MEDINFO 2019: Health and Wellbeing e-Networks for All
L. Ohno-Machado and B. Séroussi (Eds.)

doi:10.3233/SHTI190757

Comparing Usability of User Interfaces to Collect Family Health History

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Abstract

Family health history (FHx) is vital in early detection of genetic diseases. This research studied two different FHx collection interface and compared them based on the IBM CSUQ usability metrics. We found the conversational interface to be significantly better in terms of overall satisfaction, system usefulness, interface quality and information quality than the traditional interface.

Keywords:
Family health history collection, usability, user experience.

Introduction

Family Health History (FHx) play an important role in understanding the risk of individual illnesses, especially those with genetic causes [1–2]. Diagnosis of these diseases at an earlier stage is vital for initiating preventive measures [3]. For efficient and accurate diagnosis, having accurate FHx information is critical. Various methods like emails, phone conversations have been employed by the medical service providers to collect these FHX information. However, Qureshi et al., (2009) portrayed that self-collection FHx tools have certain advantages like improved accuracy and quicker data collection than the traditional methods [4].

Although there are different types of self collection tools, electronic FHx tools have been at the forefront in the recent years. Electronic FHx tools have the advantage of easy editability and the ability to share the information among their family members. This helps in getting accurate information and is a quicker way to collect the information.

Despite all the advantages of the electronic FHx, its usability is crucial since a very diverse user population from different age and education groups will interact with the system [5]. Previous studies have focused on the usefulness and potential difficulties of the FHx tool [6,7]. Wang et al. (2015) developed a virtual assistant tool and compared if this new tool could identify more health conditions compared to the Surgeon General's My Family Health Portrait [8]. However, none of the studies focused on including the diverse age group and/or studied the usability of such interfaces.

In order to bridge this knowledge gap, we tried to understand the effect of the different age group on the usability and interface design for collection of FHx data.

Methods

A total of 54 participants (27 males and 27 females) with a mean age of 44.91 years (SD=22 years) were recruited for this study via email and word-of-mouth. On completion of the study, the participants were compensated with a $20 Walmart gift card.

Apparatus

The study was conducted in a quiet and contolled room on a desktop with a 17.5 inch monitor. Two FHx interfaces analyzed in the study were:

Conversational interface

This interface consisted of a conversational dialog box in the bottom right as the data entry method as shown in the figure 1. In addition, the family pedigree provides a real time update as the family history is entered using the dialog box.

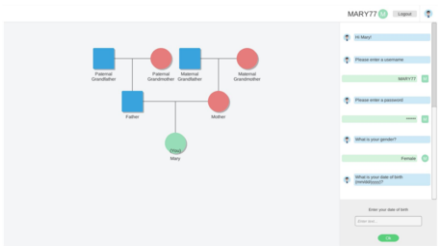

Figure 1.– Conversational interface

Traditional interface

This interface consisted of the traditional method of data entry, i.e. by clicking on the pencil icon (update history column) to enter the family health information as shown in figure 2.

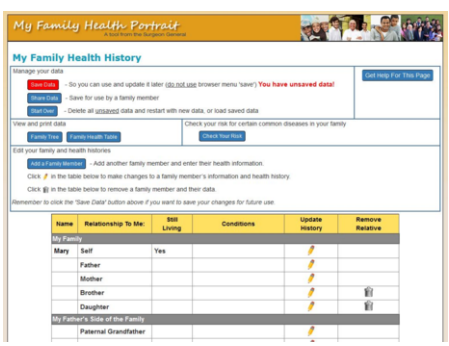

Figure 2.– Traditional interface

Procedure

A mixed experimental design was used with the type of interface being the within subject variable and age group (young adults: 18-30 years, older adults: above 60 years) being the between subject variable. Participants were randomly

assigned to the FHx interfaces and were counterbalanced to avoid order effects. Participants were provided with a fictional family health history information that included the family member's information and past cancer history in the family. Overall, the participants had to complete 5 tasks for each interface: i) create a user profile, ii) add the family health history, iii) re-access the platform, iv) edit the information and v) share the information with a family member. On completion of the tasks using either of the interfaces, the IBM Computer System Usability Questionnaire (CSUQ) was given to the participants to evaluate the usability of the interfaces [9].

Hypotheses

- **H1**: Age group moderates the relationship between the interface design and the overall satisfaction, with an increase in the satisfaction as the interface design changes from traditional to conversational and age group changes from younger to older adults.
- **H2**: Age group moderates the relationship between the interface design and the interface quality, with an increase in the perceived interface quality as the interface design changes from traditional to conversational and age group changes from younger to older adults.

Results

Usability Evaluation

The participants had a higher overall satisfaction on using the conversational interface (M= 5.65, SE=0.12) than the traditional interface (M= 4.77, SE=0.18) and system usefulness score on using the conversational interface (M= 5.79, SE=0.12) than the traditional interface (M=4.82, SE=0.21).

There was a statistically significant interaction between the age group and the interface type on information quality and on interface quality. For the information quality, in the younger age group, the participants reported a higher information quailty score on the conversational interface (M = 5.65, SD = 0.85) than the traditional interface (M = 4.51, SD = 1.30). For the interface quality, in the younger age group, the participants reported a higher interface quality score on the conversational interface (M = 5.79, SD = 0.96) than the traditional interface (M = 4.38, SD = 1.41).

Conclusions

This study looked at the effect of aging on the usability and interface design of the FHx data collection process. Although we did not find an interaction with the overall satisfaction as hypothesized, we did find a significant main effect of the interface design. We found the conversational interface was rated higher on all the usability metrics on the IBM CSUQ scale. Participants were highly satisfied using the interface as they only had to answer the questions asked by the conversational virtual agent to complete the task. Unlike in the traditional interface, where they had to manually search for all the data entry boxes to enter the family health information.

Acknowledgements

This research is supported in part by funding from the National Cancer Institute (5K07CA211786) and the Hollings Cancer Center's Cancer Center Support Grant (P30CA138313) at the Medical University of South Carolina.

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