

# Conduct a Pre-Redesign and Post-Redesign Usability Comparison of a Telemedicine mobile application

## 1. Introduction

Telemedicine is an alternative medical care option, whereby medical consultation, diagnosis, and treatment is delivered via telecommunication technologies [1]. Direct-to-Consumer (DTC) telemedicine, a specific application of telemedicine for the general public, is the synchronous, real-time delivery of healthcare via remote, digital interfaces [2]. DTC telemedicine enables physicians to consult with patients virtually typically through a video chat online or an app on their smartphone. DTC telemedicine is purported to increase access to healthcare, reduce costs, and be convenient [3].

The usability of telemedicine platforms is essential for patients to be able to safely and effectively interact with a physician and receive quality healthcare [4]. Usability is the extent to which a product can be used by target users to achieve specific goals with effectiveness, efficiency, and satisfaction in their context of use [5]. The delicate nature of healthcare predicates that usability is a critical factor affecting the widespread adoption of healthcare technology by the public [6,7]. Despite the purported benefits of telemedicine, DTC telemedicine has received limited uptake and use by the public, especially those who are underserved and/or have limited health literacy [8].

## *2.1 Background*

Usability from a widespread, multifaceted population, like the general public, hinges on important design aspects of the user interface, as well as subjective human characteristics, such as an individual's health literacy level [7]. DTC telemedicine is marketed to the public via their app. Thereby, patients first interaction with DTC telemedicine is likely to be the telemedicine provider app. DTC telemedicine apps must have a sufficient level of usability for diverse general public users to become aware of telemedicine, be able to interact with the app easily, and be able to perform the actions required to connect with a doctor virtually. Evaluating the usability of DTC telemedicine apps and being able to apply the insight gained into improving the usability of these health platforms and other similar health information technology (HIT) may ameliorate some of the disparities in healthcare.

## *2.2 Scope of Study*

The objective of this study was to demonstrate how a novel usability data collection instrument was created and applied to evaluate the usability of the Hearty public-facing app prior to and subsequent to a redesign. Remote usability testing was conducted prior to and subsequent to Hearty Health, Inc. going live with a redesigned app. The methods used in this part were reviewed by the UCF IRB (ID: STUDY00000641) and found to be exempt from any regulations regarding human subjects research. The two usability testing sessions serve as comparable data in which to discover how valuable Hearty Health, Inc.'s redesign efforts were at meeting patients' usability needs that better equip patients in utilizing the service.

## **2. Methods**

Hearty, one of the largest DTC telemedicine providers [10] was selected as the object of analysis in this study because it is a well-known DTC telemedicine provider and the insight gained can be applied to improve the usability of other telemedicine platforms or similar HITs. Remote usability testing was the approach used to allow subjects to perform in a context in which they would likely seek telemedicine and be able to simulate a real-life interaction with the Hearty app, for instance, in their home. Results from usability testing in context-specific settings are more indicative of usability problems because subjects are in a real-life context of use [11]. Therefore, subjects are better able to simulate how they would interact with an object or product in a real-life situation, which increases the ability to identify specific usability problems they encounter. Amazon Mechanical Turk was used to be able to recruit a large, heterogeneous population of participants, who best represent the laypeople who are most likely to need and use a telemedicine service [12].

### *2.3 Selection of Representative Users: Patients*

Fifty participants (n=50) took part in the pre-redesign usability assessment. Respondents ranged in age from 23 to 70, with a mean age of 35.6. Most participants (84 percent) reported that they were familiar with telemedicine prior to completing the survey, and one participant (2 percent) reported to have not been familiar with telemedicine. Fourteen percent of the participants indicated they were unsure of what telemedicine was. Thirty-three participants (n=33) took part in the post-redesign usability assessment. Respondents ranged in age from 24 to 60, with a mean age of 35.2. Most participants (73 percent) reported that they were familiar with telemedicine prior to completing the survey, and twelve percent reported to have not been familiar with telemedicine. Fifteen percent of the participants indicated they were unsure of what telemedicine was. The smaller number of participants in the post-redesign study was due to lack of funds available for recruiting participants.

### *2.4 Data Collection*

A novel data collection instrument was developed to be able to perform remote usability testing. The new tool, called Hearty app Usability Survey, asked participants to perform tasks and activities using the Hearty app that patients would likely need to in order to perform a virtual doctor. Task completion success was the metric of usability obtained. See Figure 1 for the complete survey. Some questions were task-based (Qs 1-7) and a some were subjective (Qs 8-11). The questions were specifically designed to comprehensively assess several usability qualities, including effectiveness (task completion success) and user perception of use (subjective user feedback). The usability qualities were measured using task completion success rates and qualitative data analysis of subjective user feedback, as both affect usability [13]. The qualitative data analysis of the subjective user responses and the codebook developed that categorized usability improvement suggestions are beyond the scope of this study.

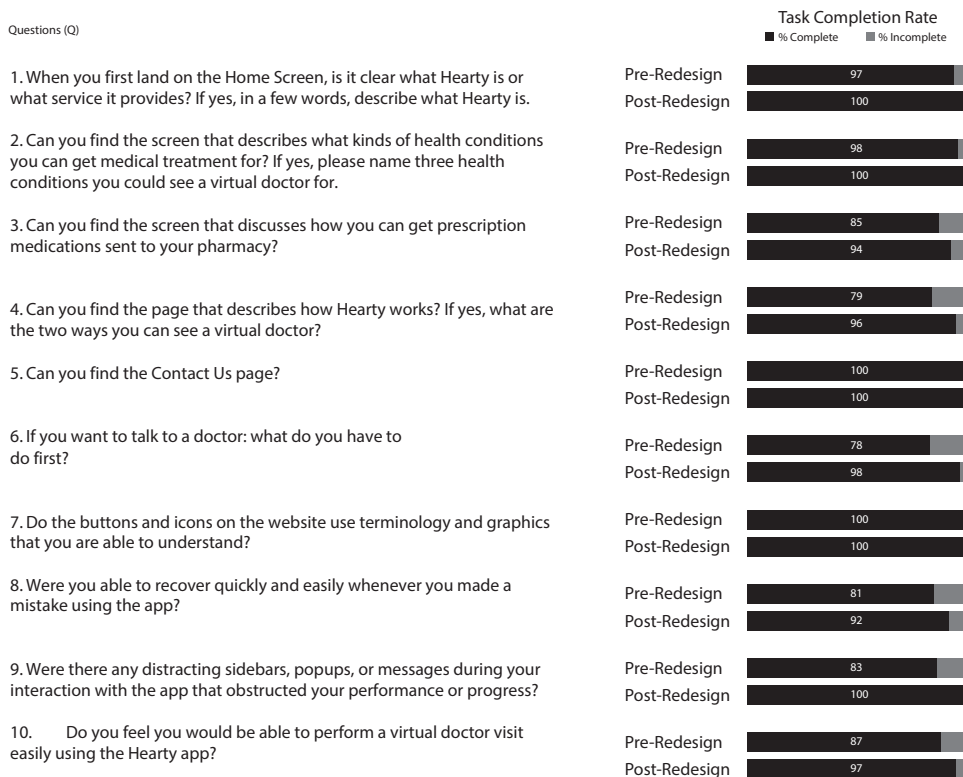
## **3. Results**

The collected task completion success data, which was used to measure usability. The average rate of task completion success for the pre-redesign group was 95 percent. The average rate of task completion success was 94 for the post-redesign group. To recall, this group interacted with the Hearty app after it had undergone design changes. See Figure 1 for complete results.

## **4. Discussion**

The Hearty app subsequent to the redesign appeared to have poorer usability than the previous interface. Several of the participants interacting with the post-redesign Hearty app failed to be able to execute some of the most critical activities required for people to be able to access healthcare from the Hearty app, or in other words, perform a virtual doctor visit. For example, several participants in the post-redesign

group were unable to locate the page that describes how Hearty works (see Figure 1 Q-4) or how to get prescription medications (see Figure 1 Q-3).



**Figure 1.** Amazon Mechanical Turk Remote Usability Testing of the Hearty app: Task and Completion Success or Failure (%) Pre- and Post- app Redesign

However, other critical design aspects of the interface were improved with the redesigned app. Many (n=11) of the participants prior to the redesign did not know what she or he had to do first in order to “Talk to a doctor.” The finding that the task completion success rate for this task improved in the post-redesign group indicates that Hearty, Inc. may have improved the clarity of this activity or used lay terminology to describe this activity on their post-redesign app. Based on the findings of the pre- and post- usability testing of the Hearty app, Hearty Inc. did not appear to enhance usability when revamping their app. This might suggest that Hearty Inc., does not perform user testing in order to discover how users interact with the app in ways that enable them to perform a virtual doctor visit.

## 5. Conclusions

In order for patients to be able to leverage telemedicine, they must first be able to use the DTC telemedicine app sufficiently and safely in their time of need. Based on the