument separately.

Efficiency

Efficiency refers to how much effort is required to use the system and how useful the system was in meeting the users' needs and goals (Davis, 1989). The efficiency measure is based on the TAM's determinants - ease of use and usefulness (Davis, 1989). The nine-item efficiency measure is divided into 4-item ease of use and 5-item usefulness of the website (Table 4). Ease of use is defined as the “degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Usefulness, on the other hand, refers to the degree to which the user believes that using the system will enhance his/her performance (Davis, 1989). Some of

the items used in the efficiency portion are adapted from TAM as well as the PHWSUQ and PSHUQ.

Table 2. Efficiency Items of the U.S.A.B.I.L.I.T.Y. Survey[©]

Ease of use

1. The website is simple and easy to use.
2. Using the website is effortless
3. I can easily remember how to use the system
4. I can get the information I need quickly

Usefulness

5. The website is useful.
6. The website is user friendly.
7. I did not notice any inconsistencies as I use it
8. The website gave me the information I need about my health
9. The website helps me understand about my health problem

Learnability

Another important component in usability is learnability. Experts, however disagree as to how learnability should be defined despite this consensus. Learnability in relation to software design focuses on consistency, simplicity and familiarity (Duchastel, 2005). It deals with questions such as, “what makes the content of the instructional site learnable?” (Duschastel, 2005, p. 2400). The taxonomy of learnability definitions are based on user experience and “the ability to perform well and to the ability to eventually achieve optimal performance, for the user with no experience with the interface” (Grossman, Fitzmaurice & Attar, 2009, p.651). Learnability is defined in this research as how easy it is to learn the system and to get information from the system. The four learnability items in this new developed survey (Table 5) are adapted from other usability questionnaires on learnability available in public domain including the Technology Acceptance survey.

Table 3. Learnability items of the U.S.A.B.I.L.I.T.Y. Survey[©]

10. I easily learn how to use the website
11. The information from the website is clear
12. The information from the website is easy to understand
13. The website will help me improve my knowledge about my illness.

Perceived user experience

User experience (UX) is the holistic perspective in HCI (Faulkner, 1998). It is “the experience a person gets when he/she interacts with a product in particular condition” (Nurkka, Kujala & Kemppainen, 2009, p.450). Actual experience is a process that assumes that all the unique elements of the product and the internal states of the user are interrelated, interact and modify each other from beginning to end (Hassenzahl & Tractinsky, 2006). In addition, UX is the consequence of a user’s internal state, the characteristics of the designed system, and the context within which interaction occurred (Hassenzahl & Tractinsky, 2006). Nielsen (1996) describes usability as the measure of quality that the user experienced. In this study, perceived UX is defined as how pleasant it is to use the system and how satisfied the user is of the quality of the systems’ design. The six-item perceived UX in this newly developed survey measures user satisfaction and the quality of the web site (Table 6).

Table 4. Perceived UX items on the U.S.A.B.I.L.I.T.Y. Survey[©]

14. The program is exactly what I need.
15. I am satisfied with the overall appearance of the website.
16. I am satisfied with the audio of the website
17. I can use it successfully every time.
18. I would recommend this website to a friend
19. The website is pleasant to use

Perceived control

Perceived control (PC) is a construct that can predict people's behavior, emotions, motivations, performance, and success and failure (Skinner, 1996). As a psychological construct, PC affects behavior, but from a cognitive sense PC does not necessarily involve attempts to affect behavior change (Langer, 1975; Xu, 2007). Perception of control in information system is related to constructs such as user satisfaction and performance (Morris & Marshall, 2004). Known attributes of PC include cognitive control, decisional control and behavioral control (Morris & Marshall, 2004). Cognitive control refers to how a person interprets an event by the gathering of information and appraisal (Averil, 1973). Decisional control refers to the opportunity to choose from different courses of action, and behavioral control occurs when a person uses direct means to exert influence over an event (Averil, 1973). Perceived control is described as how much control the user has to choose and to decide how to proceed with the information received from the system. It is sub-divided into 3-item attitudinal control and 3-item cognitive control questions that assess all the facets of three PC: cognitive, behavioral and decisional controls (Table 7). To date, measuring PC in usability has not been included as part of most available usability questionnaires.

Table 5. Perceived control items of the U.S.A.B.I.L.I.T.Y. Survey[©]

Attitudinal control

- 20.** I will change my habits because of the website
- 21.** I will continue with what I am doing with my health
- 22.** I plan to use the program in the future

Cognitive Control

- 23.** The website gave me control over my health
- 24.** I know what information I need from the website
- 25.** The information I received makes me in control.

RESULTS OF THE STUDY

Demographic characteristics

Table 8 presented the demographic characteristics of this study cohort. Sixty percent of the subjects were males, with average age of 66.9 ± 9 years, and 87% were born outside of the US. All foreign-born subjects were from a Caribbean country. Subjects have an average heart failure diagnosis of 6 years, their mean ejection fraction was $32.9\% \pm 14\%$, and 43% were NYHA-FC I at the time of enrollment. All of the subjects completed watching the video with the exception of one who was not able to complete because of technical problem with the computer. The computer froze in the middle of the tutorial.

Table 6. Demographic characteristics of the pilot samples (N=30)

Demographic characteristics	Frequencies
Gender	
Males	18 (60%)
Females	12 (40%)
Age	Mean = 66.9 years ±9
Birthplace (N=28)	
Born in the US	8
Born outside the US	18
Missing information	2
Educational background (N=29)	
Elementary grades	7
Graduated elementary school/some high school	7
Graduated high school/some College courses	8
Graduated College	5
Advanced degrees	2
Literacy/REALM Score (mean)	(6.3±2.5)
0	3
2	1
5	2
6	5
7	5
8	14
Ownership of computer	
No	21 (70%)
Yes	9 (30%)
Average daily use of computer	Mean = 0.6 hours
Computer expertise	
Novice	22 (73%)
Intermediate	8 (27%)
Expert	0
Ejection fraction (EF)	Mean= 32.9% ±14
NYHA-FC	
NYHA-FC I	43%
NYHA-FC II	37%
NYHA-FC III	20%
Usability score	106 ± 17

Literacy/REALM-R Score

The average literacy/REALM score of the cohort was 6.3 ± 2.5 . Thirty-seven percent of the subjects have literacy/REALM score of 6 and less, which indicated poor literacy. However, 47% have good literacy/REALM score of 8. Approximately half of the subjects attended high school or

less whereas 24% of reported to have completed college or have advanced degrees. Majority of the subjects reported attending high school or obtained some college courses. This study did not show any relationship between the subject's literacy/REALM score and their educational level.

Computer use

Only 30% of the subjects reported owning a computer at home. Although majority of the subjects stated not owning a computer, they had mentioned that at least one member of their family either their children or grandchildren own some form of technology or device, such as laptop, an iPhone, or iPAD at home. Seventy-three percent of the subjects identified themselves as novice users of computer, which included those who reported never using a computer at all. None of the subjects had identified themselves as an expert computer user. For those who use the computer at home, the average time per day that they use the computer was a little over half an hour. The average time the subjects completed watching the website was $37.62 \text{ minutes} \pm 14.3 \text{ minutes}$. The shortest time was 22 minutes and the longest was 88 minutes.

Cognitive age

About 30-35% of the subjects responded to be in the 40's or 50's cognitive age. When cognitive age was compared with the participants' chronological age, about 85% of the participants showed their cognitive age to be 5 or 10 years younger than their chronological age (Q1 (feel): 73.3%; Q2 (look): 86.7%; Q3 (do): 90% and Q4 (interest): 90%, respectively).

U.S.A.B.I.L.I.T.Y. Survey[©]

The reliability and validity of this newly developed instrument is reported in details below. The newly developed U.S.A.B.I.L.I.T.Y. Survey[©] provides an objective data on four determinants that predicts the user's intention to use the technology. The mean U.S.A.B.I.L.I.T.Y. Survey[©] score was 106 ± 17 . The results showed there was a good "interface" between that of the user and

the health web, which was based on the usability score range from 98 to 121, interpreted as the having a good “fit” or interface.

Reliability and validity

Face validity

Face validity was the simplest although not the strongest evidence of validity (Polit & Beck, 2012). This form of validity was described as simply looking at the instrument at face value (Soeken, 2005). Suggestions from the experts were reviewed and the instrument was revised accordingly based on their comments and suggestions.

Content validity

Content validity determined whether or not the items sampled on the developed instrument adequately represented the domain of the concept addressed by the instrument (Soeken, 2005). Seven experts were asked to evaluate the content validity of this newly developed instrument. The panel of experts consisted of one masters prepared system’s engineer and six masters prepared nurses including advanced practice nurses who were in clinical practice and academia; data showed that at least five experts were needed to achieve acceptable content validity (Lynne, 1986). Polit and Beck’s (2012) method of content validity estimation for relevance was used. Content validity index (CVI) was a widely used measure of content validity for multi-item scales (Polit, Beck & Owen, 2007). The two types of CVI measures used in the current study was the CV index for items (I-CVI) and content validity index for scales (S-CVI) (Polit & Beck, 2006). The I-CVI was evaluated by having the panel of seven experts rate each item on the scale for relevance to the usability construct (Polit & Beck, 2012). The evaluation rating used was a 4-point Likert ordinal scale from 1 (not relevant) to 4 (highly relevant). For each, the I-CVI estimation was based on the percentages of experts’ ratings of either 3 or 4, indicating item relevance (Table 9). For a scale to

be rated as having acceptable content validity using more than five experts, the I-CVI across all items must be at least 0.83 (Lynn, 1986). The calculated I-CVI for the newly instrument was 0.97, interpreted as having acceptable I-CVI. The S-CVI was calculated by computing the I-CVI for each item and calculating the average I-CVI across items, expressed as S-CVI/Ave. The S-CVI/Ave of the newly instrument was 0.97, which was considered acceptable based on the criterion of .80 as the lower limit of acceptability for S-CVI (Polit, Beck & Owen, 2007).

Table 7: Rating by Seven Expert Panels: Items Rated as 3 or 4 on a 4-Point Relevance Score

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Number in agreement	I-CVI
1	4	4	4	4	4	4	4	7	1
2	4	4	4	4	4	4	4	7	1
3	4	4	4	4	4	4	4	7	1
4	4	4	4	4	4	4	4	7	1
5	4	3	4	4	4	4	4	7	1
6	4	4	4	4	4	4	4	7	1
7	4	4	4	4	4	4	4	7	1
8	4	4	4	4	4	4	4	7	1
9	4	4	4	4	4	4	4	7	1
10	4	3	4	4	4	4	4	7	1
11	4	4	4	4	4	4	4	7	1
12	4	4	4	4	4	4	4	7	1
13	4	3	4	4	4	-	4	6	0.86
14	3	4	4	4	4	-	4	6	0.86
15	4	3	4	4	4	4	4	7	1
16	4	4	4	4	4	4	4	7	1
17	4	4	4	4	4	4	4	7	1
18	4	4	4	4	4	4	4	7	1
19	4	3	4	4	4	4	4	7	1
20	4	4	4	4	4	4	4	7	1
21	4	4	4	4	4	4	4	7	1
22	4	4	4	4	4	4	4	7	1
23	4	4	4	4	4	4	4	7	1
24	4	4	4	4	4	-	4	6	0.86
25	4	4	4	-	4	4	4	6	0.86
	3.96	3.8	4	3.84	4	3.52	4	3.87/4= 0.97 (S-CVI/Ave)	0.97 I-CVI)

Internal consistency

Reliability analysis was conducted to determine the relationship between the items. There were several approaches to determine the reliability of instruments. This researcher chose internal consistency to assess the reliability of the newly developed U.S.A.B.I.L.I.T.Y. Survey[©]. The total-item correlation coefficient of the instrument was 0.96. The internal consistency of the four determinants ranged from .71 to .95 (Table 8). With the exception of the PC determinant, the internal consistency of the three determinants exceeded Cronbach alpha of .80, indicating good reliability. Tables 9 -16 presented the correlation coefficient of each determinant of the new instrument and each determinant was analyzed separately. The efficiency determinant had an overall Cronbach alpha of 0.95. In the item-total statistics of the efficiency determinant, the highest was .95, therefore none of the items in this determinant need to be deleted (Tables 9-10). The 4-item learnability determinant had a Cronbach's alpha of .92. The highest item-total statistics of the learnability determinant was Cronbach alpha of .94, therefore none of the items need to be deleted as well (Tables 11-12). Similarly, in the perceived user experience determinant had a Cronbach's alpha of .89. Tables 13-14 presents the inter-item correlation matrix and item-total statistics of the perceived UX subscale, none of the items in this determinant need to be deleted. The PC determinant had a Cronbach's alpha of .71. After examining the item-to-total score correlation of this determinant, item number 21 has not correlated well with the total score as well as the item-total correlation were negative (Tables 15-16). This item will need to be reviewed or deleted totally.

Table 8. Reliability analysis results for the four determinants of usability

Subscales	Item numbers	Number of items	Cronbach's alpha	Cronbach's alpha based on standardized items
Efficiency	1-9	9	.94	.95
Learnability	10-13	4	.92	.92
Perceived UX	14-19	6	.89	.89
Perceived Control	20-25	6	.64	.71

Table 9. Inter-item correlation matrix (Efficiency)

EFFICIENCY	Usability Survey Q 1	Usability Survey Q 2	Usability Survey Q 3	Usability Survey Q 4	Usability Survey Q 5	Usability Survey Q 6	Usability Survey Q 7	Usability Survey Q 8	Usability Survey Q 9
Usability Survey Q 1	1.000								
Usability Survey Q 2	.504	1.000							
Usability Survey Q 3	.661	.574	1.000						
Usability Survey Q 4	.594	.516	.649	1.000					
Usability Survey Q 5	.853	.416	.673	.647	1.000				
Usability Survey Q 6	.773	.567	.750	.674	.830	1.000			
Usability Survey Q 7	.641	.350	.547	.527	.717	.764	1.000		
Usability Survey Q 8	.773	.450	.662	.674	.830	.758	.807	1.000	
Usability Survey Q 9	.799	.604	.767	.774	.833	.881	.671	.830	1.000

Table 10. Item-total statistics of the efficiency subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 1	35.41	44.174	.820	.770	.927
Usability Survey Question 2	35.89	41.103	.572	.463	.951
Usability Survey Question 3	35.67	43.077	.782	.641	.928
Usability Survey Question 4	35.67	42.385	.741	.619	.931
Usability Survey Question 5	35.26	44.123	.844	.844	.926
Usability Survey Question 6	35.37	42.934	.892	.874	.922
Usability Survey Question 7	35.52	43.567	.717	.761	.932
Usability Survey Question 8	35.37	43.396	.848	.850	.925
Usability Survey Question 9	35.26	43.353	.922	.893	.922

Table 11. Inter-item correlation matrix of the learnability subscale

LEARNABILITY	Usability Survey Q 10	Usability Survey Q 11	Usability Survey Q 12	Usability Survey Q 13
Usability Survey Q 10	1.000			
Usability Survey Q 11	.638	1.000		
Usability Survey Q 12	.705	.832	1.000	
Usability Survey Q 13	.580	.896	.832	1.000

Table 12. Item-total statistics of the learnability subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 10	13.73	5.926	.678	.515	.943
Usability Survey Question 11	13.63	4.999	.883	.833	.877
Usability Survey Question 12	13.70	4.493	.882	.779	.880
Usability Survey Question 13	13.63	5.068	.858	.830	.886

Table 13. Inter-item correlation matrix of the perceived user experience

PERCEIVED USER EXPERIENCE	Usability Survey Q 14	Usability Survey Q 15	Usability Survey Q 16	Usability Survey Q 17	Usability Survey Q 18	Usability Survey Q 19
Usability Survey Q 14	1.000					
Usability Survey Q 15	.829	1.000				
Usability Survey Q 16	.905	.870	1.000			
Usability Survey Q 17	.468	.428	.457	1.000		
Usability Survey Q 18	.411	.455	.380	.885	1.000	
Usability Survey Q 19	.654	.660	.634	.369	.349	1.000

Table 14. Item-total statistics of the perceived user experience

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 14	22.59	11.323	.807	.836	.857
Usability Survey Question 15	22.55	11.613	.800	.818	.859
Usability Survey Question 16	22.52	11.616	.803	.880	.859
Usability Survey Question 17	22.69	11.793	.635	.825	.887
Usability Survey Question 18	22.55	12.328	.610	.823	.889
Usability Survey Question 19	22.62	12.887	.638	.475	.884

Table 15. Inter-item correlation matrix of the perceived control

PERCEIVED CONTROL	Usability Survey Q 20	Usability Survey Q 21	Usability Survey Q 22	Usability Survey Q 23	Usability Survey Q 24	Usability Survey Q 25
Usability Survey Q 20	1.000					
Usability Survey Q 21	-.302	1.000				
Usability Survey Q 22	.549	-.498	1.000			
Usability Survey Q 23	.633	-.263	.706	1.000		
Usability Survey Q 24	.442	-.488	.688	.540	1.000	
Usability Survey Q 25	.635	-.338	.612	.713	.675	1.000

Table 16. Item-total statistics of the perceived control

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 20	19.54	6.036	.616	.486	.475
Usability Survey Question 22	19.18	8.745	.618	.671	.543
Usability Survey Question 23	19.36	7.201	.764	.664	.450
Usability Survey Question 24	19.00	9.333	.553	.609	.574
Usability Survey Question 25	19.36	6.312	.727	.665	.426
Usability Survey 21 reverse coded	21.96	13.665	-.423	.316	.861

Chapter 5

DISCUSSION, SUMMARY AND CONCLUSION

Chapter 5 of this dissertation includes a brief summary of this study's findings as well as a discussion of their implications and the limitations of the study. The Discussion section describes theory development, the process of instrument development and validation, implications for practice, nursing and education, recommendations for future research, and limitations. The Summary section reviews the purpose, procedure, and findings of this pilot study. Lastly, this chapter provides a Conclusion of the research.

Discussion

Theory development

Nursing science aims to develop theories that explain existing, familiar phenomena and anticipate new phenomena. Nursing theory provides rationales for models of care and a framework for nursing prescription (Meleis, 2012). Theory development starts with selecting a particular area of knowledge, either from a clinical question or research findings or from both (Meleis, 2012). Theory development doesn't necessarily follow a linear or predetermined path (Meleis, 2012). Building a theory is like putting all the pieces of a complex puzzle together. The image or idea that a researcher may initially have in mind may not be the end image or concept.

Integrative strategies that combine clinical experience and research are required in the formulation of a theoretical foundation (Meleis, 2012). While there are several strategies for developing nursing theory, this researcher followed the situation-specific strategy described by Melies (2012). For the purpose of this study, the U.S.A.B.I.L.I.T.Y. Model[©] was developed using a situation-specific strategy (Table 18). Even though the RAM is a grand theory rather than a middle-range theory, it provided a better support for the conceptual model. The conceptual model

focuses on two phenomena, aging population and the increasing use of information technology. A review of the literature provided the basis for the determinants and assumptions of the conceptual model. This researcher plans to test the assumptions and the determinants of the conceptual model in larger scale study.

Table 17. The adapted process of developing situation-specific theories. Adapted from: Meleis, A. I. (2012). *Theoretical nursing; development and progress (5th ed)*, Chapter 17. Philadelphia, PA: Wolter Klumer Health/ Lippincott Williams & Wilkins

- | |
|--|
| <ol style="list-style-type: none"> 1. Study middle-range theory. 2. Specify characteristics of the population and their experiences. 3. Describe a limited scope of experiences and responses. 4. Identify assumptions based on what is known about the population's experiences. 5. Review research and practice literature and redefine concepts, propositions, assumptions, and outcomes. 6. Develop a framework with concepts, propositions, assumptions, and outcomes 7. Provide clinical and research exemplars. 8. Critique emerging theories. 9. Communicate the emerging theory through different methods, such as presentations and publications. |
|--|

Instrument development

This researcher developed a new instrument because of paucity of well-validated usability instruments that measure the determinants of the conceptual model. An 8-step process was developed in constructing the new instrument in this quantitative, descriptive study (Figure 3). The process followed the basic recommendations for instrument development by Cronbach and Straub:

1. An exhaustive review of the literature to identify all the items to be included in the new instrument;
2. Develop the content, structure, format and types of potential responses of the new instrument;

3. Experts were asked to review the face and content validity of the new instrument and the survey items are revised based on their comments.
4. Pilot test the new instrument on a set of respondents similar to the target population to establish reliability.

This quantitative, descriptive study served as the initial testing of the U.S.A.B.I.L.T.Y. Survey[©]. This researcher planned to conduct a follow-up study after the initial reliability study.

Instrument validation

An important process in empirical research is instrument validation (Fruhling & Lee, 2005). Careful validation of instrument reduces measurement error, thus, increasing validity of the instrument (Fruhling & Lee, 2005). There are three categories of methods in establishing validity of a measurement tool: self-evident measures, pragmatic measures and construct validity (Wood & Ross-Kerr, 2011). Self-evident measures look at the apparent value of the instrument rather than the actual value (Wood & Ross-Kerr, 2011). In other words, the instrument has to appear to measure what it is supposed to measure (Wood & Ross-Kerr, 2011). The two types of self-evident measures are face and content validity. Pragmatic measures attempt to answer questions, “does it work?” and “does it do what it is supposed to do?” (Wood & Ross-Kerr, 2011). Concurrent and predictive validity are the two types of pragmatic measures (Wood & Ross-Kerr, 2011). Construct validity determines the extent to which the instrument actually measures the concept (Wood & Ross-Kerr, 2011).

This quantitative, descriptive study utilized self-evident measures in establishing the baseline validity of the newly developed instrument. Face validity was considered the lowest level of instrument validation however it is sometimes necessary to look at the instrument at face value (Soeken, 2005). Content validity measured the degree by which the instrument had appropriate

sample of items of the construct being measured (Polit & Beck, 2012). Content validity index was the method performed to assess CV of the newly developed instrument. The I-CVI and S-CVI/Ave were the approaches of CVI used.

Reliability determines the consistency, stability and repeatability of an instrument (Wood & Ross-Kerr, 2011). An instrument is considered reliable if it does not change in response to the environment and to chance (Wood & Ross-Kerr, 2011). The three methods to test the reliability of an instrument include: (1) test for stability, (2) tests for equivalency and (3) internal consistency (Wood & Ross-Kerr, 2011). Test for stability is considered the best indicator of an instrument's reliability (Wood & Ross-Kerr, 2011). One major limitation of stability however, is that the variable being measured must remain constant over time and is not useful when measuring changeable or transient states. The test-retest is the classic test for stability. Tests of equivalence attempts to yield similar results if similar test is given at the same time or if administered by different observers at the same time (Wood & Ross-Kerr, 2011). Inter-rater reliability is the most common method of testing equivalence (Wood & Ross-Kerr, 2011). Test for internal consistency refers to the extent in which all parts of the measurement techniques are measuring the same concept. Structured questionnaires that are designed to measure a concept should be tested for internal consistency to ensure that all the items on the questionnaire contribute to the overall measure of the concept (Wood & Ross-Kerr, 2011). Test for internal consistency is used to establish reliability of the newly developed instrument.

The Cronbach alpha coefficient is most commonly used to express internal consistency. The alpha coefficient correlates each individual item with each other and the overall score (Wood & Ross-Kerr, 2011). A Cronbach alpha coefficient of 0.80 is considered acceptable (Wood & Ross-Kerr, 2011). It is highly suggested that any new instrument must be tested for internal

consistency in a pilot study before it can be used in a research project. This quantitative, descriptive study suggests acceptable reliability. Further testing of internal consistency will be performed when using the newly developed of the instrument in a large scale study.

Implications to Nursing Practice

This quantitative, descriptive study, and the newly developed U.S.A.B.I.L.I.T.Y. Model[©] have several implications into nursing practice, from the patient and the nurse's viewpoint. Technology is fast becoming an integral part of patient care, albeit be through patient education or in the treatment plan. Traditional office visits are being replaced by virtual visits and treatments can now be delivered electronically. The use of telehealth is proliferating and it refers to using electronic communication to deliver health information including health promotion, diagnosis and treatment to people located in different geographic regions (Thede, 2003). The use of technology and the internet offer older adults an invaluable resource in maintaining their independence, which could enhance their QOL and improve self-care (Cresci, et al., 2010). However common pitfalls such as poor technology design that do not adhere to human factor and ergonomic principles could lead to poor technology interface between the patient and/or provider and technology, which could eventually lead to poor adherence or patient engagement (Powell-Cope, Nelson & Patterson, 2010). Likewise, understanding that having a user friendly interface could facilitate a good patient-provider encounter including teaching and learning.

Technology also has the potential to improve health care quality and cost (Powell-Cope, Nelson & Patterson, 2010). Chronic illness currently utilizes a large portion of the nations' healthcare expenditures, and every effort to contain cost is evident. The incidence of chronic illness increases with age, therefore older adults is the inadvertent recipients of this push towards technology-driven care. An exemplar of this type of care includes a person with a diagnosis of

heart failure requiring an implantable cardioverter-defibrillator (ICD). Treatment plan includes ICD interrogation every three months. Newer devices are now equipped with capabilities that allow information to be relayed from the patient's home to their physician's office, which permits the patient to be monitored from their own home. In addition, this type of care would allow patients to send real-time data to their healthcare provider whenever they develop symptoms before going to the clinic. However, older adults embracing the use of technology in their care could be a complex issue. Their intent to include technology in their self-care is highly dependent on their successful interface with technology. Healthcare providers should be able to assess older adult's knowledge of the use of technology otherwise compliance with care associated with technology could become a problem.

As user and consumers of technology, nurses must be involved in the iteration process of new systems and that evaluation must be ongoing. Nurses must also be involve in the selection of new equipment, receive proper training and monitor the effect and safety of the technology on the patient and their families (Powell-Cope, Nelson & Patterson, 2008). The conceptual model can be adapted as a guide in formative evaluation of the usability of technology and its users, as well as before implementing the use of new technology.

This research has specific implications to the specialty of nursing informatics. Nursing informatics was defined by Staggers & Thompson (2002) as a:

“. . . specialty that integrates nursing science, computer science and information science to manage and communicate data, information and knowledge in nursing practice. Nursing informatics facilitates the integration of data, information, and knowledge to support patients, nurses, and other providers in their decision making

in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology” (p. 260).

This definition continues to evolve as technology becomes more and more integrated into patient care. A nurse informatics specialist employs informatics theories and tools to analyze information, information systems requirements, and evaluate the relationship between information systems and their human-computer interactions within the context of health care (Staggers & Thompson, 2002).

Nursing informatics is becoming indispensable to nursing practice especially with the current initiatives toward the use of electronic health record (EHR). This is evident by the Centers for Medicare and Medicaid Services (CMS) offering financial incentives to the “meaningful use” of certified EHR (2010). The use of EHR allows for the interface of multiple systems to share data and network to support communication of patient information within the healthcare organization. Two types of electronic personal health record (PHR) allow patient access to their own PHR. The “standalone” model allows patient to input personal information, and the “tethered” PHR that links their EHR and allows them to access these information via web portal (Detmer, Bloomrosen, Raymond & Tang, 2014). Patient Portal is an example of this internet application tool, which allows patients to be able to access their own personal health information electronically as well as allows them to communicate with their health care providers (Zarcadoolas, Vaughan, Csajas, Levy, & Rockoff, 2013). This has significant implication to older adults who may not be able to successfully interface with this type of tools. In the clinical settings, Computers on Wheels (CoW) are now being utilized as point-of-use documentation by nurses (Stokowski, 2013). The CoW are used at the bedside to coordinate plan of care, and at the same collect and document patient data (Stokowski, 2013). This rapidly changing technology-driven paradigm in patient care can make older health care professionals frustrated and unsatisfied with their job as they attempt to catch-up

with the change. Nursing administrations and executives must provide continuous learning specifically to adult nurses in order for them to be able to adapt to this changing paradigm. The conceptual model can serve as guide to assess usability of technology with this group of nurses.

Implications for Nursing Research

This research endeavor has significant implications to nursing research in several areas: theory development, instrument development and validation, and usability studies. Theoretical progression is somewhat the most minimized or ignored standard in nursing science (Meleis, 2012). Nurses have difficulty making the link between theory and practice. This is because theory development can be painstaking task for novice nurses.

The U.S.A.B.I.L.I.T.Y. Survey[©] was developed to test the usability of health web sites by older adults and/or those with low or limited literacy. This newly developed instrument adds to the group of psychometric instruments currently available to nurses for the evaluation of the usability of online resources. Findings from the review of literature indicated that the PHWSUQ by Nahm and colleagues (2006) was the only instrument available that assesses usability in older adults. This presented a gap in the literature for a well-validated instrument to test usability in older adults. Nurses who develop instruments must have sufficient knowledge of the different psychometric properties and testing to ensure the development of a high quality measure. Knowledge of the research instrument validation process is essential in developing nursing evidence-based practice strategies. Adequate knowledge of the process in reliability and validity estimation is imperative in order develop quality instrument. Having a validated and reliable U.S.A.B.I.L.I.T.Y. Survey[©] instrument to test usability in older adults and/or low or limited literacy is much needed.

Usability studies in nursing are evolving. Usability examines the relationship between humans and technology. Usability testing whether using the formative or summative approach is a necessary process to ensure quality information from websites. Nurses must become familiar with at least one approach to conducting usability testing.

Implications to Nursing Education

Technology has considerable implications to nursing education. Nurse educators are charged to develop and include innovative educational instructions to prepare graduates to the complex healthcare environment. One of the Institute of Medicine's (2011) initiatives is to increase the number of baccalaureate prepared nurses or advanced degree nurses by 2020. This initiative has motivated institutions to encourage their staff nurses into going back to school to get their baccalaureate degree. That is why nursing schools are now seeing a surge in enrollment of adult learners. At the same time, distance education has been proposed as the solution to the nursing shortage (Mancuso-Murphy, 2007). This paradigm shift in teaching and learning strategies in nursing education focused on integrating technology or informatics into the curriculum. Thus, the teaching pedagogy is slowly transforming from the typical classroom-delivered to technology-delivered instruction. Knowledge of information technology is one of the skills adult learners need to understand and learn quickly in order to succeed in both school and clinical settings. Most schools, if not all, now offer online courses either blended or hybrid to totally online courses. This onset of online education has afforded advantages but also challenges particularly to the adult learners who are entering the classrooms for the first time in decades. The conceptualized theory could be used as a guide to predict the success of adult learners with distance education.

Nurse educators should include human factors content into the nursing curricula as well as have human factors engineers participate into the interprofessional education (Powell-Cope, Nelson & Patterson, 2008). Human factors describe the relationship between humans and machines, whereas ergonomics focus on the design and effectiveness of machines. Safety is a feature that needs to be “engineered” into the use of technology as human errors emerge from human/machine interface (Powell-Cope, Nelson & Patterson, 2008). Nurses should be trained to detect any human factor error since they are the ones who will operate this technology at the bedside. The Quality and Safety Education for Nurses (QSEN) has identified safety as one of the target competencies in knowledge, skills and attitudes for nursing programs (2014). Safety with the use of technology at the bedside is included into this competency. Simulation is a technological approach used in the classroom that facilitates learning by allowing nursing students to practice assessment and intervention skills in a safe environment without placing the patients at harm (Henneman, 2010). The newly developed model and survey instrument could be utilized to evaluate safety based on the interface between nursing students and technology.

Recommendations for Future Research

This section itemizes recommendations for future research. These recommendations may provide further validation to the conceptualized model and newly developed instrument.

1. After this pilot study, a full scale study using the U.S.A.B.I.L.I.T.Y. Model and the U.S.A.B.I.L.I.T.Y. Survey © will be performed to examine usability of a website in older adults in a larger sample size.
2. Since this study only recruited one racial group, additional studies are required to determine further validity and reliability of the conceptualized model and survey to other ethnic or racial groups.

3. Future studies should be conducted to assess the effectiveness of health websites among diverse groups of older adults especially those from different socio-economic status and other chronic conditions using the newly developed instrument.
4. Further research is needed to test the assumptions of the derived U.S.A.B.I.L.I.T.Y. model.
5. Additional research is needed to further assess the reliability of the U.S.A.B.I.L.I.T.Y. Survey.
6. Theory testing is needed to determine the adaptability of the conceptualized model to other situations or conditions including other behavior outcomes.

Limitations

Limitations are acknowledged weaknesses of the study that the researcher is aware. This study acknowledged several limitations. (1) The instrument was tested only in select sample – older (≥ 55 years of age), AAs with a definite diagnosis of HF, (2) the study was conducted in one urban academic institution in a large metropolitan area, (3) the usability testing was not conducted in a controlled environment, and distractions could not be prevented, (4) subjects were recruited from only one clinic in the institution, (5) generalizability of this study is limited because this is only a pilot study to ascertain validity and reliability of the instrument, thus cohort is small, and (6) time constraints to complete the doctoral program on schedule prevented the researcher to conduct a full-scale study.

Summary

The impetus for this quantitative, descriptive research endeavor is the rapidly accelerating use of technology by older adults. Usability addresses the issue of interface between older adults and technology. Current usability theories focus on the website and cognition of the users. To date, review of the literature found paucity in nursing theory on usability particularly in older

adults. The purposes of this research were: 1) to design a conceptualized model on usability in older adults and 2) to develop and to test the newly developed survey instrument to determine its validity and reliability.

The U.S.A.B.I.L.I.T.Y. Model was developed based on integration of several conceptual and theoretical perspectives from the RAM, the TAM and the TPB. The RAM was deemed to be the most appropriate nursing theory because it was assumed that the use of technology by older adults is a form of an adaptive behavior, whether they were effective in their task or not they have adapted to the situation. Since the conceptualized model was technology-driven, the two determinants from the TAM were integrated. Similarly, the construct of PC was abstracted from the TPB because control plays an important role in successful aging, as evidence had shown correlation between loss of control and ill-health (Infurna, Gerstorf, Ram, Schupp & Wagner, 2011; Jacelon, 2007). The conceptualized model had identified four determinants of usability based on the integration of these diverse theoretical and conceptual perspectives – efficiency, learnability, perceived UX and PC. This conceptualized model was derived to examine usability of health web sites in older adults to predict their intent to use the technology. With regards to the methodology of evaluating the usability of websites, besides the use of expensive laboratory setting there were few quantitative tools available to assess usability, most of them were developed by researchers themselves for the purpose of their own study. To date, only one usability questionnaire was found that evaluate usability of a website in older adults and no survey was found that included the construct of perceived control among these questionnaires. Therefore, a U.S.A.B.L.I.T.Y. Survey© was developed and tested to determine the baseline validity and reliability of this newly developed instrument.

A quantitative, descriptive study of 30 African-American adults, 55 years and older with a confirmed diagnosis of heart failure to watch a 30-minute interactive video on “Congestive Heart Failure” was conducted. Subjects completed the REALM and cognitive age surveys before watching the video. This study presented the validity and reliability of the developed instrument. Validity of the newly developed instrument was established by asking experts to evaluate its face and CV. Experts’ evaluations of the CV showed that the instrument had “high” relevance. Content validity index using I-CVI and S-CVI/Ave approaches were used to assess CV, which revealed that the new instrument has acceptable CVI. Internal consistency was used to assess reliability of the developed instrument. The initial estimate of the overall survey total-item correlation alpha was 0.96, which indicated high reliability.

Conclusion

Usability is an evolving field and conducting usability testing by nurse researchers is slowly progressing. Usability testing is an iterative and systematic process to obtain feedback from the users (Karsh, 2004). Review of the literature found a paucity in the nursing literature of theoretical/conceptual framework and usability evaluation that focused on older adults as well as divergent racial/ethnic groups, and/or with low or limited literacy. Although considerable research on usability testing has been conducted by other disciplines, nursing is progressing. Most usability research addressed mostly the technical component such as website designs, cognition, and very few focuses on the behavioral aspect of the user. Nurse scholars search for knowledge from theories to guide research, education and practice. In order for nursing science to progress, it is imperative to continue to build a robust scientific base and develop logical frameworks that drive the discipline forward (Meleis, 2012).

Besides social networking one reason older adult's use the internet is to search for health related information to assist them make decisions about their health (Tsai and Chai, 2005). Older adults who are able to perform this task are empowered and engaged, thus maintaining a sense of control over their care. However, issues such as credibility of websites are important to consider particularly among this age group (Tsai and Chai, 2005). The wide differences in the content of information could be very confusing to the general public, much more so in older adults (Tsai and Chai, 2005).

Data collection is not a precise science and there are many factors that may affect the validity and reliability of the study results. Research on instrument development is a noteworthy research endeavor. Finding the right instrument that would measure a construct precisely is always a challenge to researchers. At times, researchers may have to develop their own instrument if tools that measure their defined construct may not be available. Researchers are expected to follow a process when developing instrument. Development and validation of a newly developed instrument is an important process in order to ensure high quality measurement. It is therefore, suitable to imply that the quality of data collected will only be as good as the instrument used to collect these data (Wood & Ross-Kerr, 2011). Therefore, a critical step in research process is to estimate the degree to which the instrument used is valid and reliable (Wood & Ross-Kerr, 2011).

APPENDIX A

TABLES

Table 1. Determinants of the U.S.A.B.I.L.I.T.Y. Model[©] and their definition.

U.S.A.B.I.L.I.T.Y. constructs	Definitions
Learnability	How easy it is to learn the system and to get information from the system.
Efficiency	How much effort is required to use the system and how useful is the system in meeting the user's needs and goals.
Perceived User experience	How pleasant it is to use the system and how satisfied is the user on the quality of the systems' design.
Perceived control	How much control the user have to choose and to decide how to proceed with the information received from the system

Table 2. Efficiency Items of the U.S.A.B.I.L.I.T.Y. Survey[©]

<u>Ease of use</u>
1. The website is simple and easy to use.
2. Using the website is effortless
3. I can easily remember how to use the system
4. I can get the information I need quickly
<u>Usefulness</u>
5. The website is useful.
6. The website is user friendly.
7. I did not notice any inconsistencies as I use it
8. The website gave me the information I need about my health
9. The website helps me understand about my health problem

Table 3. Learnability items of the U.S.A.B.I.L.I.T.Y. Survey[©]

1. I easily learn how to use the website
2. The information from the website is clear
3. The information from the website is easy to understand
4. The website will help me improve my knowledge about my illness.

Table 4. Perceived UX items on the U.S.A.B.I.L.I.T.Y. Survey[©]

- | |
|---|
| 5. The program is exactly what I need.
6. I am satisfied with the overall appearance of the website.
7. I am satisfied with the audio of the website
8. I can use it successfully every time.
9. I would recommend this website to a friend
10. The website is pleasant to use |
|---|

Table 5. Perceived control items of the U.S.A.B.I.L.I.T.Y. Survey[©]**Attitudinal control**

- | |
|--|
| 11. I will change my habits because of the website
12. I will continue with what I am doing with my health
13. I plan to use the program in the future |
|--|

Cognitive Control

- | |
|--|
| 14. The website gave me control over my health
15. I know what information I need from the website
16. The information I received makes me in control. |
|--|

Table 6. Demographic characteristics of the pilot samples (N=30)

Demographic characteristics	Frequencies
Gender	
Males	18 (60%)
Females	12 (40%)
Age	Mean = 66.9 years ±9
Birthplace (N=28)	
Born in the US	8
Born outside the US	18
Missing information	2
Educational background (N=29)	
Elementary grades	7
Graduated elementary school/some high school	7
Graduated high school/some College courses	8
Graduated College	5
Advanced degrees	2
Missing information	1
Literacy/REALM Score	6.3 ± 2.5
0	3
2	1
5	2
6	5
7	5
8	14
Ownership of computer	
No	21 (70%)
Yes	9 (30%)
Average daily use of computer	Mean = 0.6 hours ± 1.3
Computer expertise	
Novice	22 (73%)
Intermediate	8 (27%)
Expert	0
Ejection fraction (EF)	Mean= 32.9% ±14
NYHA-FC	
NYHA-FC I	43%
NYHA-FC II	37%
NYHA-FC III	20%
Usability Score	106 ± 17 (87.6%)

Table 7: Rating by Seven Expert Panels: Items Rated as 3 or 4 on a 4-Point Relevance Score

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Number in agreement	I-CVI
1	4	4	4	4	4	4	4	7	4
2	4	4	4	4	4	4	4	7	4
3	4	4	4	4	4	4	4	7	4
4	4	4	4	4	4	4	4	7	4
5	4	3	4	4	4	4	4	7	3.85
6	4	4	4	4	4	4	4	7	4
7	4	4	4	4	4	4	4	7	4
8	4	4	4	4	4	4	4	7	4
9	4	4	4	4	4	4	4	7	4
10	4	3	4	4	4	4	4	7	3.85
11	4	4	4	4	4	4	4	7	4
12	4	4	4	4	4	4	4	7	4
13	4	3	4	4	4	-	4	6	3.28
14	3	4	4	4	4	-	4	6	3.28
15	4	3	4	4	4	4	4	7	3.85
16	4	4	4	4	4	4	4	7	4
17	4	4	4	4	4	4	4	7	4
18	4	4	4	4	4	4	4	7	4
19	4	3	4	4	4	4	4	7	3.85
20	4	4	4	4	4	4	4	7	4
21	4	4	4	4	4	4	4	7	4
22	4	4	4	4	4	4	4	7	4
23	4	4	4	4	4	4	4	7	4
24	4	4	4	4	4	-	4	6	3.43/4
25	4	4	4	-	4	4	4	6	3.43
	3.96	3.8	4	3.84	4	3.68 3.52	4	3.87/4= 0.97	3.87/4= 0.97 I-CVI)

Table 8. Cronbach alpha of the four subscales of the U.S.A.B.I.L.I.T.Y. Survey[©]

Subscales	N (item)	Cronbach's alpha	Cronbach's alpha based on standardized items
Efficiency	9	.94	.95
Learnability	4	.92	.92
Perceived User Experience	6	.89	.89
Perceived Control	6	.64	.71

Table 9. Inter-item correlation matrix (Efficiency)

EFFICIENCY	Usability Survey Q 1	Usability Survey Q 2	Usability Survey Q 3	Usability Survey Q 4	Usability Survey Q 5	Usability Survey Q 6	Usability Survey Q 7	Usability Survey Q 8	Usability Survey Q 9
Usability Survey Q 1	1.000								
Usability Survey Q 2	.504	1.000							
Usability Survey Q 3	.661	.574	1.000						
Usability Survey Q 4	.594	.516	.649	1.000					
Usability Survey Q 5	.853	.416	.673	.647	1.000				
Usability Survey Q 6	.773	.567	.750	.674	.830	1.000			
Usability Survey Q 7	.641	.350	.547	.527	.717	.764	1.000		
Usability Survey Q 8	.773	.450	.662	.674	.830	.758	.807	1.000	
Usability Survey Q 9	.799	.604	.767	.774	.833	.881	.671	.830	1.000

Table 10. Item-total statistics of the efficiency subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 1	35.41	44.174	.820	.770	.927
Usability Survey Question 2	35.89	41.103	.572	.463	.951
Usability Survey Question 3	35.67	43.077	.782	.641	.928
Usability Survey Question 4	35.67	42.385	.741	.619	.931
Usability Survey Question 5	35.26	44.123	.844	.844	.926
Usability Survey Question 6	35.37	42.934	.892	.874	.922
Usability Survey Question 7	35.52	43.567	.717	.761	.932
Usability Survey Question 8	35.37	43.396	.848	.850	.925
Usability Survey Question 9	35.26	43.353	.922	.893	.922

Table 11. Inter-item correlation matrix of the learnability subscale

LEARNABILITY	Usability Survey Q 10	Usability Survey Q 11	Usability Survey Q 12	Usability Survey Q 13
Usability Survey Q 10	1.000			
Usability Survey Q 11	.638	1.000		
Usability Survey Q 12	.705	.832	1.000	
Usability Survey Q 13	.580	.896	.832	1.000

Table 12. Item-total statistics of the learnability subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 10	13.73	5.926	.678	.515	.943
Usability Survey Question 11	13.63	4.999	.883	.833	.877
Usability Survey Question 12	13.70	4.493	.882	.779	.880
Usability Survey Question 13	13.63	5.068	.858	.830	.886

Table 13. Inter-item correlation matrix of the perceived user experience

PERCEIVED USER EXPERIENCE	Usability Survey Q 14	Usability Survey Q 15	Usability Survey Q 16	Usability Survey Q 17	Usability Survey Q 18	Usability Survey Q 19
Usability Survey Q 14	1.000					
Usability Survey Q 15	.829	1.000				
Usability Survey Q 16	.905	.870	1.000			
Usability Survey Q 17	.468	.428	.457	1.000		
Usability Survey Q 18	.411	.455	.380	.885	1.000	
Usability Survey Q 19	.654	.660	.634	.369	.349	1.000

Table 14 Item-total statistics of the perceived user experience

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 14	22.59	11.323	.807	.836	.857
Usability Survey Question 15	22.55	11.613	.800	.818	.859
Usability Survey Question 16	22.52	11.616	.803	.880	.859
Usability Survey Question 17	22.69	11.793	.635	.825	.887
Usability Survey Question 18	22.55	12.328	.610	.823	.889
Usability Survey Question 19	22.62	12.887	.638	.475	.884

Table 15. Inter-item correlation matrix of the perceived control

PERCEIVED CONTROL	Usability Survey Q 20	Usability Survey Q 21	Usability Survey Q 22	Usability Survey Q 23	Usability Survey Q 24	Usability Survey Q 25
Usability Survey Q 20	1.000					
Usability Survey Q 21	-.302	1.000				
Usability Survey Q 22	.549	-.498	1.000			
Usability Survey Q 23	.633	-.263	.706	1.000		
Usability Survey Q 24	.442	-.488	.688	.540	1.000	
Usability Survey Q 25	.635	-.338	.612	.713	.675	1.000

Table 16. Item-total statistics of the perceived control

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Usability Survey Question 20	19.54	6.036	.616	.486	.475
Usability Survey Question 22	19.18	8.745	.618	.671	.543
Usability Survey Question 23	19.36	7.201	.764	.664	.450
Usability Survey Question 24	19.00	9.333	.553	.609	.574
Usability Survey Question 25	19.36	6.312	.727	.665	.426
Usability Survey 21 reverse coded	21.96	13.665	-.423	.316	.861

APPENDIX B
FIGURES

Figure 1. Pictorial representation of the derived model – The **U**se of **T**echnology for **A**daptation by Older Adults and/or those with **L**imited **L**iteracy (U.S.A.B.I.L.I.T.Y.) Model[©]

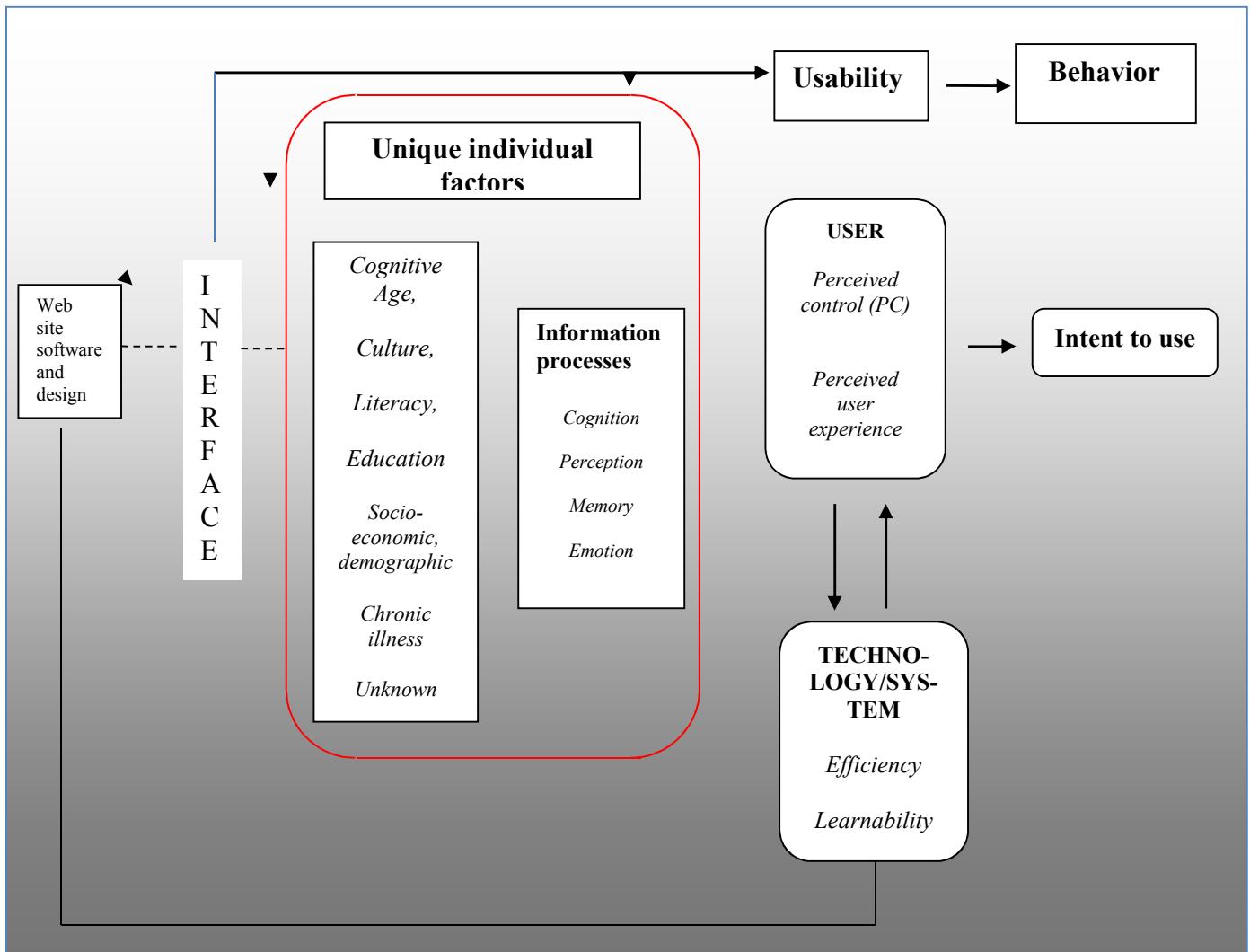


Figure 2. The Disclaimer page of the interactive tutorial video by X-Plain

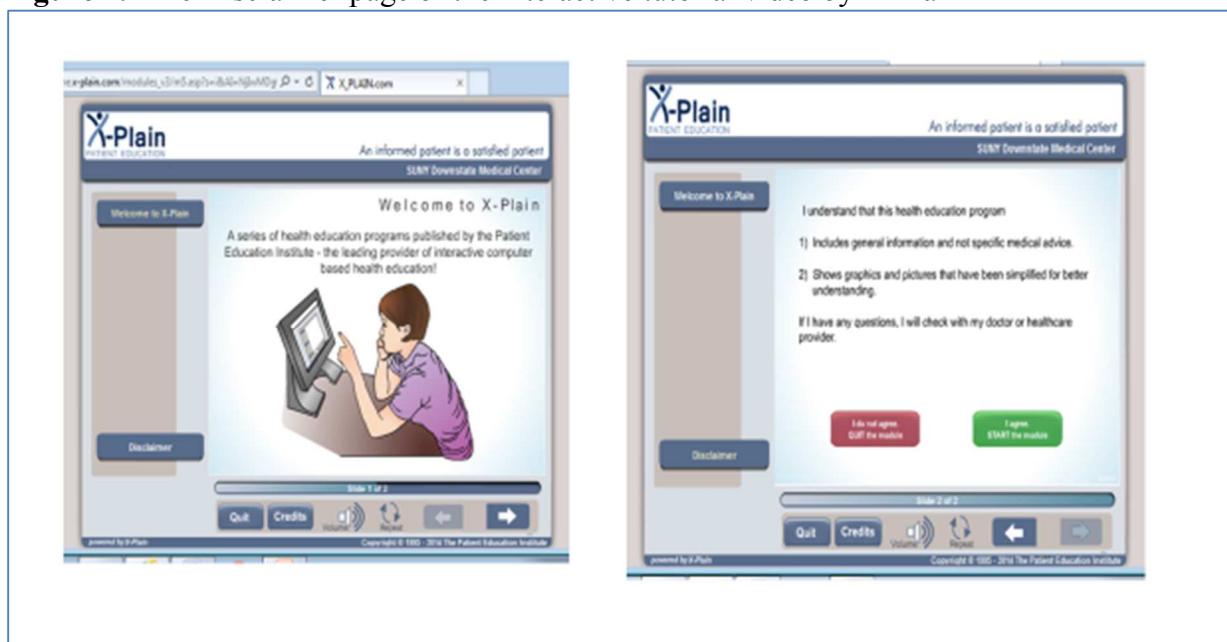


Figure 3: The Introductory screen page of the video tutorial



Figure 4. Sample question found in the tutorial video that is answered by the participants

The screenshot shows a slide from a patient education program. At the top left is the X-Plain logo and "PATIENT EDUCATION". Below it is the title "Congestive Heart Failure". At the top right is the text "An informed patient is a satisfied patient" and "SUNY Downstate Medical Center". On the left is a vertical navigation menu with the following items: Introduction, The Heart, Heart Failure, Symptoms, Causes, Diagnosis, Treatment Options, Lifestyle Changes, and Summary. In the center of the slide is a statement: "Fluids accumulate in the lungs because the heart cannot pump all the blood it receives to the body." Below this statement are two green buttons labeled "1 True" and "2 False". To the right of the statement is a color illustration of a human lung showing the internal structure of the bronchial tubes and blood vessels. At the bottom of the slide are several control buttons: "Slide 17 of 107", "Quit", "Credits", "Volume" (with a speaker icon), "Repeat", and arrows for navigating between slides. The footer of the slide includes the text "powered by X-Plain" and "Copyright © 1995 - 2014 The Patient Education Institute".

Figure 5. Schematic representation of the Roy Adaptation Model.

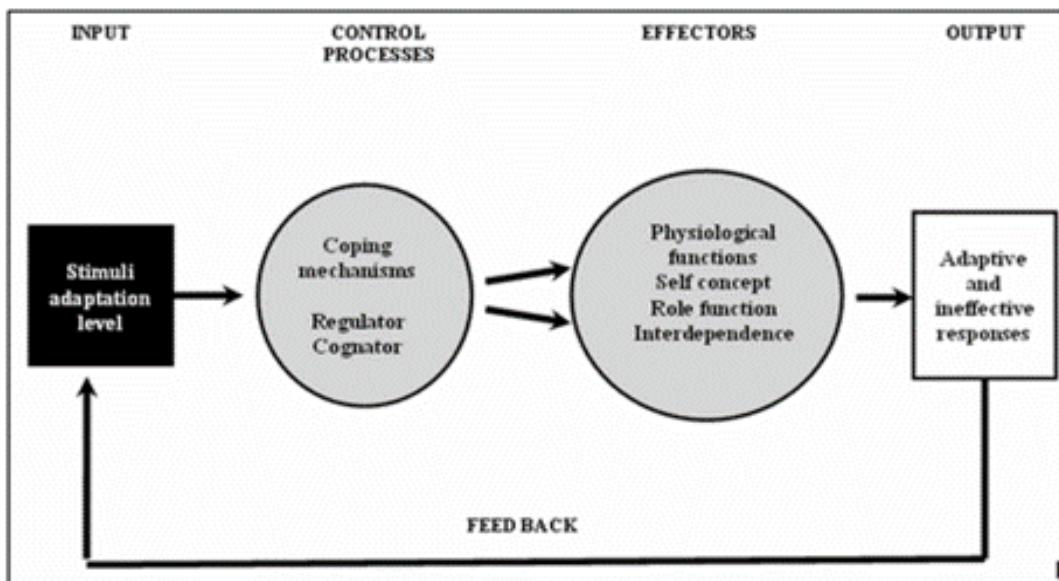


Figure 6. Technology Acceptance Model by Davis (1989) on the left and the United Theory of Acceptance and Use of Technology by Venkatesh et al. (2003) on the right.

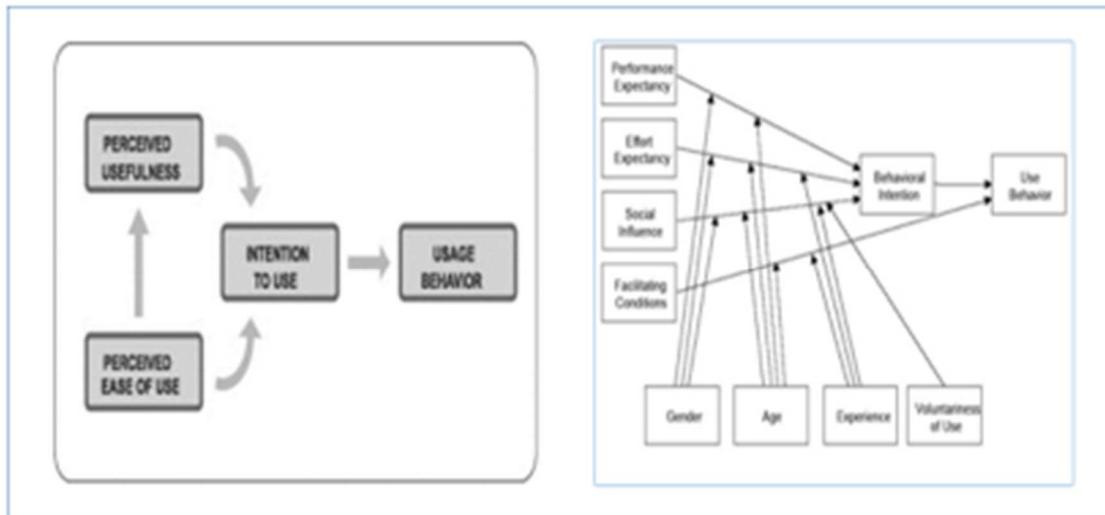


Figure 7. Theory of Planned Behavior by Fishbein & Ajzen

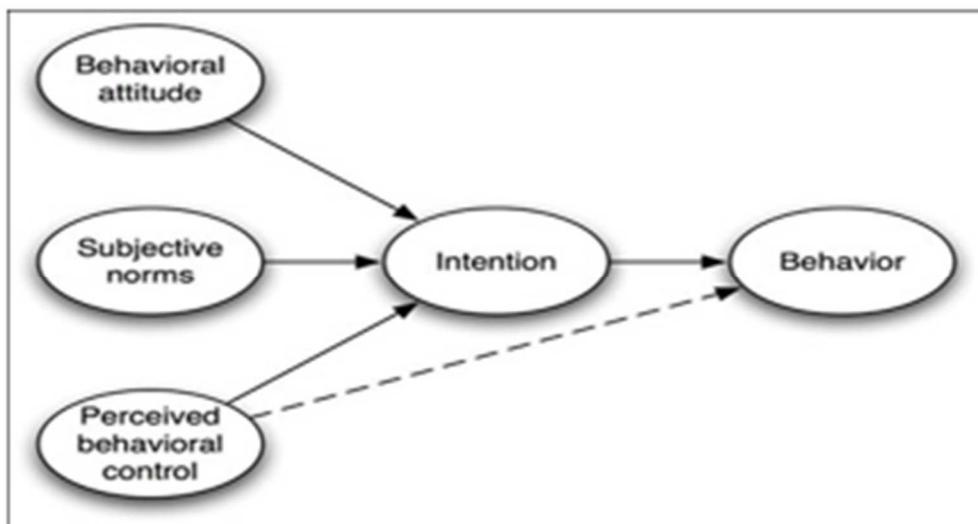
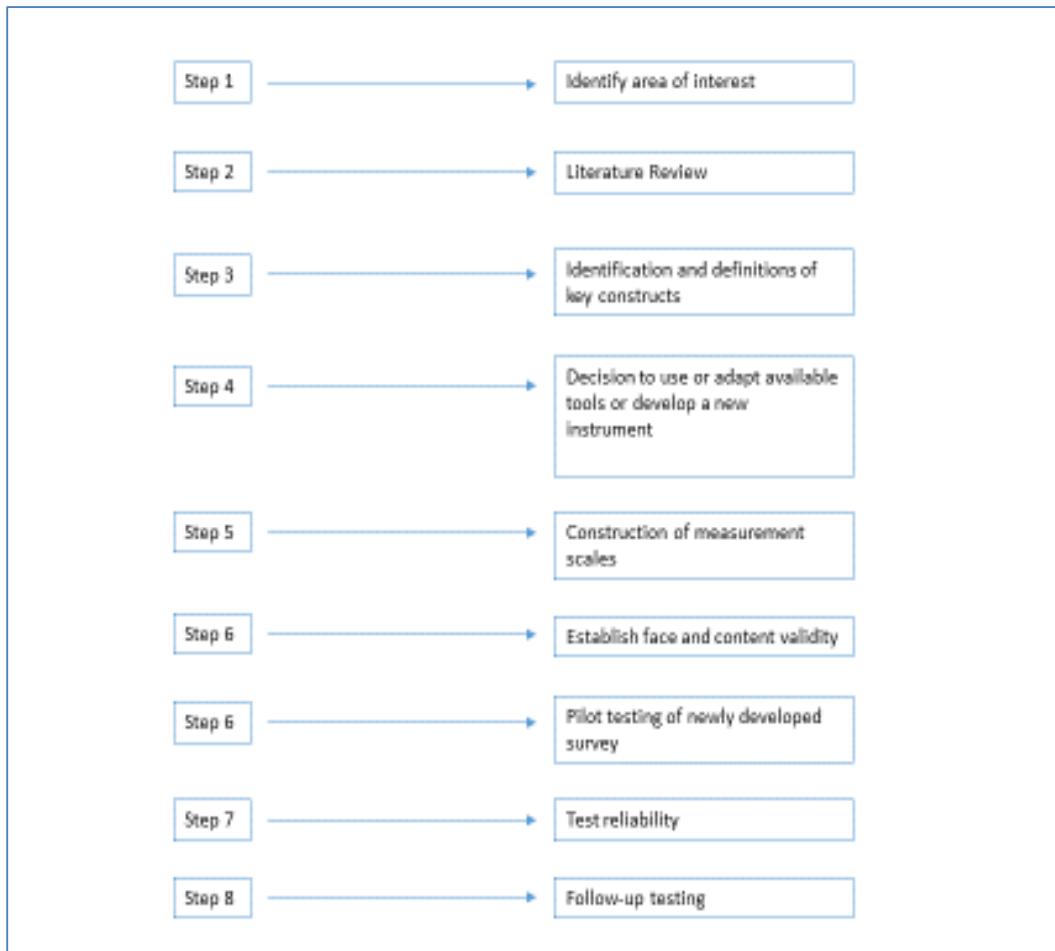


Figure 8. 8-Step of instrument development.



APPENDIX C

INSTITUTIONAL REVIEW BOARDS APPROVAL LETTERS (CUNY)



Human Research Protections Program
Herbert H. Lehman College (CUNY) HRPP Office

DATE: May 14, 2012

TO: Meriam Caboral, RN, MSN, NP-C
FROM: Herbert H. Lehman College (CUNY) HRPP Office

PROJECT TITLE: [328363-1] USABILITY OF A HEALTH WEB SITE IN OLDER AFRICAN-AMERICANS

SUBMISSION TYPE: New Project

ACTION: APPROVED

APPROVAL DATE: May 7, 2012

EXPIRATION DATE: May 6, 2013

RISK LEVEL: Minimal Risk

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 4

Thank you for your submission of New Project materials for this project. The University Integrated IRB has APPROVED your research. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Please remember that informed consent is a process beginning with a description of the project and assurance of the participant's understanding, followed by a signed consent form(s). Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any modifications/changes to the approved materials must be approved by this IRB prior to implementation. Please use the appropriate modification submission form for this request.

All UNANTICIPATED PROBLEMS (UPS) involving risks to subjects or others, NON-COMPLIANCE issues, and SUBJECT COMPLAINTS must be reported promptly to this office. All sponsor reporting requirements must also be followed. Please use the appropriate submission form for this report.

This research must receive continuing review and final IRB approval before the expiration date of May 6, 2013. Your documentation for continuing review must be received with sufficient time for the IRB to conduct its review and obtain final IRB approval by that expiration date. Please use the appropriate continuation submission forms for this procedure. PLEASE NOTE: The regulations do not allow for any grace period or extension of approvals.

If you have any questions, please contact Tara Prairie at (718) 960-8717 or tara.prairie@lehman.cuny.edu. Please include your project title and reference number in all correspondence with this committee.

APPENDIX C

INSTITUTIONAL REVIEW BOARDS APPROVAL LETTERS (SUNY)



**SUNY
DOWNSTATE**
Medical Center

University Hospital of Brooklyn
 College of Medicine
 School of Graduate Studies
 College of Nursing
 College of Health Related Professionals
 School of Public Health

Institutional Review Board
 Rebecca Twersky, MD, MPH, Chair
 Phyllis Supino, EdD, Vice-Chair, Committee A
 Stanley Friedman, MD, Vice-Chair, Committee B

FWA# 00003624
 Study #[377524-2]

DATE: April 29, 2013

TO: Meriam Caboral, MSN, NP-C
 FROM: SUNY Downstate Medical Center IRB Committee A

PROJECT TITLE: [377524-2] Usability of a Health Website in Older African-Americans with Heart Failure

REFERENCE #:

SUBMISSION TYPE: Response/Follow-Up

ACTION: APPROVED

APPROVAL DATE: April 29, 2013

EXPIRATION DATE: April 28, 2014

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 45 CFR 46.110 (f) 7

Thank you for your submission of Response/Follow-Up materials for this study. The SUNY Downstate Medical Center IRB Committee A has APPROVED your study. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

The following have been approved for this submission:

- * consent form version dated 4/22/13
- * flyer

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require that each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

APPENDIX C

INSTITUTIONAL REVIEW BOARDS APPROVAL LETTERS (SUNY)



**SUNY
DOWNSTATE**
Medical Center

University Hospital of Brooklyn
 College of Medicine
 School of Graduate Studies
 College of Nursing
 College of Health Related Professionals
 School of Public Health

Institutional Review Board
 Rebecca Tversky, MD, MPH, Chair
 Phyllis Supino, EdD, Vice-Chair, Committee A
 Stanley Friedman, MD, Vice-Chair, Committee B

FWA# 00003624
 Study #[377524-3]

DATE: May 14, 2014

TO: Meriam Caboral, MSN, NP-C
 FROM: SUNY Downstate Medical Center IRB Office

PROJECT TITLE: [377524-3] Usability of a Health Website in Older African-Americans with Heart Failure

REFERENCE #:

SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED

APPROVAL DATE: May 14, 2014

EXPIRATION DATE: May 14, 2015

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # [45CFR46.110(f) 7. Individual or group behavior]

Thank you for your submission of Continuing Review/Progress Report materials for this study. The SUNY Downstate Medical Center IRB Office has APPROVED your request for continuation. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

The following items are approved with this submission:

- consent form, dated 4/22/13
- recruitment flyer

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require that each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this study must be reported promptly to this office.

This study has been determined to be a Minimal Risk project. Based on the risks, this study requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of May 14, 2014, unless closed before that date.

Please note that all research records must be retained for a minimum of three years after the completion of the study.

Please note that IRB approval of this study/protocol does not necessarily constitute final approval to carry out the study. Where necessary (e.g., at Kings County Hospital Center), specific affiliate institutional approvals may be required before a study may be started.

If you have any questions, please contact the IRB staff (718-613-8480 / fax: 718-613-8497 / email: irb@downstate.edu). Please include your study title and reference number in all correspondence with this office.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within SUNY Downstate Medical Center IRB Committee A's records.

APPENDIX D

CITY UNIVERSITY OF NEW YORK**LEHMAN COLLEGE
Department of Nursing****CONSENT TO PARTICPATE IN A RESEARCH PROJECT**

Project Title: Usability of a Health Web Site in Older African-Americans with Heart Failure

Principal Investigator: Meriam F. Caboral
 Graduate Center
 365 Fifth Avenue, Rm 3317
 New York, NY 10016
 917-757-7646

Faculty Advisor: Martha V. Whetsell
 Associate Professor
 Lehman College, Department of Nursing
 T3 building, Room 201
 250 Bedford Park Blvd West,
 Bronx, NY 10468

Site where study is to be conducted: SUNY Downstate Medical Center 450 Clarkson Avenue
 Brooklyn, NY 11203

Introduction/Purpose: You are invited to participate in a research study. The study is conducted under the direction of Meriam F. Caboral, RN,MSN, NP-C and the Graduate Center. The purpose of this research study is to examine how older African-Americans find the information about congestive heart failure from a health web site usable. The results of this study may help identify some problems older adults may have with the use of a health web site or computer for their health information.

Procedures: Approximately **75** individuals are expected to participate in this study. After signing the informed consent, subjects will be asked three sets of questions, which include literacy and cognitive age questionnaires. Each subject will then be asked to watch “Congestive heart failure” video on a laptop computer and will be asked a U.S.A.B.I.L.I.T.Y. survey at the end of the program. The video is about 30-minute long and the expected time commitment for each participant is **about 45 minutes to one hour**. All session will take place at SUNY Downstate Medical Center at 450 Clarkson Avenue Brooklyn, NY 11203.

Possible Discomforts and Risks: There is no known major risk involved in participating in this study. However, you may feel anxious using the computer especially if you are not use to it. To minimize this risk, a nurse will stay with you while you are watching the video. Another potential risk is breach of confidentiality. To minimize this risk the study will not collect any personal information and we will take every effort to protect any information we collect for this study.

CUNY UI - Institutional Review Board

Approval Date: May 7, 2012

Expiration Date: May 6, 2013

Coordinator Initials: TMC

Benefits: The possible benefit of participating in this research study is that a health web site can be a source of information on your illness that can increase your knowledge on heart failure, which could help you understand about the disease.

Alternatives: The other alternative is not to participate in this study.

Voluntary Participation: Your participation in this study is voluntary, and you may decide not to participate without prejudice, penalty, or loss of benefits to which you are otherwise entitled. If you decide to leave the study, please contact the principal investigator, Meriam F. Caboral, to inform them of your decision.

Financial Considerations: Participation in this study will not cost anything. You will not receive any compensation for your participating in this study.

Confidentiality: The data obtained from you will be collected via pen and paper. Only the principal investigator, her designated research person, and the IRB members and staff can access the data collected. The researcher will protect your personal information by using identifiers that will not contain any information that can possibly link to you. The principal investigator will keep and store the collected data in a locked cabinet. A paper copy will be kept for two years in order to verify information if necessary.

Contact Questions/Persons: If you have any questions about the research now or in the future, you should contact the Principal Investigator, Meriam F. Caboral, at (917) 757-7646 or email address: meriam.caboral@gmail.com. If you have any questions concerning your rights as a participant in this study, you may contact Tara Prairie, the Human Research Protections Administrator of Lehman College at (718) 960-8717 or email address: hrpp.administrator@lehman.cuny.edu.

Statement of Consent:

"I have read the above description of this research and I understand it. I have been informed of the risks and benefits involved, and all my questions have been answered to my satisfaction. Furthermore, I have been assured that any future questions that I may have will also be answered by the principal investigator of the research study. I voluntary agree to participate in this study.

By signing this form, I have not waived any of my legal rights to which I would otherwise be entitled.

I will be given a copy of this statement."

Printed Name of Subject

Signature of Subject

Date Signed

Printed Name of Person Explaining Consent Form

Signature of Person Explaining Consent Form

Date Signed

Printed Name of Investigator

Signature of Investigator

Date Signed

CUNY UI - Institutional Review Board

Approval Date: May 7, 2012

Expiration Date: May 6, 2013

Coordinator Initials: TCP

APPENDIX D
INFORMED CONSENT (SUNY)

Protocol #: 377524
 Page #: 1

HSCB/KCHC IRB
 PROTOCOL # 377524-3
 APPROVED 5/14/14 TO 5/14/15

CONSENT FORM

SUNY DOWNSTATE MEDICAL CENTER @ BROOKLYN

Usability of a Health Web Site in Older African-Americans with Heart Failure

We are asking if you want to be in a research study. This study is about African-Americans with heart failure.

What you should know about research studies:

- This consent form gives you information about the study. It tells you about the purposes, risks, and benefits of this research study.
- **Regular care** is based on the best-known treatment. The main goal of regular care is to help the individual patient. The main goal of **research studies** is to learn more so that we can help future patients. You might benefit from being in the study, but we cannot promise this.
- There may be risk to participating in this study.
- Your participation is voluntary. You don't have to be in this research study. You can agree to be in the study now and change your mind later. Your decision will not affect your regular care. Your doctor's attitude toward you will not change.
- Please read this consent form carefully. Ask any questions you have before you make a decision. The study doctor will answer your questions. You may consult with your family or friends.

1) Why is this research being done?

People are now using computers more often to get health information to help them make decisions regarding their health. The use of the computer, however, may be intimidating to older people. We would like to know how older African-Americans would find the information about heart failure from our website usable to them and if having nurses around help you to use the computer.

2) Who is doing the study?

Meriam F. Caboral is in charge of this study at this location. About 75 people will be in the study at this location.

3) Will it cost me money to be in this study?

You will not be charged for participating in this study.

Protocol #: 377524
Page #: 2

HSCB/KGHC IRB
PROTOCOL # 377524-3
APPROVED 5/14/14 TO 5/14/15

4) You cannot be in this study if:

- You do not have a heart sonogram or echocardiogram showing that your heart is pumping at 45% or less,
- You are younger than 55 years of age,
- You are not black or African-American,
- You do not wish to answer any of the questions,
- You do not wish to sign the informed consent,
- You cannot read, speak and understand English,
- You have medical conditions such as Alzheimer's dementia; significant psychiatric conditions such as paranoid schizophrenia or untreated manic depression; or severe problems with movement such as rheumatoid arthritis that might limit or prevent you from using the computer,
- You currently live in a nursing home.

5) What will happen to you if you decide to be in this study?

If you decide to participate in this study, we will first ask you to answer a questionnaire about your knowledge and another questionnaire about what age you believe yourself to be. Afterwards, we will ask you to watch a video on "Congestive heart failure" using the laptop computer that we will provide. The investigator or a nurse will be with you throughout the session. We are there to open the health website to where the video is located and to help you with any problem you may have using the computer. The video is about 30 minutes long and at the end of the program you will be asked to answer a survey about how you like the website. In addition, we will ask you information about your medical history, your education, your income, your insurance information and your computer experience.

6) What are the possible risks of being in the study?

There is no known major risk involved in participating in this study. However, you may feel anxious using the computer especially if you are not used to it before or do not use it often. To decrease this risk, the investigator or a nurse will stay with you while you are watching the video. Another potential risk is breach of confidentiality. To minimize this risk, we will not collect use any personal information that will be linked to you and we will take every effort to protect any information we collect for this study.

7) What are the possible benefits of being in the study?

The *possible* benefit of participating in this research study is that a health web site could be a source to get information on heart failure, which could help you understand about the disease.

8) What are your other choices?

The alternative to being in this study is to not participate.

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Page #: 3

HSCB/KCHC IRB
PROTOCOL # 377524-3
APPROVED 5/14/14 TO 5/14/15

9) If you have any questions or problems, whom can you call?

If you have any questions about this study, you can call Meriam F. Caboral at (718) 270-7651.

If you have questions about your rights as a research subject, you can call the IRB office at (718) 613-8480, or you can contact the SUNY HSCB University Hospital Medical Director's Office at (718) 270-2401.

10) What information do we keep private?

In this study, we will keep your personal information confidential. We will hold your identity confidential and all data will be kept in a secure, limited access location. We will not reveal your identity in any publication or presentation of the results of the study. However, confidentiality cannot be guaranteed; your personal information may be disclosed if so required by the Federal Privacy law.

Federal law protects your right to privacy concerning Individually Identifiable Health Information (IIHI). There are certain things you need to know, IIHI is any information from your medical record, or obtained from this study, that can be linked to you, and that refers to your mental or health conditions in the past, the present or the future.

For this study we will create, use or report the following IIHI:

- Information from your medical records including results of your echocardiogram, cardiac catheterization, and labs including BNP.
- Information obtained from this study including educational level, insurance information, income, computer experience, literacy level, cognitive age, and the U.S.A.B.I.L.I.T.Y. Survey®.

The researchers, their staff and the staff of SUNY Downstate Medical Center participating in the research will use your protected IIHI for this research study.

Your IIHI will be shared with the following persons or agencies for purposes related to the conduct of the research:

- The Institutional Review Board of SUNY Downstate Medical Center, the applicable DMC officials, and the federal Office for Human Research Protections.
- The Institutional Review Board of Lehman College.

We will have to use and report your health information for an indefinite period of time.

You need to know that some of the individuals or groups mentioned above are not obligated to protect the privacy of your IIHI.

This result of the study can be shared with you at the end of the study.

You can withdraw this authorization for the use or reporting of your IIHI. You have to

Protocol #: 377524
Page #: 4

HSCB/KCHC IRB

PROTOCOL # 377524-3

APPROVED 5/14/14 TO 5/14/15

write to us to withdraw:

Meriam F. Caboral,
450 Clarkson Avenue,
Box 22
Brooklyn, NY 11203.

If you withdraw we will stop collecting and accessing your IIHI, but we will collect and report any adverse event (bad effect) that you had in the study. Your IIHI collected before you withdraw your authorization will still be used and reported.

If you withdraw your authorization you can no longer be in the study.

11) Can your being in the study end early?

Being in this study is voluntary. You do not have to be in the study if you do not want to. You can agree to be in the study now and change your mind later. If you want to quit the study, you should talk to Meriam F. Caboral.

12) What else do you need to know?

If we find out any new information that might affect your decision to stay in the study, we will give it to you.

13) Subject Consent

By signing this consent form you accept that you read this form, or had it read to you. You agree to be in the study and authorize the use and reporting of your individual identifiable health information (IIHI) as explained in this form. You will not be giving up any of your legal rights by signing this consent. We will give you a copy of this form and of DMC's Notice of Privacy Practice.

Signature of Subject (or Legal Guardian)

Date

Print name

Signature of Witness

Date

Print name

APPENDIX D
INFORMED CONSENT (SUNY)

Protocol #: 377524-1
Page #: 1

HSCB/KCHC IRB
PROTOCOL # 377524-1
APPROVED 4-29-13 TO 4-28-14

CONSENT FORM

SUNY DOWNSTATE MEDICAL CENTER @ BROOKLYN

Usability of a Health Web Site in Older African-Americans with Heart Failure

We are asking if you want to be in a research study. This study is about African-Americans with heart failure.

What you should know about research studies:

- This consent form gives you information about the study. It tells you about the purposes, risks, and benefits of this research study.
- **Regular care** is based on the best-known treatment. The main goal of regular care is to help the individual patient. The main goal of **research studies** is to learn more so that we can help future patients. You might benefit from being in the study, but we cannot promise this.
- There may be risk to participating in this study.
- Your participation is voluntary. You don't have to be in this research study. You can agree to be in the study now and change your mind later. Your decision will not affect your regular care. Your doctor's attitude toward you will not change.
- Please read this consent form carefully. Ask any questions you have before you make a decision. The study doctor will answer your questions. You may consult with your family or friends.

1) Why is this research being done?

People are now using computers more often to get health information to help them make decisions regarding their health. The use of the computer, however, may be intimidating to older people. We would like to know how older African-Americans would find the information about heart failure from our website usable to them and if having nurses around help you to use the computer.

2) Who is doing the study?

Meriam F. Caboral is in charge of this study at this location. About 75 people will be in the study at this location.

3) Will it cost me money to be in this study?

You will not be charged for participating in this study.

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HSCB/KCHC IRB

PROTOCOL # 377524-1
APPROVED 4/29/13 TO 4/28/14

4) You cannot be in this study if:

- You do not have a heart sonogram or echocardiogram showing that your heart is pumping at 45% or less,
- You are younger than 55 years of age,
- You are not black or African-American,
- You do not wish to answer any of the questions,
- You do not wish to sign the informed consent,
- You cannot read, speak and understand English,
- You have medical conditions such as Alzheimer's dementia; significant psychiatric conditions such as paranoid schizophrenia or untreated manic depression; or severe problems with movement such as rheumatoid arthritis that might limit or prevent you from using the computer,
- You currently live in a nursing home.

5) What will happen to you if you decide to be in this study?

If you decide to participate in this study, we will first ask you to answer a questionnaire about your knowledge and another questionnaire about what age you believe yourself to be. Afterwards, we will ask you to watch a video on "Congestive heart failure" using the laptop computer that we will provide. The investigator or a nurse will be with you throughout the session. We are there to open the health website to where the video is located and to help you with any problem you may have using the computer. The video is about 30 minutes long and at the end of the program you will be asked to answer a survey about how you like the website. In addition, we will ask you information about your medical history, your education, your income, your insurance information and your computer experience.

6) What are the possible risks of being in the study?

There is no known major risk involved in participating in this study. However, you may feel anxious using the computer especially if you are not used to it before or do not use it often. To decrease this risk, the investigator or a nurse will stay with you while you are watching the video. Another potential risk is breach of confidentiality. To minimize this risk, we will not collect use any personal information that will be linked to you and we will take every effort to protect any information we collect for this study.

7) What are the possible benefits of being in the study?

The *possible* benefit of participating in this research study is that a health web site could be a source to get information on heart failure, which could help you understand about the disease.

8) What are your other choices?

The alternative to being in this study is to not participate.

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HSCB/KCHC IRB
PROTOCOL # 377524-1
APPROVED 4/29/13 TO 4/28/14

9) If you have any questions or problems, whom can you call?

If you have any questions about this study, you can call Meriam F. Caboral at (718) 270-7651.

If you have questions about your rights as a research subject, you can call the IRB office at (718) 613-8480, or you can contact the SUNY HSCB University Hospital Medical Director's Office at (718) 270-2401.

10) What information do we keep private?

In this study we will keep your personal information confidential. We will hold your identity confidential and all data will be kept in a secure, limited access location. We will not reveal your identity in any publication or presentation of the results of the study. However confidentiality cannot be guaranteed; your personal information may be disclosed if so required by the Federal Privacy law.

Federal law protects your right to privacy concerning Individually Identifiable Health Information (IIHI). There are certain things you need to know, IIHI is any information from your medical record, or obtained from this study, that can be linked to you, and that refers to your mental or health conditions in the past, the present or the future.

For this study we will create, use or report the following IIHI:

- **Information from your medical records including results of your echocardiogram, cardiac catheterization, and labs including BNP.**
- **Information obtained from this study including educational level, insurance information, income, computer experience, literacy level, cognitive age, and the U.S.A.B.I.L.I.T.Y. Survey©.**

The researchers, their staff and the staff of SUNY Downstate Medical Center participating in the research will use your protected IIHI for this research study.

Your IIHI will be shared with the following persons or agencies for purposes related to the conduct of the research:

- **The Institutional Review Board of SUNY Downstate Medical Center, the applicable DMC officials, and the federal Office for Human Research Protections.**
- **The Institutional Review Board of Lehman College.**

We will have to use and report your health information for an indefinite period of time.

You need to know that some of the individuals or groups mentioned above are not obligated to protect the privacy of your IIHI.

This result of the study can be shared with you at the end of the study.

You can withdraw this authorization for the use or reporting of your IIHI. You have to

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HSCB/KCHC IRB

PROTOCOL # 377524-1
APPROVED 4-29-13 TO 4-28-14

write to us to withdraw:

Meriam F. Caboral,
450 Clarkson Avenue,
Box 22
Brooklyn, NY 11203.

If you withdraw we will stop collecting and accessing your IIHI, but we will collect and report any adverse event (bad effect) that you had in the study. Your IIHI collected before you withdraw your authorization will still be used and reported.

If you withdraw your authorization you can no longer be in the study.

11) Can your being in the study end early?

Being in this study is voluntary. You do not have to be in the study if you do not want to. You can agree to be in the study now and change your mind later. If you want to quit the study, you should talk to Meriam F. Caboral.

12) What else do you need to know?

If we find out any new information that might affect your decision to stay in the study, we will give it to you.

13) Subject Consent

By signing this consent form you accept that you read this form, or had it read to you. You agree to be in the study and authorize the use and reporting of your individual identifiable health information (IIHI) as explained in this form. You will not be giving up any of your legal rights by signing this consent. We will give you a copy of this form and of DMC's Notice of Privacy Practice.

Signature of Subject (or Legal Guardian)

Date

Print name

Signature of Witness

Date

Print name

APPENDIX E
FLYER



University Hospital of Brooklyn
College of Medicine
School of Graduate Studies
College of Nursing
College of Health Related Professions

**Title of study: USABILITY OF A HEALTH WEB SITE IN
OLDER AFRICAN-AMERICANS WITH HEART FAILURE**

If you are 55-year old age and older, Black or African-American who have been diagnosed with heart failure.

We are enrolling study participants to watch a 30-minute video on "**Congestive Heart Failure**" that will play from website, and to answer three short questionnaires that will be given before and after watching the video. We would like to find out how useful this health website is to you.

If you are interested to participate, please contact the principal investigator below to schedule a meeting.

Thank you for your time.

Meriam F. Caboral, MSN, RN, NP-C (PI)
College of Nursing
Phone #: (718) 270-7651
Email: meriam.caboral@downstate.edu



APPENDIX E
FLYER



University Hospital of Brooklyn
College of Medicine
School of Graduate Studies
College of Nursing
College of Health Related Professions

**Title of study: USABILITY OF A HEALTH WEB SITE IN
OLDER AFRICAN-AMERICANS WITH HEART FAILURE**

If you are 55-year old age and older, Black or African-American who have been diagnosed with heart failure.

We are enrolling study participants to watch a 30-minute video on “Congestive Heart Failure” that will play from website, and to answer three short questionnaires that will be given before and after watching the video. We would like to find out how useful this health website is to you.

If you are interested to participate, please contact the principal investigator below to schedule a meeting.

Thank you for your time.

Meriam F. Caboral, MSN, RN, NP-C (PI)

College of Nursing

Phone #: (718) 270-7651

Email: meriam.caboral@downstate.edu

APPENDIX F
RECRUITMENT LETTER

Dear _____,

I am conducting a research study looking at the usability of a health web site by black or African-American patients with heart failure. If your patient has an ejection fraction (EF) of 45% or less and would like them to participate in the study, please contact me at (718) 270- 7651. This study involves watching a 30-minute patient education on "**congestive heart failure**" using a portable laptop that will be provided. Participants will also be asked to answer several questions before and after watching the video. Thank you.

Sincerely,

Meriam F. Caboral, MSN, RN, NP-C
College of Nursing
Phone: (718) 270-7651
Email: meriam.caboral@downstate.edu

CUNY UI - Institutional Review Board	
Approval Date:	<u>May 7, 2012</u>
Expiration Date:	<u>May 6, 2013</u>
Coordinator Initials:	<u>MCB</u>

APPENDIX G
HIPAA

CUNY UNIVERSITY INTEGRATED INSTITUTIONAL REVIEW BOARD

HIPAA RESEARCH AUTHORIZATION

Subject/Client/Patient Name:

ID Number:

Study: Usability of a health web site in older African-American adults with Heart Failure

IRB Protocol No.

CUNY Institution: Lehman College

We understand that information about you and your health is personal. We are committed to protecting the privacy of that information. Federal regulations and our commitment to your privacy require that we obtain your written authorization before we may use or disclose your protected health information for the research purposes described below. This form provides that authorization and helps us make certain that you are properly informed of how this information will be used or disclosed. Please read the information below carefully before signing this form.

USE AND DISCLOSURE COVERED BY THIS AUTHORIZATION

Meriam F. Caboral must answer these questions completely before providing this authorization form to you. DO NOT SIGN A BLANK FORM. You or your personal representative should read the descriptions below before signing this form.

What information will be used or disclosed for the research? The appropriate boxes should be checked below and the descriptions should be in enough detail so that you (or any organization that will use or disclose information pursuant to this authorization) can understand what information may be used or disclosed.

Any medical, treatment, or research records held by [list covered entity from whom records are sought] may be used and/or disclosed.

X The following information: age, gender, educational background, income, source of income, insurance, echocardiogram, cardiac catheterization, b-type natriuretic peptide (BNP).

CUNY UI - Institutional Review Board
Approval Date: <u>May 7, 2012</u>
Expiration Date: <u>May 6, 2013</u>
Coordinator Initials: <u>TOMR</u>

Who will disclose, receive, and/or use the information while it is in individually identifiable form? This research authorization form will authorize the following person(s), class (es) of persons, and/or organization(s) to disclose, use, and/or receive the information in connection with the research:

X Meriam F. Caboral and his or her research staff.

X The following co-investigators and members of their research staffs: Martha V. Whetsell (Lehman College); and Lorraine S. Evangelista (University of California, Irvine)

X Statisticians at the following institutions: Downstate Medical Center

X The members and staff of the CUNY Institutional Review Board and other CUNY officials and staff who oversee research

Government authorities or agencies that oversee research

X The members and staff of the Institutional Review Boards at participating research sites SUNY Downstate Medical Center @ Brooklyn

X Others (as described below):

Funding agency: Sigma Theta Tau – American Nurses Foundation

If not specifically listed above, you also authorize the following persons or institutions that maintain records about you to disclose the information described above for the purpose of this research:

[Enter Text Here]

SPECIFIC UNDERSTANDINGS

By signing this research authorization form, you authorize the use and/or disclosure of your protected health information as described above. The purpose for the uses and disclosures you are authorizing is to conduct the research project explained to you during the informed consent process and to ensure that the information relating to that research is available to all parties who may need it for research purposes.

Many of the recipients listed in this form have legal or professional obligations to protect the confidentiality of your information. If, however, your information is disclosed to persons or organizations that are not required by state or federal law to protect the privacy of the information, such persons or organizations could reuse or redisclose the information without penalty under

CUNY UI - Institutional Review Board

Approval Date: May 7, 2012

Expiration Date: May 6, 2013

Coordinator Initials: TOM

those laws. For this reason, it is the policy of the Lehman IRB that investigators ask all recipients of your information to agree to treat your information as confidential.

You have a right to refuse to sign this authorization. Your health care, the payment for your health care, and your health care benefits will not be affected if you do not sign this form.

If you sign this authorization, you will have the right to revoke it at any time. However, your revocation would not apply to the extent that Meriam Caboral and the investigators in this research have already taken action based upon your authorization or need the information to complete analysis and reports of data for this research. This authorization will never expire unless and until you revoke it. To revoke this authorization, please write to Meriam Caboral, 450 Clarkson Avenue, Box 1199 Brooklyn, NY 11203; Martha V. Whetsell, Lehman College, T3 Building, Rm 201; 250 Bedford Park Blvd West, Bronx, NY 10468

A copy of this form will be provided to you after you have signed it.

SIGNATURE

I have read this form and all of my questions about this form have been answered. I understand that, if I have questions about this form in the future, they will also be answered. By signing below, I acknowledge that I have read and accept all of the above.

Signature of Subject or Personal Representative

Print Name of Subject or Personal Representative

Date

Description of Personal Representative's Authority

CONTACT INFORMATION

The contact information of the subject or personal representative who signed this form should be filled in below.

Address:

Telephone:

Email Address (optional):

THE SUBJECT OR HIS OR HER PERSONAL REPRESENTATIVE MUST BE PROVIDED WITH A COPY OF THIS FORM AFTER IT HAS BEEN SIGNED.

CUNY UI - Institutional Review Board	
Approval Date:	<u>May 7, 2012</u>
Expiration Date:	<u>May 6, 2013</u>
Coordinator Initials: <u>TMR</u>	

APPENDIX H PERMISSIONS

Perceived Health Web Site Usability Questionnaire

Good day Dr. Nahm,

My name is Meriam Caboral and is currently pursuing my Doctoral in Nursing program at the Graduate Center at CUNY. I am currently on the dissertation proposal phase of the program and is not putting together a proposal. I would like to ask your permission to use the **Perceived Health Web Site Usability Questionnaire (PHWSUQ)** as one of the instruments in my project. My project is about the user's perception of website usability among older black patients with heart failure. I believe your instrument fits well with my project. Also if there is somewhere I can get the final version of the questionnaire.

Thank you for your time and hope to hear from you soon

Sincerely,

Meriam

Meriam F. Caboral, RN, MSN, NP-C
 Clinical Coordinator/Nurse Practitioner
 Heart Failure Clinic
 Clinical Instructor
 Dept of Medicine/College of Medicine
 SUNY Downstate Medical Center
 450 Clarkson Avenue
 Box 1199
 Brooklyn, NY 11203
 Phone: (718) 270-8172
 Fax: (718) 270-2917
 Email: meriam.caboral@downstate.edu

From: Meriam Caboral [mailto:Meriam.Caboral@downstate.edu]

Sent: Wednesday, June 15, 2011 7:42 AM

To: Nahm, Eun-Shim

Subject: request permission

Good day Dr. Nahm,

This is just a follow-up on my earlier email (see below) regarding request to use the **Perceived Health Web Site Usability Questionnaire** as one of the instruments in my dissertation. I would really prefer to use this instrument because of the subjects that I have in mind. I know you are the corresponding author in the study but if I need to get the permission from someone or somewhere else please let me know so I can ask the right person. Unfortunately, I need this permission soon so that if needed I can make changes as I try to apply for funding.

Looking forward to your response and thank you for taking time with this matter, I know you must be very busy.

Sincerely,

Meriam

Meriam F. Caboral, RN, MSN, NP-C
Clinical Coordinator/Nurse Practitioner
Heart Failure Clinic
Clinical Instructor
Dept of Medicine/College of Medicine
SUNY Downstate Medical Center
450 Clarkson Avenue
Box 1199
Brooklyn, NY 11203
Phone: (718) 270-8172
Fax: (718) 270-2917
Email: meriam.caboral@downstate.edu

Oh, I am so sorry. I must have missed your e-mail.
Of course, you are welcome to use the scale.

Wish you all the best for your study!

Eun-Shim

Eun-Shim Nahm, PhD, RN, FAAN
Associate Professor and Program Director
Nursing Informatics
University of Maryland School of Nursing
Department of Organizational Systems & Adult Health
655 W. Lombard St., Rm 455 C
Baltimore, MD 21201
Office Phone: 410-706-4913; Fax: 410-706-3289; e-mail: enahm@son.umaryland.edu

Principal Investigator
Online Bone Health Study
1-866-902-6563
bonepower@son.umaryland.edu

APPENDIX H PERMISSIONS

Congestive Heart Failure Website

Meriam,

Below is the link we would like you to use:

http://online.x-plain.com/client/run_LinkCPD_v5.asp?c=3094&p=logs_suny0212&d=ct129105

Citing X-Plain

Author. (Publication Date). *Web page title*. Retrieved Month day, year, from URL

Example:

Patient Education Institute (2009). X-Plain – Overview. October 27, 2009, from

<http://www.patient-education.com/main.asp?p=aboutxplain>

You can find the publication date in the credits page. If you start the tutorial then click the credits page you should find this information.

Thanks,

Kristen Hoffman

Patient Education Institute
2000 James Street
Coralville, IA 52241
319-351-5220 ext.102

From: Meriam Caboral [mailto:Meriam.Cabral@downstate.edu]

Sent: Tuesday, February 14, 2012 1:11 PM

To: Hoffman, Kristen

Subject: RE: Linking to X-Plain on Medline Plus

Hi Kristen

Good day. Absolutely I'd share the information with you. Would you also let me know how I would put your information properly on the paper that way I write the correct acknowledgment.

Thank you for your support. Let me know if there is anything else you need to know.

Meriam

Meriam F. Cabral, RN, MSN, NP-C
Clinical Coordinator/Nurse Practitioner
Heart Failure Clinic
SUNY Downstate Medical Center
450 Clarkson Avenue
Box 1199
Brooklyn, NY 11203
Phone: (718) 270-8172
Fax: (718) 270-2917
Email: meriam.cabral@downstate.edu

-----Kristen Hoffman <khoffman@patient-education.com> wrote: -----

To: 'Meriam Cabral' <Meriam.Cabral@downstate.edu>

From: Kristen Hoffman <khoffman@patient-education.com>

Date: 02/14/2012 01:40PM
Subject: RE: Linking to X-Plain on Medline Plus

If you are willing to share your published research with us, we would be happy to provide the education for your research. Please let me know if this is something you are interested in. We will actually ask that you use a link we provide, not the link you found online.

Thanks,

Kristen Hoffman
Patient Education Institute
2000 James Street
Coralville, IA 52241
319-351-5220 ext.102

From: Meriam Caboral [mailto:Meriam.Cabral@downstate.edu]
Sent: Monday, February 13, 2012 2:00 PM
To: Hoffman, Kristen
Subject: RE: Linking to X-Plain on Medline Plus

Hi Kristin,

Yes I am planning to submit it for publication afterwards.

Meriam
Meriam F. Caboral, RN, MSN, NP-C
Clinical Coordinator/Nurse Practitioner
Heart Failure Clinic
SUNY Downstate Medical Center
450 Clarkson Avenue
Box 1199
Brooklyn, NY 11203
Phone: (718) 270-8172
Fax: (718) 270-2917
Email: meriam.cabral@downstate.edu

-----Kristen Hoffman <khoffman@patient-education.com> wrote: -----

To: 'Meriam Caboral' <Meriam.Cabral@downstate.edu>
From: Kristen Hoffman <khoffman@patient-education.com>
Date: 02/13/2012 02:36PM
Subject: RE: Linking to X-Plain on Medline Plus

Hi Meriam

Is this research you will be publishing when complete?

Thanks,

Kristen Hoffman
Patient Education Institute
2000 James Street
Coralville, IA 52241
319-351-5220 ext.102

From: Meriam Caboral [mailto:Meriam.Caboral@downstate.edu]
Sent: Monday, February 13, 2012 1:29 PM
To: Hoffman, Kristen
Subject: Re: Linking to X-Plain on Medline Plus

Good day Ms. Hoffman,

Thanks for returning my inquiry.

I'm not sure what you meant by deep link to the X-Plain material. What I am requesting permission is only to let the patient watch the "Congestive Heart Failure" video that is under the Interactive Health Tutorial (video and cool tools). I would have the participants watch the tutorial only on CHF and ask them to evaluate their experience with the web site afterwards. I will be using my computer to open up the link to Medline so that they can watch the video from a room. Could you apprise me if these is possible or do I need a separate permission from X-Plain also? At present I do not have funding for this research.

Thank you again for your time.

Meriam
Meriam F. Caboral, RN, MSN, NP-C
Clinical Coordinator/Nurse Practitioner
Heart Failure Clinic

SUNY Downstate Medical Center
450 Clarkson Avenue
Box 1199
Brooklyn, NY 11203
Phone: (718) 270-8172
Fax: (718) 270-2917
Email: meriam.caboral@downstate.edu

-----Kristen Hoffman <khoffman@patient-education.com> wrote: -----

To: "meriam.caboral@downstate.edu" <meriam.caboral@downstate.edu>
From: Kristen Hoffman <khoffman@patient-education.com>
Date: 02/13/2012 01:58PM
Subject: Linking to X-Plain on Medline Plus
Dear Meriam,
The terms of use on the Medline Plus website do not allow you to deep link to the X-Plain materials. The Patient Education Institute does license X-Plain to hospitals, clinics, websites and other healthcare facilities for a fee. If you are interested in learning more about X-Plain please contact us at 319-351-5220.

Thank you,
Kristen Hoffman
Patient Education Institute
(319) 351-5220

APPENDIX I
DEMOGRAPHIC AND CLINICAL QUESTIONNAIRES

Demographic Information

ID # _____

Date of birth: _____ Age: _____ Gender: ___ M ___ F

_____ Country of birth

Highest Educational Background: _____ Elementary grades
 _____ Completed/graduated elementary education
 _____ High School
 _____ Completed/ graduated HS
 _____ College courses
 _____ Completed College
 _____ Graduate studies
 _____ Advanced degrees
 _____ Other _____

Insurance/Source of payment: _____ Medicare
 _____ Medicaid
 _____ Private insurance _____
 _____ No insurance/self-pay

Income: _____ yearly/monthly

Source of income (check all that applies): _____ Social security
 _____ Disability
 _____ Others _____

Does insurance company pays for medications? _____ Yes _____ No
 If not show do you pay for your medications? _____

Do you own a computer? _____ Yes _____ No

How do you consider your experience with computer use? _____ novice _____ intermediate
 _____ expert

Number of hours per day do you use the computer? _____

Literacy Score: _____

Clinical variables

Echocardiogram

Date: _____

Ejection fraction: _____ %

LVEDD: _____

Cardiac catheterization

Date: _____

Coronaries:

Normal: _____

Non-obstructive: _____

Less than 50% stenosis on any coronary anatomies _____

Over 50% stenosis on any coronary anatomies _____

BNP: _____ pg/ml (outpatient)

_____ pg/ml (admit)

_____ pg/ml (discharge, if available)

NYHA-FC: I II III IV

Six-minute walk test (if possible) _____ ft.

Year diagnosed with HF: _____

Number of readmission within the year for decompensated HF: _____

APPENDIX J
COGNITIVE AGE QUESTIONNAIRE

20's 30's 40's 50's 60's 70's 80's

I feel as though
I am in my -- _____

I look as though
I am in my -- _____

I do most things
as though I were
in my -- _____

My interests are
mostly those of a
person in her -- _____

APPENDIX K
U.S.A.B.I.L.I.T.Y. SURVEY

U.S.A.B.I.L.I.T.Y. SURVEY[©]

Instructions:

Please rate your agreement with the following statements about how you feel in general when using _____. Just circle or X out the level of agreement that applies (where 1 means strongly disagree, 4 means neither disagree nor agree, and 7 means strongly agree; and NA means it doesn't apply), as in the example.

Strongly Disagree 1---2---X---4---5 Strongly Agree NA

EFFICIENCY

Ease of use

1. The website is simple and easy to use.

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

2. Using the website is effortless

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

3. I can easily remember how to use the system

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

4. I can get the information I need quickly

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

Usefulness

5. The website is useful.

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

6. The website is user friendly.

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

7. I did not notice any inconsistencies as I use it

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

8. The website gave me the information I need about my health

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

9. The website helps me understand about my health problems

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

LEARNABILITY

10. I easily learn how to use the website

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

11. The information from the website is clear

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

12. The information from the website is easy to understand

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

13. The website will help me improve my knowledge about my illness.

Strongly Disagree 1---2---X ---4---5 Strongly Agree NA

USER EXPERIENCE

14. The program is exactly what I need.

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

15. I am satisfied with the overall appearance of the website.

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

16. I am satisfied with the audio of the website

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

17. I can use it successfully every time.

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

18. I would recommend this website to a friend

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

19. The website is pleasant to use

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

PERCEIVED CONTROL*Attitudinal control*

20. I will change my habits because of the website

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

21. I will continue with what I am doing with my health

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

22. I plan to use the program in the future

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

Cognitive Control

23. The website gave me control over my health

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

24. I know what information I need from the website

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

25. The information I received makes me in control.

Strongly Disagree 1---2---X --4---5 Strongly Agree NA

What do you like best about the website?

What is the worst feature of the website?

Suggestions on how to improve the website?

Observer

How many times did the participant ask for assistance? _____

What kind of assistance was requested? _____

How long did the participant complete the entire testing? _____

Comments: _____

APPENDIX L
REALM-R QUESTIONNAIRES

REALM-R Examiner Record

Reading Level _____

Grade Completed _____

Patient Name/Subject # _____ Date of Birth _____

Date _____ Examiner _____

Fat Fatigue _____

Flu Directed _____

Pill Colitis _____

Allergic Constipation _____

Jaundice Osteoporosis _____

Anemia _____

Fat, Flu, and Pill are not scored. We have previously used a score of 6 or less to identify patients at risk for poor literacy.

Score _____

APPENDIX M

Certificate of Registration

Certificate of Registration

This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

Maria A. Pallante
Register of Copyrights, United States of America

Registration Number

TXU 1-803-720

Effective date of registration:

March 30, 2012

Title

Title of Work: U.S.A.B.I.L.I.T.Y. Survey
Contents/Titles: U.S.A.B.I.L.I.T.Y. model

Completion/Publication

Year of Completion: 2011

Author

Author: Meriam F. Cabral
Author Created: text, photograph(s), editing, artwork

Work made for hire: No

Citizen of: United States

Domiciled in: United States

Year Born: 1962

Copyright claimant

Copyright Claimant: Meriam F. Cabral
1453 East 53rd Street, Brooklyn, NY, 11234, United States

Rights and Permissions

Name: Meriam F. Cabral
Email: meriam.cabral@gmail.com

Certification

Name: Meriam F. Cabral
Date: March 30, 2012

Copyright Office notes: Regarding author information: Copy does not contain photographs.

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