Patient Age and Mobile Home Exercise Program (HEP) Use in Outpatient Physical Therapy

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Abstract

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Home Exercise Programs (HEPs) are typically prescribed by physical therapists based on the individual needs of patients, and are a common supplement to outpatient physical therapy[1]. While adherence to these programs has been associated with improved patient outcomes, nearly 70% of patients do not perform HEPs as prescribed by their physical therapists, and adherence tends to decrease over time[2]. Given that 77% of adults in the United States own a smartphone, including 42% of adults age 65 and older, smartphone applications (mobile apps) offer an alternative to paper-based programming for delivering and encouraging adherence to HEPs[3]. MedBridgeGO is a mobile app designed to facilitate individualized home exercise programs as a supplement to physical therapy. The purpose of this research is to examine if older age is

associated with lower levels of MedBridgeGO utilization, and what patient factors are associated with utilization.

This study involves a sequential mixed-methods analysis of the MedBridgeGO Mobile HEP. Key themes that reflect performance expectancy, effort expectancy, social influence and facilitating conditions of mobile HEP use are identified through an analysis of app store reviews from Google Play and iTunes. Subsequently, the research tests whether older age is associated with lower levels of MedBridgeGO utilization, as well as what patient factors are associated with use through a bivariate and multivariate analysis of MedBridgeGO.

Major themes identified in analysis of app store reviews include: the role of the MedBridgeGO mobile HEP in supporting successful rehabilitation through motivation, compliance with the exercise program, and consistent use of proper exercise form; the role of the MedBridgeGO mobile HEP in supporting patient self-efficacy and ease of adherence to their prescribed home exercise program; and areas for further development of the MedBridgeGO mobile HEP to better meet the needs of the users. When compared with adults aged 18-45, adults older than age 85 had lower odds of mobile HEP utilization in un-adjusted analysis (OR 0.33, 95% CI 0.24, 0.43) and after adjusting for exercise dose, geographic location and median family income (OR 0.33, 95% CI 0.23-0.45).

Older age (85+ years) is associated with lower levels of mobile HEP utilization, and MedBridgeGO mobile app utilization did not differ among adults younger than 85. The results of this research provide insight into the use of app-based technology as an alternate to paper-based HEP programming, indicate age-associated societal, health system and individual factors that contribute to use of mobile HEPs, and serve as a resource for the wider healthcare community to design and develop mHealth technologies that meet the needs of a diverse population.

Introduction

Home Exercise Programs (HEPs) are typically prescribed by physical therapists, are customized based on the individual needs of patients, and are a common type of treatment for many types of patients[1]. Typically, HEPs are provided to the patient as a paper handout with the goal of enabling the patient to take responsibility of their rehabilitation and self-manage their recovery. However, while adherence to these programs has been associated with improved patient outcomes, nearly 70% of patients do not perform HEPs as prescribed by their physical therapists, and adherence tends to decrease over time[2]. In these cases, non-adherence to HEPs may be due to patient-related factors including low motivation, pain, poor self-efficacy, limited experience with exercise or reduced social support, and the benefits of HEPs may not be immediately recognized by patients[5].

Given that 77% of adults in the United States own a smartphone, including 42% of adults age 65 and older, mobile apps offer an alternative to paper-based programming for delivering and encouraging adherence to HEPs[3]. This is supported by a recent review that suggests that the ability of apps to include self-monitoring systems, such as electronic logs of completed exercises, may increase adherence, and that adherence may be positively influenced by patients' knowledge that their physical therapists can remotely monitor their adherence and provide feedback and support[10].

Mobile health, also known as mHealth, can be defined as the use of portable and wireless devices to connect health information and service needs of healthcare consumers to healthcare providers[11]. mHealth technologies, such as wearables or mobile phone applications, are increasingly being used as a means to engage patients, promote self-management, and reduce the burden of unmanaged care. However, while 90% of patients are interested in mHealth interventions, typical medical or fitness apps have a 90-day user retention rate of only 27 – 30 percent, and older adults have unique physical, acceptance and design barriers to using mobile technology[4]. Knowledge of patient factors, barriers and motivators of utilization of mHealth interventions can lead to increased understanding of factors that promote utilization of a mobile app designed to facilitate HEPs among older adults.

There are several barriers to mHealth technology that are unique to older adults, including physical barriers due to the process of aging (e.g. cognitive decline, spatial acuity, processing speed and memory capacity), acceptance barriers (e.g. thoughts and attitudes about mobile technology), and design barriers (e.g. mobile apps not designed for use by older adults)[6]. Wildenbos, et al found that effective use of mHealth technology in older adults is complicated by cognition and motivation barriers, physical ability and perceptual barriers increase risk of user error or failure to notice an interaction task, and medical complexity and functional status can cause errors in user interactions[12]. In addition, among older adults, computer access and ability to use mobile technology has been shown to be lower among those with lower incomes, and those with lower educational attainment[13].

However, mHealth is suitable for use by many older adults and may be effectively used to improve care, self-management, self-efficacy, behavior promotion (including quality of sleep, diet, physical activity and mental health), and medication adherence, as well as promote disease prevention, lifestyle changes and management of non-communicable diseases such as cardiovascular disease and diabetes[14]. Physical barriers affected by decline due to the normal aging process can be addressed by the addition of targeted app features, modes and options;

barriers affecting thoughts and attitudes of acceptance can be overcome through discussion, education and training; and technological barriers can be mitigated through design that is tailored to the needs of the older adult[6].

Special consideration should be paid by developers when designing mHealth interventions designed for use by older adults. For example, Mehra, et al use the Medical Research Council framework to develop a customizable mHealth intervention that includes a combination of tablet app, cloud-based database, and web-based dashboard that can be used by a personal health coach to remotely monitor and guide older adults and includes goal setting, personal training schedules, exercise videos, progress tracking, remote feedback, and targeted guidance from a health coach[15].

However, while research shows that mHealth may be suitable for use by many older adults, there is still significant opportunity for additional research in the area of mHealth app usability for older adults. Lunde, et al found that there is very limited research on the use of smartphone apps for non-communicable diseases other than diabetes, and Jonkman, et al found that individualized mHealth interventions used by older adults had a positive short-term effect on health, but that evidence for the long-term impact was limited[16,17].

As the population of older adults continues to increase, it is important to know what solutions and resources are available and effective in assisting older adults in healthy aging[18]. When designing and developing phone-based mHealth applications, knowledge of barriers and motivators to adopting mobile phone-based health apps can be a helpful tool in understanding, implementing and encouraging the use of mHealth technology in the older adult population.

MedBridgeGO is a mobile app designed to facilitate individualized home exercise programs as a supplement to physical therapy. It includes looped video-based education, scheduled reminders and progress tracking, adherence-driven gamification, in-app messaging and clinician reporting on adherence to prescribed plans (Figure 1.1, 1.2). Barriers to use of the MedBridgeGO mobile HEP unique to the older adult population may include physical barriers due to the process of aging (e.g. cognitive decline, special acuity, and memory capacity), thoughts and attitudes about mobile technology, and design barriers which may result in increased risk of user error or failure to notice interaction tasks[6].

Figure 1.1

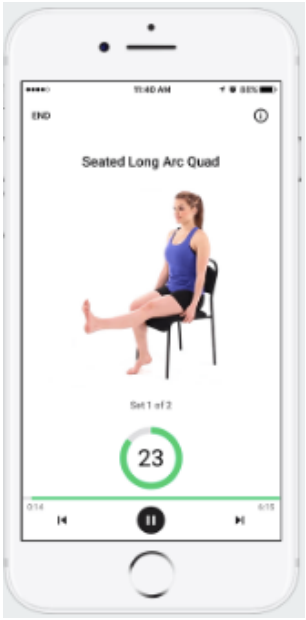


Figure 1.2

The aims of this research are to:

- Identify key themes that reflect performance expectancy, effort expectancy, social influence and facilitating conditions of the MedBridgeGO mobile HEP through analysis of app store reviews from the Google Play and iTunes app store;
- Test for age-related differences in mobile HEP use, informed by the thematic analysis and age-associated patient characteristics associated with utilization.

Specifically, this research examines how utilization of the MedBridgeGO mobile HEP varies by age, and explores factors that contribute to age-related differences in utilization. This research is expected to show that performance expectancy, effort expectancy, social influence and facilitating conditions will be reflected in themes from analysis of the Google Play and iTunes app store reviews. Additionally, this research is expected to show that age-related patient characteristics are associated with utilization of the MedBridgeGO mobile HEP. Specifically, I hypothesize that:

- Older age will be associated with lower levels of mobile HEP use;
- Higher rates of mobile HEP use for older adults will be associated with higher neighborhood income levels, and lower exercise dosage;
- Lower rates of mobile HEP use for older adults will be associated with lower income, treatment at a Federally Qualified Health Care Facility, and with rural or mostly rural clinic locations.

The results of this research will provide greater insight into the use of app-based technology as an alternate to paper-based HEP programming, indicate age-associated societal, health system and individual factors that contribute to use of mobile HEPs, and serve as a valuable resource for the wider healthcare community to design and develop mHealth technologies that reflect the needs of a diverse population.

Theoretical Model

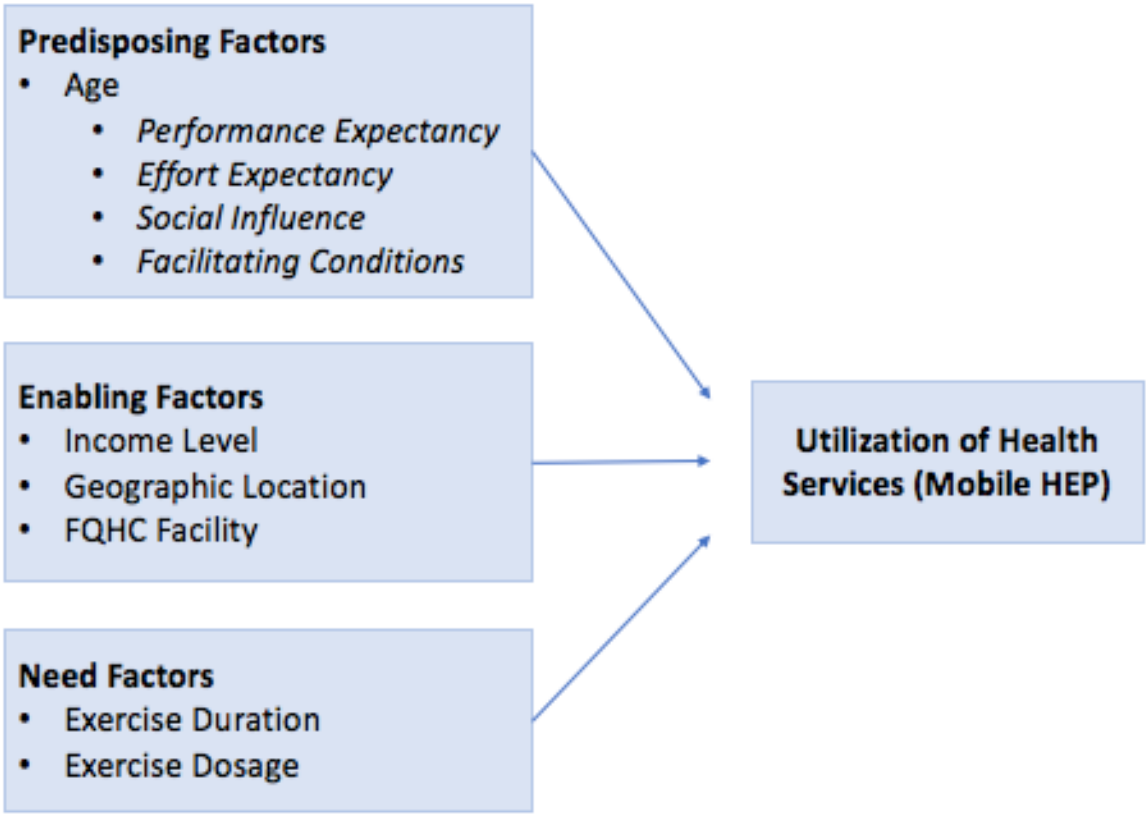
Part 1 of this research focuses on identifying themes that reflect performance expectancy, effort expectancy, social influence and facilitating conditions of MedBridgeGO mobile HEP use through analysis of app store reviews from the Google Play and iTunes app stores. Part 2 of the research assesses age-associated patient characteristics that predict utilization of the MedBridgeGO mobile HEP, including income level, rural vs. urban location, treatment at a Federally Qualified Health Care Facility, and exercise dosage through a comparison of the thematic analysis with patient-associated variables. Analysis of the MedBridgeGO mobile HEP can be supported by the Unified Theory of Use and Acceptance of Technology and the Andersen Model of Health Care Utilization (UTUAT), which when viewed together, offer a framework for patient characteristics that contribute to behavioral intention and use behavior.

The UTUAT posits that there are several factors that contribute to a person's intent to use a technology, as well as their actual utilization of that technology, including performance expectancy, effort expectancy, social influence and facilitating conditions[8]. Each of these factors are influenced by characteristics of the individual user, including age, gender, experience and voluntariness of use. For the proposed research, performance expectancy is defined as the perceived usefulness of the mobile HEP, or the user's belief that using the mobile HEP will help them reach their rehabilitation goals. Effort expectancy is defined as how convenient the mobile HEP is perceived to be. Social influence is defined as the degree to which the user believes that important others believe that the mobile HEP should be used. Facilitating conditions are the degree to which the user believes that organizational and technical infrastructure support the use of the mobile HEP.

The Andersen Model of Health Care Utilization incorporates both individual and environmental determinants of health service use, and posits that there are several factors that influence health choices and utilization of health services. These factors include health system and external environmental factors, as well as population-related characteristics[9]. Population characteristics are defined as predisposing (demographic and social) factors, enabling (economic) factors and need (health-status) factors[9].

Predisposing characteristics include the demographic characteristics of age and sex, social factors such as education, occupation, ethnicity and social relationships, as well as values, knowledge and attitudes related to health and health services[19]. Additionally, according to the UTUAT, age informs predisposing characteristics related to performance expectancy, effort expectancy, social influence and facilitating conditions. Because of this, age will be used as the primary variable of interest in association with use, while enabling and need-based factors will be analyzed in association with age. Older age is expected to be associated with increased performance expectancy and increased effort expectancy, meaning that while older adults may expect the app to be more difficult to use, they believe that use of the app will lead to improved health outcomes. Social influence is expected to have an interaction effect with age and use, with young adults and older adults more influenced by socialization of the app among others in their peer groups and social circles. Facilitating conditions are an important factor to consider when analyzing trends in who is assigned mobile HEP access by their clinician, and may reveal implicit bias towards assigning mobile HEPs to younger adults over older adults (Figure 2).

Figure 2: Theoretical Model



Enabling factors include financial and organizational factors, as well as economic factors that encourage or discourage utilization of health services, including the ability of an individual to pay for health services, as well as their ability to access health care facilities[19]. Enabling factors examined in the proposed research include median household income, rural vs. urban location, and whether or not treatment was provided at a Federally Qualified Health Center.

Need-based factors include evaluated need based on clinical assessment, as well as perceived need for health-services, such as how people view their general health and functional status[19]. Need-based factors examined in the proposed research focus on evaluated need, and include exercise dosage.

In this study, the outcome of interest is mobile HEP utilization, and the primary independent variable is age. Additional independent covariates include treatment at a Federally Qualified Health Care facility, clinic location, median household income, exercise dosage, and clinician messaging.

Methods

This study involves a sequential mixed-methods analysis of the MedBridgeGO Mobile HEP. Part 1 of the research focuses on identifying key themes that reflect performance expectancy, effort expectancy, social influence and facilitating conditions of mobile HEP use through analysis of app store reviews from the Google Play and iTunes app stores.. Part 2 of the study aims to test

whether age is associated with mobile HEP use, and how income level, geographic location, communication with clinician, and exercise dosage may contribute to the relationship between age and mobile HEP use. This part of the study culminates in the development of logistic regression models to describe age-related differences in mobile HEP utilization.

Part 1 – Qualitative Analysis

Mobile HEP app store reviews submitted to Google Play and iTunes between December 31, 2016 and October 1, 2018 were analyzed in part 1 of this study. Mobile HEP app store reviews that did not include direct observation or feedback of the app, were submitted in a non-English language, were submitted by clinicians, or were submitted prior to December 31, 2016 were excluded from analysis. Braun and Clark's Thematic Analysis technique was used to conduct the analysis of app store reviews, including 1) familiarization with data, 2) generation of initial codes, 3) searching for themes among codes, 4) reviewing themes, 5) defining and naming themes, and 6) producing the final report. For step 1, verbatim app store reviews exported from Google Play and iTunes were reviewed. In step two, quotes from the app store reviews were excerpted and coded using Dedoose. Once extraction of data and coding was complete, themes reflected among the codes were identified. From there, themes were reviewed with Debra Revere for further refinement and identification of sub-themes. Then, this manuscript was completed. The thematic analysis of Google Play and iTunes app store reviews was performed using Dedoose. Data measurement and issues of reliability and validity for the qualitative analysis are further summarized in Table 1 of Appendix A.

Part 2 – Quantitative Analysis

Methods: Part 2 involves analysis of the MedBridgeGO mobile HEP use in association with age. Covariates in the adjusted analysis include neighborhood income level, geographic location, treatment at a Federally Qualified Health Care Facility, communication with clinician, and exercise dosage. Data is summarized by percentages and a chi-square test is used to analyze age-group specific associations between users and non-users with treatment at a Federally Qualified Health Center, geographic location, median household income, and exercise dosage. It also involves development of adjusted logistic regression models to describe age-based differences in utilization based on statistically significant age-associated patient characteristics as identified in the bivariate analysis: Model 1 is adjusted for exercise dose; Model 2 is adjusted for exercise dose and geographic location; Model 3 is adjusted for exercise dose, geographic location and median household income. All statistical analyses are performed using R (R Core Team, 2017).

Sample: The MedBridgeGO mobile HEP is available to patients who are treated by a clinician with a MedBridge license, as a supplement to physical therapy. Data included in this study comes from 6,190 clinicians across 99 organizations assigned mobile HEPs using MedBridgeGO. Study participants include adults (> 18 years) who had mobile HEPs created by their physical therapist as a supplement to outpatient physical therapy between December 31, 2016 and October 1, 2018. Children (< 18), and adults who were assigned mobile HEPs that received care in non-outpatient settings were excluded from analysis.

Outcome: MedBridgeGO use is defined through total number of logins following assignment of the mobile HEP from the clinician. Non-users defined as 0-1 total logins during the study period, and users defined as >1 login to the mobile HEP during the study period. The rationale for this definition is based on the recommended process for clinicians assigning the mobile HEP to patients, which includes downloading the app with the patient at the point of care. To account

for patients who log in to the app as a part of this process, but do not log in independently, non-use includes users who sign in to the app 0-1 times, and use includes users who sign in to the app more than 1 time.

Primary Independent Variable: In this study, age is the primary variable of interest. In the summary of study participants, age is categorized as: 18-24, 25-44, 45-65, 66-85, and 85 or older. However, because the research is primarily interested in utilization among older age groups and because summary analysis showed that there are limited mobile HEP users in the 18-24 age group, further analysis will categorize 18 – 44 year-olds together.

Additional Covariates: Median neighborhood household income, rural vs. urban clinic location, messages sent per day from patient to clinician, and frequency of exercises prescribed (dosage) are reported as categorical values: Median household income is categorized as: Less than $45,000, $45,000 - $62,999, $63,000 – 81,999 and $82,000 or more; Geographic location is categorized as: Mostly Urban, Mostly Rural and Completely Rural; Messages sent per day is transformed into categorical variables: <1 message per day, 1-5 messages per day, 6-10 messages per day, and >10 messages per day based on the number of messages sent by the patient to the clinician; Frequency of exercises prescribed, or exercise dosage, is transformed into categorical variables: <1 per week, 1-3 per week, 3-5 per week, >5 per week based on number of exercise sets prescribed to the patient by the clinician per week. Data measurement and issues of reliability and validity for the quantitative analysis are further summarized in Table 2 of Appendix A. In examining age in association with mobile HEP use, it is important to evaluate covariates for potential confounding, effect modification and interaction. The following is a preliminary conceptualization of confounding, effect modification and interaction factors between age and use that informed the data analysis:

- Federally Qualified Health Center: We did not include FQHC in adjusted analysis since no mobile HEP users had received care at FQHCs.
- Clinic Location (Rural vs. Urban): Around 25% of adults aged 65 or older live in a small town or other rural area, and rural communities have a higher prevalence of chronic disease, a higher disability rate, a lower prevalence of healthy behaviors, and a widening gap in life expectancy relative to the nation as a whole potentially exacerbated by a lack of available services, resources and social network[23]. Although there are higher numbers of older adults moving to rural locations compared to younger adults, most of the relationship between age and rural vs. urban location is pre-existing in terms of HEP use[25]. Because of this, rural vs. urban clinic location is expected to have a confounding effect on the relationship between age and mobile HEP use and will be included in both the bivariate and logistic analyses.
- Median Neighborhood Household Income: While there is variation in median income by age, the relationship between age and median neighborhood income is pre-existing in terms of HEP use. Lower levels of broadband subscription are associated with neighborhoods with lower median household incomes, so lower neighborhood income levels are expected to be associated with lower levels of HEP utilization across age cohorts[24]. Because of this, median neighborhood income is expected to be a confounder and will be included in both the bivariate and logistic analysis.
- Frequency of exercises prescribed, or exercise dosage: Older age may be associated with lower exercise dosage due to changes in functional status and the aging process, while higher exercise dosage may be associated with increased use of the app as a result of the

motivating effect of communication with clinicians[15]. Because of this, the bivariate analysis will include utilization by exercise dosage, and the logistic analysis will adjust for exercise dosage.

- Patient Messaging to Clinician: More frequent electronic communication with a clinician has been shown to be associated with increased HEP adherence, meaning the increased communication is in the causal pathway for use for adults of all ages. Because of this, clinician messaging will be reported in part 2 of the evaluation, but it will not be included in the logistic regression models to describe age-based differences in utilization.

Based on this conceptualization, part 2 of the evaluation includes data on utilization by FQHC, clinic location, median household income, frequency of exercises prescribed, and messaging with a clinician. In the logistic analysis, separate models are developed to account for confounding.

Data for this research was collected through several sources. App store feedback was exported verbatim from the Google Play and iTunes app stores and is recorded in Google Sheets; HEP utilization, age, treatment facility name, treatment facility zip code, count of messages sent from clinician to patient, and exercise dosage are deidentified and exported via proprietary MedBridge software via CSV; Federally Qualified Healthcare Facilities are identified by cross tabulating clinic name with the list of Federally Qualified Health Care Facilities from the US Health Resource & Service Administration 2018 database; Clinic location is identified by cross tabulating clinic zip code with the US Census Bureau's 2010 urban and rural classifications; Median household income is identified by cross tabulating clinic zip code with the 2016 IRS individual income tax statistics.

Results

Part 1. Qualitative analysis of major themes and sub-themes of app store reviews

544 total app store reviews were analyzed. 59.9% were from Google Play while 41.1% were from iTunes. The average length of app store reviews from Google Play was 114 characters, and the average length of app store reviews from iTunes was 210 characters. Both Google Play and iTunes give app reviewers the option of rating their experience on a five-star scale. The average star-rating for MedBridgeGO for iTunes reviews was 4.7 out of 5, while the average star-rating for Google Play reviews was 4.8 out of 5.

The majority of participants reflected overall satisfaction with the app in the Google Play and iTunes store reviews. App reviews also reflected ideas of how the app could be improved. These themes were divided into three main categories: themes related to performance expectancy, or the belief that use of the mobile app supported successful rehabilitation (motivation, memory aid, exercise buddy, and set up for success); themes related to effort expectancy, or patient self-efficacy, confidence, and ease of use of the mobile app compared to paper-based home exercise programming (alternate to paper, confidence booster), and specific app design preferences to enhance performance expectancy and effort expectancy (bidirectional feedback, communication with clinician).

> *The role of the MedBridgeGO mobile HEP in supporting successful rehabilitation through motivation, compliance with the exercise program, and consistent use of proper exercise form (performance expectancy):*

Motivation: App store reviews described the role of MedBridgeGO as a compliance aid that encourages and supports adherence to prescribed home exercise programs. One reviewer noted, *"…this app has helped me stay consistent and motivated with my health plan."* Another noted*,"…Great app to help me stay on track with my physical therapy*." Reviewers also suggest that use of the app supports both compliance with the program, and maintenance of proper technique *("…I find that I'm more likely not only to follow the program, but do the exercises correctly"*).

Memory Aid: App store reviews described the role of MedBridgeGO as a memory aid to support proper exercise technique (*"I need reminding, what a great help"*. One reviewer noted, *"… I do not have to keep pestering my therapist to show me again, me being my forgetful self cannot recall what to do and how many I need to do*." Reviewers also note that they are able to focus more on maintaining proper form by having to focus less on counting sets and reps, further supporting proper form and technique ("*It helps me keep track of my daily exercises and as a resource for the proper way to implement them*").

Exercise Buddy: App store reviews reflect that MedBridgeGO supports motivation and accountability to exercise programs. Several reviewers noted the role of the app as an accountability partner (…"*Gives me a 'buddy' to work with!"*). Another reviewer noted that, "*[the app] has helped me stay consistent and motivated with my health plan.*" Additionally, reviewers noted that the app makes exercise program compliance and motivation easier to maintain (*"…Makes it easier to keep going"*).

Set Up for Success: App store reviews also reflect that use of the app leads to patient-reported improvements in functional status. Several reviewers noted functional or physical improvements with continued use of the app (*"…While it's not fun to do exercises, this app walks me through my routine and offers me incentive and encouragement… Best of all, I am regaining range of movement in my shoulder").* One participant stated, "*Using this app is very easy, and it is helping me recover from surgery*." In addition, reviewers report accountability to their physical therapist as a part of the recovery process (*"This app really holds you accountable for following your PT which will ensure a faster recovery"*).

The role of the MedBridgeGO mobile HEP in supporting patient self-efficacy and ease of adherence to their prescribed home exercise program (effort expectancy):

Alternate to Paper: App store reviews described the role of MedBridgeGO in comparison to traditional paper-based home exercise programs. Several reviewers noted that they are less likely to lose or misplace their home exercise program when prescribed via mobile app (*"…Easy to keep your exercises handy, no worrying about losing the paper with them on it*"). Reviewers also noted the role that video-based education plays in terms of supporting adherence to programming and proper technique in comparison to paper-based programming ("*I love it because it's so much better than following instructions on paper*"). Reviewers also commented that, compared to paper-based programming, exercises prescribed via the mobile app were easier to adhere to outside of the

home ("*makes it a lot easier to do rather than carry a sheet of paper around everywhere…*").

Confidence Booster: App store reviews described the role of the MedBridgeGO as a method to increase the user's confidence that they are completing their home exercise program as prescribed. One user noted, "*It helps me keep track of my daily exercises and as a resource for the proper way to implement them."* Another user stated, "*[I] enjoy being able to see the correct way to do my exercises."* Reviewers also commented that voice coaching helped maintain the correct pace as the patient progressed through the prescribed sets and reps ("*Exercises are concise and easy to follow. Pace of exercises is appropriate with good transition.")*

App store reviews also indicated several areas for further development of the MedBridgeGO mobile HEP to better meet the needs of the users. Reviewers identified the following specific app design enhancements:

Communication with Clinician: App store reviews reflected user's need for increased bidirectional feedback between the patient and their clinician. Several users identified the value of feedback from their clinician via the app in terms of its impact on motivation and adherence to their prescribed exercise program ("*It has made a big difference in my ability to do the exercises properly. And being able to see the notes from my physical therapists helps me focus on the form mentally. I think I'm on track because of this app*"). Other users commented on the need to be able to increase use of bidirectional feedback as a part of their home exercise program (*"The feedback for clinic reminder doesn't allow me to provide feedback; my PT has updated my program but I don't get the updated version"*).

Customization: App store reviews reflected user's needs to customize and modify elements of their prescribed home exercise program based on individual needs. Reviews reflected the need for users to be able to customize the order in which they complete exercises via the app ("*I would like to be able to edit myself*"). Other reviews indicated the need for more flexibility in terms of the time it takes to complete exercises, and rest times between exercises (*"I wish it let you set the times for each prescribed exercise"*).

These themes are further summarized in Table 1 of Appendix B.

Part 2. Quantitative analysis of MedBridgeGO utilization

There were 53,668 total participants included in the analysis. 90.4 % of participants were non-users of the mobile HEP, while 9.6% were users of the mobile HEP. Study participants are further summarized using descriptive characteristics.

Table 1 summarizes study participants by mobile HEP utilization status.

Table 1: Summary of Study Participants

Variable	Non-users Number (%)	Users Number (%)	P
Age			
18-24	3,761 (7.75)	283 (5.50)	<0.001
25-44	9,465 (19.51)	1,141 (22.18)	
45-65	18,834 (38.81)	2,099 (40.80)	
66-85	14,856 (30.62)	1,565 (30.42)	
85+	1,607 (3.31)	57 (1.11)	
Federally Qualified Health Center			
Yes	66 (0.14)	0 (0.00)	0.008
No	12,681 (26.13)	1,294 (25.15)	
Information Not Available	35,776 (73.73)	3,851 (74.85)	
Clinic Location			
Mostly Urban	44,533 (91.78)	4,872 (94.69)	<0.001
Mostly Rural	3,530 (7.27)	215 (4.18)	
Completely Rural	460 (0.95)	58 (1.13)	
Median Household Income			
<$45,000	7,736 (15.94)	1,015 (19.73)	<0.001
$45,000 - $62,999	16,793 (34.61)	1,689 (32.83)	
$63,000 – 81,999	12,171 (25.08)	1,061 (20.62)	
> $82,000	11,823 (24.37)	1,380 (26.82)	
Messages sent to clinician			
<1 time per day	48,409 (99.77)	4,616 (89.72)	<0.001
1-5 times per day	112 (0.23)	467 (9.08)	
6-10 times per day	2 (0.00)	39 (0.76)	
>10 times per day	0 (0.00)	23 (0.45)	
Frequency of Exercises Prescribed			
<3 times per week	3,587 (7.39)	133 (2.59)	<0.001
3-5 times per week	15,785 (32.53)	841 (16.35)	
6-10 times per week	14,172 (29.21)	1,103 (21.44)	
>10 times per week	14,978 (30.87)	3,068 (59.63)	

There were statistically significant associations between HEP utilization and the following variables: Age, Clinic Location, Median Household Income, Messages sent to clinician, and Exercises prescribed by clinician. This means that users of the mobile HEP are more likely to be younger in age, receive treatment at in a mostly urban geographic area, have a higher median household income, send more messages in the mobile HEP app from their clinician, and have a higher exercise dosage.

Treatment at a Federally Qualified Health Center was included in the summary data, however, because there were no mobile HEP users who were treated at a Federally Qualified Health Center, it was excluded from future analysis.

Table 2 shows age-based associations between HEP utilization and other subject characteristics. For adults aged 18- 44, 45-65 and 66-85, there were statistically significant associations between HEP utilization and the following variables: Clinic location, Median Household Income, Messaging and Exercise Dosage. This means that for adults in aged 18-44, 45 – 65, and 66 – 85,

mobile HEP utilization was associated with treatment at a location in a mostly urban area, higher median household income, increased messaging to clinician, and more exercises prescribed. For adults aged 85 and older, there were statistically significant associations between HEP utilization and the following variables: Messaging and Exercise Dosage. This means that for adults older than age 85, mobile HEP use was associated with increased messaging to a clinician and higher exercise dosage, but that there was not a statistically significant association between use and other independent variables.

Table 2: Sample Characteristics in Relation to Utilization Status, by Age

	18-44			45-65			66-85			>85		
	Users N (%)	Non-Users N (%)	P	Users N (%) 2099 (40.8)	Non-Users N (%) 18834 (38.8)	P	Users N (%) 1565 (30.4)	Non-Users N (%) 14856 (30.6)	P	Users N (%) 57 (1.1)	Non-Users N (%) 1607 (3.3)	P
Clinic Location												
Mostly Urban	1346 (94.5)	12071 (91.3)	<0.001	1976 (94.1)	17372 (92.2)	<0.001	1495 (95.5)	13621 (91.7)	<0.001	55 (96.5)	1469 (91.4)	0.28
Mostly Rural	68 (4.8)	1038 (7.8)		98 (4.7)	1300 (6.9)		48 (3.1)	1076 (7.2)		1 (1.8)	116 (7.2)	
Completely Rural	10 (0.7)	117 (0.9)		25 (1.2)	162 (0.9)		22 (1.4)	159 (1.1)		1 (1.8)	22 (1.4)	
Median Household Income												
<$45,000	319 (22.4)	2145 (16.2)	<0.001	366 (17.4)	2822 (15.0)	<0.001	317 (20.3)	2498 (16.8)	<0.001	13 (22.8)	271 (16.9)	0.59
$45,000 - $62,999	415 (29.1)	4470 (33.8)		717 (34.2)	6617 (35.1)		540 (34.5)	5157 (34.7)		17 (29.8)	549 (34.2)	
$63,000 – 81,999	295 (20.7)	3283 (24.8)		445 (21.2)	4700 (25.0)		310 (19.8)	3814 (25.7)		11 (19.3)	374 (23.3)	
> $82,000	395 (27.7)	3328 (25.2)		571 (27.2)	4695 (24.9)		398 (25.4)	3387 (22.8)		16 (28.1)	413 (25.7)	
Messages sent to Clinician												
<1	1296 (91.0)	13209 (99.9)	<0.001	1875 (89.3)	18787 (99.8)	<0.001	1398 (89.3)	14811 (99.7)	<0.001	47 (82.5)	1602 (99.7)	<0.001
1-5	116 (8.1)	17 (0.1)		197 (9.4)	47 (0.2)		145 (9.3)	43 (0.3)		9 (15.8)	5 (0.3)	
6-10	9 (0.6)	0 (0)		17 (0.8)	0 (0)		13 (0.8)	2 (0.0)		[No Data]	[No Data]	
>10	3 (0.2)	0 (0)		10 (0.5)	0 (0)		9 (0.6)	0 (0.0)		1 (1.8)	0 (0)	
Frequency of Exercises Prescribed												
<3	38 (2.7)	936 (7.1)	<0.001	48 (2.3)	1467 (7.8)	<0.001	42 (2.7)	1045 (7.0)	<0.001	5 (8.8)	139 (8.6)	0.002
3-5	237 (16.6)	4367 (33.0)		350 (16.7)	6183 (32.8)		239 (15.3)	4661 (31.4)		15 (26.3)	574 (35.7)	
6-10	316(22.2)	3871 (29.3)		438 (20.9)	5428 (28.8)		338 (21.6)	4357 (29.3)		11 (19.3)	517 (32.2)	
>10	833 (58.5)	4052 (30.6)		1263 (60.2)	5756 (30.6)		946 (60.4)	4793 (32.3)		26 (45.6)	377 (23.5)	

Table 3 shows adjusted logistic regression models examining age-based associations between mobile HEP utilization. Compared with adults aged 18-44, adults aged 85+ had lower odds of mobile HEP utilization in an unadjusted analysis (OR 0.33, 95% CI 0.24, 0.43) as well as in an analysis adjusted for exercise dose, geographic location and median neighborhood income (OR 0.33, 95% CI 0.23, 0.45). Compared with adults aged 18-44, adults aged 45 – 66 had higher odds of mobile HEP utilization when adjusted for exercise dose, geographic location and median family income (OR 1.09, 95% CI 1.01, 1.19).

Table 3: Adjusted logistic analysis of age-based differences in mobile HEP utilization

	OR (95% CI) for being a mobile HEP user			
Age	Unadjusted	Model 1. Adjusted for exercise dose	Model 2. Adjusted for exercise dose and geographic location	Model 3. Adjusted for frequency of exercises prescribed, geographic location and median family income
18-44	1	1	1	1
45-65	1.03 (0.96, 1.11)	1.04 (0.97, 1.12)	1.03 (0.96, 1.11)	1.09 (1.01, 1.19)*
66-85	0.97 (0.90, 1.05)	0.95 (0.88, 1.03)	0.94 (0.87, 1.02)	1.01 (0.91, 1.09)
85+	0.33 (0.24, 0.43)***	0.34 (0.25, 0.45)***	0.34 (0.25, 0.45)***	0.33 (0.23, 0.45)***

*p<0.05

**p<0.01

***p<0.001

Discussion and Conclusion

When designing and developing phone-based mHealth applications, knowledge of barriers and motivators to adopting mobile phone-based health apps are a helpful tool in understanding, implementing and encouraging the use of mHealth technology in the older adult population.

In the qualitative analysis, we expected to find themes related to patient demographics, however these were not present during open coding of the app store reviews. Analysis did indicate key themes related to performance expectancy (the perceived usefulness of the app) and effort expectancy (how convenient and easy to use the app is), as well as areas for future app development to better support individual needs. Key themes related to performance expectancy indicated that app users found MedBridgeGO effective as a compliance and motivation aid that supports adherence to prescribed exercise programs while also serving as a memory aid to ensure proper exercise technique. App store reviews also indicated that app users found that regular use led to improvements in functional status and rehabilitation outcomes. Key themes related to effort expectancy indicated that app users favorably compare user of the MedBridgeGO mobile HEP to paper-based exercise programming, and highlighted the role of video-based education in terms of convenience, clarity and usability. Reviews also indicated that use of MedBridgeGO increases users confidence that they are able to complete a home exercise program as prescribed. App store reviews also indicated areas for future app development, including increased need for bidirectional and ongoing feedback between the patient and their clinician and the ability to modify or customize prescribed exercise programs based on individual needs and functional status. Based on this analysis, the theoretical model introduced earlier can be evolved to reflect the importance of patient self-efficacy in management of their home exercise programs. The

expressed need for app users to be able to customize their prescribed exercise programs, coupled with the themes of confidence, motivation and the use of the MedBridgeGO mobile HEP as an exercise program support the need for patient self efficacy in use of mobile health technology. If the patient does not feel confident that they'll be able to succeed in their use of the app and their successful completion of their prescribed exercise programs, they may be less likely to use the app regularly. However, because demographic information about app reviewers was unavailable, we are unable to correlate these findings directly to age-related trends examined in the quantitative analysis.

In the quantitative analysis, we sought to identify whether utilization of the MedBridgeGO mobile HEP differed by age, and results of the analysis support the hypothesis that older age is associated with lower levels of mobile HEP use.

In the adjusted logistic analysis, adults older than age 85 had lower odds of mobile HEP utilization (OR 0.33, 95% CI 0.24,0.43). The adjusted logistic analysis also showed that, compared to adults aged 18-44, the odds of mobile HEP utilization among adults aged 45-65 and 65 to 85 were not significantly different. This is inconsistent with previous research analyzing age-based trends in mobile health technology use. According to research conducted by Gallagher, et al, adults under the age of 56 were at greater odds of using any mobile technology when compared to adults over the age of 69 (OR 4.45, 95% CI 1.46-13.55), as well as greater odds to using mobile apps in general (OR 5.00, 95% CI 2.01-12.44), and for health-related reasons (OR 3.31, 95% CI 1.34-8.18). Compared with the older group, the middle age group (56-69 years) had greater odds of using any mobile technology (OR 2.42, 95% CI 1.27-4.59) and mobile technology for health-related purposes (OR 1.92, 95% CI 1.04-3.53)[21]. This inconsistency may be caused by several possible factors, and indicates an area of opportunity for future research. According to Ganjuli, et al, in-clinic, face-to-face support from clinic staff plays an important role in adherence to self management of care[25]. Clinics and clinicians who prescribe MedBridgeGO to their patients are recommended to assist patients in downloading the app at the point of care, and in addition the MedBridge clinician portal includes template education tools that can be provided to patients to support their use of the MedBridgeGO app. An example of this material can be found in Appendix C. Use of these types of material coupled with in-clinic app support may contribute to the reduced odds of app utilization occurring at an older age for MedBridgeGO users compared to other research.

In the bivariate analysis, we found that for adults aged 85 and older, mobile HEP use was associated with increased messaging from clinician and higher frequency of exercises prescribed, but that there was not a statistically significant association between use and other independent variables. For adults aged 18-44, 45-65, and 65-85, mobile HEP use was associated with treatment at a location in a mostly urban area, higher median neighborhood household income, increased messaging from clinician, and higher exercise dosage. The role that clinician messaging and frequency of exercises prescribed by the clinician plays in supporting utilization across age groups is supported by research conducted by Jordan, et al, which suggests that the ability of apps to include self-monitoring systems, such as the electronic logs of completed exercises featured in MedBridgeGO, may increase adherence. In addition, Jordan, et al, found that adherence may be positively influenced by patients' knowledge that their clinician can monitor their adherence and provide feedback[10].

Additionally, the logistic analysis models controlling for exercise dosage, median family income and clinic location create an artificially equitable population, and don't reflect the actual

circumstances and experiences of app users. To inform the app development process, as well as patient/clinician training, and app use among certain patient populations, the unadjusted model is most useable for taking these results back to app builders.

Based on the results of these analyses, it is recommended that mobile HEP app providers, including the developers of MedBridgeGO, include participants that reflect a diverse age-range when conducting needs analysis, user-testing, app deployment and ongoing evaluation so that age-specific needs are reflected in the design of the app, particularly for adults over the age of 85. Since odds of MedBridgeGO utilization among adults aged 45-65 and 65-85 was not significantly different compared to adults aged 18-44, further analysis of the app features, patient/provider training protocol and communication tools could indicate features or practices that could be generalized across other mobile health tools to promote adoption among older adults.

Additionally, results indicate that mobile devices are an important tool for mediating communication between patients and their healthcare providers, and that there is room to further enhance the MedBridgeGO mobile HEP in order to further facilitate frequent communication and promote utilization. As explored in the descriptive analysis, only 9.4% of patients assigned mobile HEPs in the MedBridgeGO app signed in to use the app more than once, which indicates significant opportunity to enhance patient/provider training protocols to promote adoption of the app as well as features of the app.

As discussed earlier, barriers to use of mobile technology unique to the older adult population may include physical barriers due to the process of aging (cognitive decline, special acuity, and memory capacity), thoughts and attitudes about mobile technology, and design barriers which may result in increased risk of user error or failure to notice interaction tasks, all of which may be reflected and referenced through a user persona. According to Cooper, personas are," hypothetical archetypes of actual users… defined by their goals."[20] They can be used to reflect the character, skills, priorities, beliefs and goals of the hypothetical user, and can be used as a point of reference during the design process. Future work may include the development of user personas, which can help developers reflect the unique needs of older adults in the app development process.

Limitations of this study include use of only 1 coder for the qualitative analysis, which could contribute to issues of validity. Additionally, inability to link app store reviews with actual use data, as well as user demographic information, limits the way in which the qualitative thematic analysis informs the quantitative analysis and corresponding discussion. Limited information about patient demographics may lead to residual confounding and interaction in the analysis. Individual characteristics unavailable for analysis include sex, ethnicity, native language, education level, health literacy, technical literacy, type of insurance, marital status, diagnosis, acute vs. chronic condition, severity of condition as well as cognitive, tactile, or visual functional status which may influence mobile HEP use behavior. Additionally, there is a potential for omission bias, where clinicians may be prescribing mobile home exercise programs only to patients who they believe would use the app, resulting in clinician bias predicating trends in utilization. Since app store reviews were collected by convenience sample, there may also be a potential for inclusion bias, where patients who submit reviews to Google Play or iTunes may be more likely to be younger, or already be users of mobile technology, resulting in an underrepresentation of barriers to use in the qualitative analysis.

Themes identified in the qualitative analysis indicated that users of the MedBridgeGO mobile HEP found it preferable to paper-based programming, so additional research in this area comparing paper-based programming with mobile / app-supported programming is indicated. The age-stratified analysis of mobile HEP use in comparison to other variables showed that the gap between rural and urban use increases with age, which may indicate future analysis for policy or practice implications. Additionally, the role that health literacy and tech literacy play in utilization of the MedBridgeGO Mobile HEP were not explored as a part of this study, so additional research on the intersection of health literacy and tech literacy with age would provide additional insight into how technology could be used to better meet the needs of older adults. Additional research on age-based trends in utilization of Android vs Apple devices may reveal additional patient demographic factors that could provide additional context to the analysis of app store reviews. An analysis of facility size and further analysis of patient demographic information may reveal additional information about facilitation conditions that influence use behavior. Additionally, analysis of patterns of behavior from the clinician-users of the MedBridgeGO Mobile HEP may indicate additional factors that influence patient use behavior.

In summary, this study found that older age (85+) is associated with lower levels of MedBridgeGO mobile HEP utilization and that, compared to adults aged 18-44, the odds of mobile HEP utilization among adults aged 45-65 and 65 to 85 were not significantly different. The results of this research provide insight into the use of app-based technology as an alternate to paper-based HEP programming, indicate age-associated societal, health system and individual factors that contribute to use of mobile HEPs, and serve as a resource for the wider healthcare community to design and develop mHealth technologies. Research also indicates several opportunities for future research including analysis of the impact of mobile home exercise programming, like MedBridgeGO, on long term patient outcomes, particularly for non-communicable, chronic conditions.

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Appendix A. Data, How it is Measured, and Questions of Validity

Table 1: Qualitative Feedback from iTunes & Google Play

Data	How it is Measured	Concerns with reliability or validity?
Patient feedback	Feedback submitted via iTunes and Google Play app stores.	Patients submitting feedback to app stores may already be heavier users of mobile technology and have higher levels of comfort with mobile apps.

Table 2: Patient Characteristics & Mobile HEP Utilization Data

Variable	How it is Measured	Concerns with reliability or validity?
HEP Utilization Non-Users Users	Non-users are defined as 0-1 total logins to mobile HEP; Users are defined as >1 login to mobile HEP	Logins to mobile HEP may not be a reliable measure of HEP adherence.
Age 18-24 25-44 45-65 66-85 85+	Birth year of patient participant.	None
Treatment Facility Name	Facility name as reported by MedBridgeGO client	None
Treatment Facility Zip Code	Facility zip code as reported by MedBridgeGO client	None
Treatment at FQHC Facility Yes No	Facility name associated with prescribing clinician using MedBridgeGO cross-referenced with list of Federally Qualified Health Care Facilities from US Health Resource & Service Administration database.	None
Clinic Location Mostly Urban Mostly Rural Completely Rural	Facility zip code associated with prescribing clinician using MedBridgeGO cross-referenced with US Census Bureau's urban and rural classifications.	Rural vs. urban area as determined by zip code may not accurately indicate true geographic location of clinic or of the patient receiving treatment at that clinic

Median household income <$45,000 $45,000 - $62,999 $63,000 – 81,999 > $82,000	Facility zip code associated with prescribing clinician using MedBridgeGO cross-referenced with IRS individual income tax statistics.	Median household income as determined by zip code may note accurately indicate true income levels of patient participants
Count of Messages Sent from Clinician to Patient <1 1-5 6-10 >10	Count of total messages sent from clinician to patient over the duration of the exercise program.	None
Exercise Dosage 1-3 3-5 5-10 >10	Count of total number of exercises prescribed in HEP	None

Appendix B. Summary of Qualitative Analysis

Qualitative analysis of major themes and sub-themes of app store reviews

Performance Expectancy	
Motivation	App reviews reflecting that the app helps users maintain compliance with their prescribed program and adhere to the plan as it is prescribed. Key language used to indicate this theme includes, "keep on track" or "keep up with" a physical therapy program: - "Love this app. Makes it much easier to stay compliant with my PT." - "Great app to help me stay on track with my physical therapy" - "Helps me keep up with my physical therapy at home." - "This app really holds you accountable for following your PT which will ensure a faster recovery" - "This app has helped me stay consistent and motivated with my health plan. It is also easy to use." - "This app helped me follow through with my PT exercises. I loved that it tracked how many days I did them, which held me accountable to actually do them! The videos were really helpful to follow along as well." - "I find that I'm more likely not only to follow the program, but do the exercises correctly" 95 excerpts reflect this theme in Google Play reviews; 65 excerpts reflect this theme in iTunes reviews.
Memory Aid	App reviews reflecting that the app helps users remember how to do specific exercises and proper technique for exercises. Key language used to indicate this theme includes, "remember" or "reminding": - "… I do not have to keep pestering the therapist to show me again being my forgetful self cannot recall what to do and how many I need to do…" - "Very handy to remember exercises." - "I need reminding, what a great help" - "So helpful with remembering the proper way to accomplish the exercises!" - This app is helping me remember the home exercises my PT gave me to do…" 20 excerpts reflect this theme in Google Play reviews; 28 excerpts reflect this theme in iTunes reviews.
Exercise Buddy	App reviews reflecting that the app helps users feel motivated to complete their exercises. Key language used to indicate this theme includes language of "accountability partners" – i.e. "it's

	like having my PT with me" or "like having a buddy to work with." – as well as "motivation" or "motivational." - "Nice motivational app" - "Keeps me motivated" - "Gives me a 'buddy' to work with!" - "Brilliant app, has really got me going… it's been great for motivation!" - "Good to see the exercises. Like a buddy helping you complete them every day." - "This app has helped me stay consistent and motivated with my health plan" - "Makes it easier to keep going" - This is truly giving me a way to do my exercises willingly." - "This has been a great app to help me remember and motivate me to do the exercises my physical therapist gave me for back pain!" 22 excerpts reflect this theme in Google Play reviews; 24 excerpts reflect this theme in iTunes reviews.
Set Up for Success	App reviews reflecting that the app helps the patient feel better, indicating belief that the app is doing what it is 'supposed to do.' Key language to indicate this theme includes language of "recovery, "healing, "or "feeling better." - "Great recovery tool for PT" - "It is an easy to follow video exercises that helps you so much to furthering your physical therapy process" - "Helping my shoulder and elbow." - "This app really holds you accountable for following your PT which will ensure a faster recovery" - "Helping my wellbeing" - "Very helpful in recovery!!" - "Using this app is very easy, and it is helping me recover from surgery" - "While it's not fun to do exercises, this app walks me through my routine and offers me incentive and encouragement… Best of all, I am regaining range of movement in my shoulder!" 24 excerpts reflect this theme in Google Play reviews; 15 excerpts reflect this theme in iTunes reviews.
Effort Expectancy	
Alternate to Paper	App reviews reflecting a direct comparison to the mobile HEP and paper-based HEPs. Key language to indicate this theme includes language of, "much better than paper," or "better than print outs."

	- "Love the app so far as I've only just discovered it and with my access code all my exercises are there and makes it a lot easier to do rather than carry a sheet of paper around everywhere…" - "The examples of the exercises my PT prescribes is so valuable. Going from a black and white print out to this app is night and day." - "So much better than a black and white print out" - "It's easier than photos" - "Easy to keep your exercises handy, no worrying about losing the paper with them on it." - "It's easy to follow and so much better than doing paperwork!" - I always hated having to just look at the print outs. The full-explanation videos are awesome!" - "Much better than getting lots of papers from PT with home exercises." - "I love it because it's so much better than following instructions on paper." 15 excerpts reflect this theme in Google Play reviews; 38 excerpts reflect this theme in iTunes reviews.
Confidence Boost	App reviews that reflect that the app increases users confidence in their ability to complete exercises as prescribed. - "It helps me keep track of my daily exercises and as a resource for the proper way to implement them." - "I love being able to follow along to do my pt" - "Good photos to help do exercises correctly" - Voice coach is very helpful. Also the tutorials are very good" - "Enjoy being able to see the correct way to do my exercises" - "The apps great for keeping me motivated and using good form to do my exercises" - "Exercises are concise and easy to follow. Pace of exercises is appropriate with good transition." 76 excerpts reflect this theme in Google Play reviews; 64 excerpts reflect this theme in iTunes reviews.
Specific App Design Preferences	
Customization	App reviews that reflect convenience-factors of mobile HEP, including patient autonomy and customization. Key language used to describe this theme includes, "I wish," "tweak," "modify," or "make changes to" - "I wish it let you set the times for each prescribed exercise."

	- " I love how highly customizable it is (from the PTs' end and how easy it is to stay on track through the program from start to finish." - "Should allow more customization" - "I would only like to be able to edit myself, but great app." 23 excerpts reflect this theme in Google Play reviews; 25 excerpts reflect this theme in iTunes reviews.
Bidirectional Feedback	App reviews that reflect that bidirectional feedback between the user and the clinician increases use of app and confidence / compliance with adherence to exercise program. - "It has made a big difference in my ability to do the exercises properly. And being able to see the notes from my physical therapists helps me focus on the form mentally. I think I'm on track because of this app." - "It needs to have a comments sections" - "the feedback for clinic reminder doesn't allow me to provide feedback; my PT has updated my program but I don't get the updated version" 5 excerpts reflect this theme in Google Play reviews; 4 excerpts reflect this theme in iTunes reviews.

Appendix C. Education Tool for Patients Prescribed MedBridgeGO

Home Exercise Program

Login Instructions

Two Ways To Access

Try MedBridgeGO

Access your home exercise program with our mobile app for iOS and Android.

Search The App Store or Google Play for:

"MedBridgeGO"

Open in your Browser

To access your program without the app, enter your access code below at:

https://www.medbridgego.com/

Your Access Code

A6HMGPMT

By accessing your home exercise program online you can:

View Your Exercise Videos

Interactive HD videos guide you with easy to follow instructions.

Learn About your Condition

Gain a deeper understanding of your condition and the road to a healthy recovery.

Track Your Progress

Keep track of your activity and progress throughout treatment and post care.