PREFERENCES FOR AN EXERCISE INTERVENTION USING TEXT MESSAGES WITH OLDER VETERANS: AN EXPLORATORY STUDY

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ABSTRACT

Julia Murphy Neal: Preferences for an Exercise Intervention Using Text Messages with Older Veterans: An Exploratory Study
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Mobile phone text messaging intervention programs have been shown to be cost-effective and convenient strategies to teach, support, and improve self-management among the general population. Mobile phone interventions are particularly effective in behavior management and in maintaining medication adherence. This study investigated the appropriateness of a text-messaging library for behavioral change in an exercise intervention for veterans. The purpose of the study was to summarize feedback concerning the current text library from participants, to examine messages for appropriateness, and determine the perceived utility of an exercise intervention delivered via text messages. Results from the current study suggest that a text messaging intervention for elderly veterans for exercise and health management is both desired and perceived as useful for behavior change. Modifications to the texting library should include categories specific to mental health management diabetes and messages focused on exercise encouragement. Implications for rehabilitation counseling research and practice are discussed.

Keywords: elderly, physical activity, mobile health, exercise, text messages

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Chapter I: Introduction

In 2012 only 20.3% of the United States' (U.S.) adult population met the Physical Activity Guidelines for both aerobic and muscle-strengthening activities and 46.6% of the total adult population did not met either guideline (Centers for Disease Control and Prevention, 2014). Approximately 25% of the US adult population is completely sedentary, or engages in no physical activity, and spends most leisure time sitting (Singh, 2002). Sedentary lifestyle has been linked to many chronic conditions such as osteoporosis, obesity, depression, type 2 diabetes, heart disease and cancer (Carroll et al., 2014). Overall, 11.6% of the U.S. adult population reported at least one disability, 5.8% of which is related to mobility. In this population, nearly half (47.1%) of adults with disabilities are inactive (Carroll et al., 2014). In the United States, the average number of deaths related to physical inactivity is estimated to be more than 250,000 per year (Schutzer & Graves, 2004). Sedentary lifestyle is a serious problem in individuals with both mental and physical illnesses, causing increased mortality and morbidity rates particularly among the geriatric population (Singh, 2002). Levels of activity progressively decrease with age, and adults aged 65 and greater have the highest rates of inactivity. Although 46.6% of the adult population reported adherence to the Physical Activity Guidelines, only 11.9% of adults aged 65 and up met the required guidelines appropriate for their age (CDC, 2014).

Physical Activity and Exercise Prescription for the Elderly Population

Physical activity can be broadly defined as any body movement that produces contraction of the muscles and causes an increase in energy expenditure regardless of the intensity or duration of the activity (Singh, 2002). Exercise is a planned, coordinated, and

repetitive form of physical activity with or without the intent of improving one's physical fitness, or ability to perform physical work and improve health status (Singh, 2002). The geriatric population can be defined as persons over the age of 65. In 2011, the oldest baby boomers- Americans born between 1946 and 1964- turned 65, raising the total population of persons aged 65 and older over 40 million. This age group represents 15% of the total U.S. population and is predicted to rise to nearly 20% of the entire population by 2030 (Arterburn et al., 2004; Jacobson et al., 2011).

In the geriatric population, the recommendation for physical activity is much different than the younger adult population, due to various aging factors. Exercise prescriptions should include simple acts of daily living, occupational and leisure activities, socialization, and diversity in order to increase participation and adherence (Williams et al., 2002). Exercise recommendations for the aging population include resistance training, cardiovascular endurance, flexibility and balance training (Singh, 2002). Resistance training, or strengthening activities, is essential in the elderly population for preventing conditions such as mobility impairment from falls, osteoporosis, or arthritis. Aerobic exercise at moderate levels of intensity such as walking, stationary cycling, or swimming can prevent many chronic conditions (Singh, 2002). Balance and flexibility exercises increase the range of motion of different muscle groups (Singh, 2002). Inclusion of all four types in training is essential for the prevention and treatment of chronic diseases, may counteract specific side effects of standard medical care and increase longevity in the elderly population. Exercise has been recognized as one of the best ways to achieve optimal health, and has recently been accepted as a preventive method of treatment for many chronic illnesses (Warburton et al., 2006). Exercise can also help target symptoms of chronic disease by determining which musculosketal regions of the body have atrophied, which can many times

contribute to the severity of the disease (Singh, 2002). An example of this is includes an adult with type 2 diabetes and obesity. Due to the amount of adipose tissue (visceral fat), the body is unable to metabolize insulin effectively, which can lead to fluctuations in insulin sensitivity. A reduction of visceral fat due to aerobic and/or muscle-strengthening exercises can improve insulin resistance, making medications more effective (Warburton et al., 2006; Kahn et al., 2006). Physical activities helps control weight, contribute to healthy bones, muscles and joints, reduce the risks for falls particularly in the elderly population, and alleviate symptoms of depression and anxiety (CDC, 2003). Regular physical activity and exercise can also minimize the physiological changes associated with aging. Consistent exercise engagement can contribute to better psychological health and well-being, which are vital to optimal aging. Exercise is a low cost complement to psychotropic medication, increases cardiovascular and metabolic health, improves cognitive function, and has many other positive effects on quality of life and well-being (Duncan et al., 2012). An active lifestyle helps preserve functional ability and independence across all age groups.

Inactivity in the Elderly Population

Inactivity is common in the elderly population and results from factors such as the inability to adhere to an exercise program, lack of resources, and low health literacy (Cohen-Mansfield et al., 2003). Health problems and pain continue to be the most common barriers to exercise in the elderly due to the lack of knowledge and understanding of the relationship between moderate physical activity and good health. In a survey of 146 elders, 94% of participants reported seeing their physician at least once in the last year (Schutzer & Graves, 2004). Although the participants were actively seeking out a health care professional, physicians

were not regularly counseling their patients on the benefits of regular exercise. This disconnect could be a reason for the lack of exercise and low health literacy in this population (Schutzer & Graves, 2004). However, in a study that examined physician advice on physical activity with the elderly population, persons who received exercise advice and recommendations from their physician were more likely to engage in moderate levels of exercise than those that did not receive advice (Balde et al., 2003). A common challenge associated with adherence to an exercise program is the time commitment, regardless of context (Schutzer & Graves, 2004). Many elderly adults see physical activity as a burden because of the time needed to travel to an exercise facility, engage in activity, and return home. This can be particularly challenging for those who rely on public transportation. Another barrier to adherence is the common viewpoint in the elderly that physical activity is a recreational interest rather than a preventive measure in their health management. Many times, the elderly see exercise as an unpleasant activity, causing more harm than good, due to physiological responses that occur such as sweating, labored breath and muscle soreness (Schutzer & Graves, 2004). Many older women even perceived these physiological changes during exercise as "not ladylike" (Schutzer & Graves, 2004).

Inactivity and Health Risks in the Elderly Veteran Population

According to the 2010 U.S. Census, there are currently 9.1 million veterans over the age of 65. In the geriatric population, every 2 out of 3 males are veterans (U.S. Census Bureau, 2012). In this population, there is a much higher prevalence rate for poor health, including obesity, chronic disease, and poor quality of life than in the civilian population. In a 2010 randomized telephone survey, over 450,000 U.S households were called to measure self-reported general health and current health risks and conditions in men (Hoerster et al., 2012). The

homeowners were categorized into four groups: veteran, active duty, national guard/reserve member, or civilian. Veterans were more likely than civilian participants to report poor physical health and limited activities due to compromised physical or mental health status. Veterans were also more likely to report lack of exercise and the presence of a chronic condition, including cardiovascular disease, than civilians. The veterans in the study were also much more likely to report a history of depressive and anxiety disorders (Hoerster et al., 2012).

Elderly individuals are more likely to experience social isolation, loneliness, declining quality of life, poor social function, deficits in cognition, inactivity, increased medical burdens, and possible increased suicide and death rates (Chang & Chueh, 2011; Selim et al., 2004). Diagnosing depression in the elderly population can be particularly difficult because this age group often describes physical symptoms and ignores emotional well-being (Chang & Chueh, 2011). In a study that surveyed nearly 1.5 million elderly veterans randomly selected from the Large Health Survey of Veteran Enrollees, health status was examined in elderly veterans enrolled in a VA hospital versus elderly non-veterans enrolled in Medicare managed care (Selim et al., 2004). Results from the survey concluded that elderly veteran enrollees had significantly greater disease burden than the non-veteran participants. Lower levels of education were seen in the elderly veteran population, which can be associated with lower income, lower standards of living, and lower health status. Higher levels of emotional distress and social functioning were also self-reported in the elderly veteran population (Selim et al., 2004).

Depression and the Benefits of Exercise

Within the next 5-10 years, it is predicted that major depressive disorder, will pose the second-greatest public health burden behind cardiovascular disorders significantly impacting

overall quality of life and well-being (Mead et al., 2010). Depression is a broad term used to describe a category of mental health illnesses predominately defined by a loss of interest or enjoyment in pleasurable activities, low mood, and many other associated emotional, cognitive, behavioral, and physical symptoms (Mead et al., 2010). Currently, depression is treated with medication and psychotherapy, however many people with depression or depressive symptoms are turning to exercise as an alternative treatment (Cohan et al., 2007). In a 3-month comparison study, community-dwelling persons with Alzheimer's disease were randomly assigned to either an at-home exercise plus caregiver training program or to routine medical care group (Teri et al., 2003). Following the trial, the exercise and caregiver group showed a decrease in depressive symptoms and an improvement in overall physical health, whereas the routine medical care group showed a worsening of depressive symptoms (Teri et al., 2003). Depression is linked to changes in many of the brain's neurotransmitters, including dopamine and serotonin (Deslandes et al., 2009). Exercise has been reported to facilitate neurogenesis, or the proliferation of synapses in the brain, which allows for improved cognitive functioning, mood regulation and elevation, increased pain threshold, and produces a more relaxed state of mind (Landers & Arent, 2001). A study performed on rats and mice, directly linked exercise to cognitive performance (Landers & Arent, 2001). After the animals voluntarily ran long distances on a wheel, selective increases biological components associated with learning and memory were seen in the hippocampus as well as increased development of capillaries, synapses, neurogenesis, cell survival pathways, and neural plasticity (Landers & Arent, 2001). Inhibition of beta-amyloid development, a peptide associated with Alzheimer's disease, was also reported at the level of the hippocampus (Landers & Arent, 2001). Exercise has also been shown to enhance positivity as

well as psychological factors that depression may inhibit. Exercise as a treatment for depression has also been shown to be "dose-dependent," where greater frequencies in exercise lead to greater improvements in depressive symptoms (Cotman et. al, 2007, p. 465). Exercise is often seen as a pleasurable activity, and performance of pleasing activities has been known to decrease feelings of low mood. Exercise groups and sports teams provide individuals with social interaction and offer opportunities for emotional support and encouragement. Exercise is a complementary form of treatment not associated with social stigma, a significant barrier to conventional treatment in persons with mental illness. Exercise is easily accessible and relatively cost-effective (Sarris, Kavanagh, & Newtown, 2008).

Mobile Phone Technologies

Mobile Health, or "mHealth," is the use of mobile communications technology including "cellular phones, smart phones, personal digital assistant, and tablets, to improve health outcomes, health care services, and health research" (Shore et al., 2014, p. 865). Mobile phone technologies have recently become a popular method to instigate behavioral change, particular in the healthcare field (Shore et al., 2014). Approximately 83% of the adult population in the United States owns a mobile phone, and the number of activated phones currently outnumbers the actual size of the adult population (Fanning, Mullen, & McAuley, 2012). Mobile devices provide unique characteristics to enhance communication, improve compliance, supplement available health care information, and encourage client engagement and activity. One characteristic of particular importance is that mobile devices are generally within a user's reach virtually any time (Shore et al., 2014). This allows for continuous information delivery and shortens response time. Another distinctive characteristic of mobile devices, unlike laptops or

desktop computers, is that they are easily transportable and usually always powered on and functioning, allowing for faster communication and collection of data (Shore et al., 2014). Downloadable specialized apps and technologies can continuously collect health data such as heart rate, breathing patterns, or skin conductance measurements. Global Positioning Systems (GPS) allows information regarding location and movement to be recorded both actively and passively (i.e., while sleeping or sitting) (Shore et al., 2014). Currently, the most common form of mHealth technology used for exercise are the phone applications. Individuals with a smartphone can download low-cost or free mobile phone apps, which include products and services designed to enhance behavior change. These mobile phone apps aim at promoting regular physical activity by allowing users to self-monitor and track their progress across time, receive personalized target feedback through data collection (i.e. heart rate and walking steps), provide social support networks through virtual communities (Hongu et al., 2014). The most common exercise apps continue to be training program apps, pedometer (step counting) apps, data-monitoring and feedback message apps, and game apps that facilitate physical activity by playing games on the smartphone. Data-monitoring and feedback message apps provide the user with social interactions via email, blogs and text messages among users. These apps monitor the duration of the activity, distance and speed using GPS tracking, and estimates caloric expenditure (Hongu et al., 2014).

Text messages, a form a digital communication, have become a common way to engage in brief conversations and can be delivered instantaneously and more frequently than face-to-face interactions. Text messaging interventions enable two-way communication and can be individually modified to individual needs. A recent meta-analysis on the outcomes of mobile

device interventions and physical activity was performed to provide a foundation for the development of effective and efficient intervention techniques for health behaviors (Fanning, Mullen, & McAuley, 2012). The analysis found that when text messaging was included in larger intervention studies, they provided more effective strategies for relaying information and gave the researchers real time interaction with the individual (Fanning et al., 2012; Nundy et al., 2014). A study on the effectiveness of exercise text messages and the implementation of the desired behavior, showed that text messages alone increased the time spent exercising (Prestwich, Perugini, & Hurling, 2014). The text messages served as reminders to participants and enhanced the relevancy of their exercise goals. Participants were more likely to commit, maintain, and achieve their exercise-related goals when they were reminded and motivated *via* text messages (Prestwich et al., 2014). Mobile phone interventions can also reduce or eliminate barriers to exercise such as transportation, financial costs, lack of time, bad weather, and childcare thus increasing adherence to a health management plan.

Behaviorists have started to use mobile phone technologies for multiple health conditions, including diabetes management and smoking cessation, in order to promote positive change and self-management (Fanning et al., 2012). Mobile phone interventions have been an effective tool in providing appointment reminders for patients, improving patient compliance to medication, monitoring chronic conditions, and improving healthcare service utilization among populations that do not normally seek medical care (i.e., teenagers and young adult males) (Agyapong et al., 2013). Various prompts, such as telephone-supervised exercise interventions, have been analyzed to enhance regulation of self-care and adherence to an exercise program in aging adults. Home-based telephone supervision was as effective as face-to-face exercise

programs and serves as a source of social support, which can enhance participant motivation and compliance (Schutzer & Graves, 2004). In a six-month text messaging intervention with elderly persons with diabetes significant changes in behavior were seen (Nundy et al., 2014). Measures of healthy eating and glucose monitoring improved at both mid-intervention (3 months) and post-intervention (6 months). Self-efficacy scores increased after three months and continued to increase for the remainder of the study. Most importantly, improvements in daily self-care, including foot care, blood-glucose monitoring, exercise, and adherence to medication routines were seen after six months. Individuals reported becoming more aware of the seriousness and consequences of type 2 diabetes, which was attributed to the frequency, content, and quality of texts messages they received throughout the study. Participants reported developing a more positive attitude about diabetes and therefore a more positive outlook on the importance of general health (Nundy et al., 2014).

The "GetFitVET" Program

"GetFitVET" is an 8-week text messaging exercise intervention program for geriatric-aged veterans developed by the Traumatic Stress and Health Laboratory and Geriatric Research in collaboration with the Clinical Center, both housed in the Veterans Affairs Medical Center in Durham, NC (Beckham & Morey, 2015). In GetFitVET each participant receives a smart phone free of charge for the duration of the intervention. The text message library includes over 300 messages related to exercise, how to perform specific exercises associated with endurance, strength, balance and flexibility, and health information in regards to symptom management and self-care. Current categories of messages include: cardiovascular, strength, balance, flexibility/coordination, social engagement, mood improvement, alternative exercise options for

various barriers (i.e. lack of time, bad weather, and pain or discomfort), goal setting, and exercise progression. These messages were developed in compliance with the National Institute on Aging, National Institutes of Health (NIH) guidelines to fitness for the geriatric population (NIH, 2009). Essential text messages include self-management reminders, opportunities for social support, and interventions/techniques for increasing motivation and desire to change. The purpose of the intervention is to increase health literacy, minimize barriers to exercise, and educate participants on the importance of adherence to an exercise routine. The implementation of mobile health interventions through specific text messaging schedules could potentially increase self-management skills in the geriatric population. The project is in its evaluative stage to determine whether the proposed intervention would be effective with older veterans. The current qualitative study is being conducted in the Traumatic Stress and Health Laboratory in the Veteran's Affairs Medical Center, Durham, NC.

The first step in the intervention development has been completed. This step includes the development of the text message library and key words that the participant can text in order to receive topic specific messages. Text messages were developed to be no longer than 140 characters, including spaces, and written to be read and understood at the 5^{th} grade reading level. The next step is to screen messages for efficiency. In this stage, veterans will review the messages and categories in order to further refine the text library and keywords. The evaluative assessment on user preferences for the developed texting library will provide essential information needed to move forward with the future exercise intervention. The current study aims at completing this second step of the GetFitVet project.

The purpose of the current project was to evaluate user preferences for the proposed intervention which information will be used to finalize the content of the text-messages library. The aims were to determine which text messages are relevant, age-appropriate, and informative enough to meet the needs of an older veteran population. Data was analyzed from each participant to determine the attitudes towards the text messages and categories of messages, and willingness to engage in a mobile/text-message based exercise intervention. Participants' responses are a critical component in the development of the intended treatment. It was also necessary to receive information regarding the presence of chronic disease and depression in the targeted population in order to improve the content of the messages and their format of delivery. One component of the intervention will emphasize chronic disease management through implementation of an exercise routine, and therefore understanding the various conditions present in this population are necessary. It was hypothesized that the mobile text-message based intervention would be positively received and perceived as an effective tool to help older veterans initiate and commit to an exercise program.

Chapter II: Methods

Data collection was performed by members of the Traumatic Stress and Health Laboratory at the Veteran's Affairs Medical Center in Durham, NC. Upon completion of each interview, the author of this paper received access to the database to examine the hypotheses outlined above. Because this was a quality improvement project, no research consent form was completed. University of North Carolina at Chapel Hill Office of Human Research Ethics approved this study and determined that Institutional Review Board approval was not needed, as it did not constitute as human subjects research. (See Appendix E)

Participants

Geriatric-age veterans from the Veterans Affairs Medical Center in Durham, NC were enrolled in the study. Fifteen participants were interviewed. For comparison purposes, both male and female elderly veterans (N=10) as well as 5 younger veterans (age range 35-64) were interviewed to evaluate age and gender effects. Four standardized questionnaires were administered and responses to a subset of questions were extracted for the current analysis. In order to gain sufficient insight into the appropriateness of the text library, an interviewer in the Traumatic Stress and Health Laboratory completed interviews with each veteran. Upon completion of data collection, each participant was paid $100.

Instruments

Each participant completed four questionnaires. There was no time limit, and for each participant it took less than 60 minutes to complete the interview.

Exercise Interview Questionnaire: This instrument consists of 38 items that ask about current cell phone usage, current exercise routine, and preferences regarding a set of text messages from the developed library (see Appendix A). The questionnaire provides researchers with descriptive feedback from participants about specific example text messages selected from the library. The questionnaire starts with questions regarding their current use of cell phones and technology. Sample questions include: "Do you own a cell phone?" "Is your cell phone a smart phone?" "How often do you text?" The next set of questions focus on current exercise routines and beliefs about physical activity and exercise. Sample questions include: "Do you currently engage in physical activity? If yes, what kinds of activities do you engage in?" The remaining questions relate to a specific text message from the library to determine interest in learning more about the proposed intervention, determine appropriateness of a specific text, and initial thoughts about the program. Responses to 38 items were extracted for analysis for the current qualitative study.

Interests in Text Messaging (Exercise Vet Questionnaire): This 11-item instrument determines interests for specific text message categories (See Appendix B). The categories developed in the text library include specific exercise categories (i.e. cardiovascular, muscular, flexibility and balance), information on how to overcome different barriers to exercise (i.e. time, weather, transportation), opportunities for social engagement, goal setting and motivational texts, and health information texts. The purpose of this questionnaire is to determine what types of messages are most desired, as well as gain information regarding the perceived interests in messages that are currently developed.

Patient Health Questionnaire-9 (PHQ-9): this instrument measures the level of depression and number of depressive symptoms (Kroenke, Spitzer, & Williams, 1999). The 9-item survey

was chosen to screen for depressive symptoms and determine the severity of depression (See Appendix C). The PHQ-9 asks the participant to answer questions that are descriptive of how often they have been bothered by specific problems over the last two weeks. Responses are coded on a 4-point Likert scale such that higher scores represent more severe depressive symptoms. An answer of "0" means no depression symptoms, "1" indicates that the person has reported experiencing the depressive symptom(s) for several days. A "2" suggests experiencing the depressive symptom(s) for more than half the time during the last two weeks, and an answer of "3" indicates experiencing the depressive symptoms (s) nearly everyday all day for the past two weeks. This questionnaire was used to evaluate whether volunteers endorse depressive symptoms. This instrument is used for screening, diagnosing, monitoring, and measuring the severity of depression. The survey asks nine questions based on the DSM-IV diagnostic criteria. Scoring is based on the frequency of symptoms and screens for the presence and duration of suicidal ideation. A score of 1-4 indicates minimal depression, a score of 5-9 indicates mild depression, moderate scores are between 10-14, and moderately severe scores are between 15 and 19. Scores from 20 to 27 represent severe and persistent major depression (Kroenke, Spitzer, & William, 2001).

Medical Questionnaire (see Appendix D): is a 71-item questionnaire that determines the number of diagnosed chronic medical conditions, symptomatic health problems, and length of time since diagnosis or onset of symptoms.

Procedure

Veterans were referred to the study by GeroFit staff. GeroFit is a Geriatric Fitness program directed through the Geriatric Research and Clinical Center (GRECC) at the Veterans

Affairs Medical Center in Durham, North Carolina. The Trauma and Stress Department and the GRECC partnered together to develop the GeroFit study. Participants from previous Traumatic Stress and Health Research studies were also contacted. Orientation was provided and upon survey completion, participants received $100 for their time. The surveys were given in the following order: Exercise Interview Questionnaire, Interests in Text Messaging Survey, PHQ-9 Depressive Symptoms Questionnaire, and the Medical Questionnaire. The participants were given a printed version of the excel spreadsheet of text messages developed and asked to write down any comments or suggestions they had.

Data Analysis

Data was summarized to determine attitudes towards the text messages contained in the library, and perceived willingness to engage in the proposed exercise intervention. This descriptive evaluation of participant responses is a critical component in the development of the intervention. Qualitative data from the Exercise Interview Questionnaire was used to evaluate cell phone usage, exercise practices, and interest in the potential intervention. Additional quantitative data was analyzed from the Exercise Vet Questionnaire, PHQ-9 depressive symptoms questionnaire and the Medical Questionnaire to answer the questions raised in this research. Using the Glaser and Strauss' Grounded theory themes and subthemes emerging from the data were summarized (Glaser & Strauss, 1998). Textual responses provided by participants were read and placed in categories based on their interrelationships (Borgatti, 2005).

Trustworthiness of the Data

Trustworthiness, or credibility, of qualitative data refers to the standards that should be met in order to ensure quality analysis of the data (Morrow, 2005). In order to monitor for

researcher bias and check for reliability of the codes and categories, a second trained researcher crosschecked the categories and codes developed by the author. High levels of consistency were reached and discrepancies were discussed in order to refine the categories.

Chapter III: Results

A total of 15 individuals participated. Participants' age ranged between 31 to 85 years, with nine participants in the Geriatric age group (older than 65) and six participants under the age of 65 (age range 31-60). Only one participant was female and she was older than 65. 40% of participants (N=6) were African American/Black and 60% (N=9) were white. Participants were asked their current work status ("unemployed, not looking for work," "unemployed, looking for work," "working part-time," "working full-time," or "retired"). 87% of participants (N=13) reported being retired and 13% (N=2) of participants qualified themselves as working part-time.

Prevalence of Chronic Diseases

Each participant had at least one chronic medical condition (M=3.1, SD=3.2). The average number of chronic conditions for participants under the age of 65 was significantly lower (M=2.3) than the average number for participants in the geriatric age group (M=3.6). The most prevalent conditions included: hypertension (N=10), chronic heart conditions (N=7) and diabetes (N=6). Other conditions included cancer, head injury, allergies, and hearing loss (See Table 1).

Prevalence of Depression

Slightly more than half, or 53% of participants (N=8) had mild to moderately severe depression. 33% (N=5) reported minimal depressive symptoms, with a score less than four. The average depression score in participants under the age of 65 (M=8.8) was nearly twice as high as the depressive score for participants in the geriatric age group (M=4.9). The most common symptoms of depression (N=10) included difficulties falling or staying asleep, and memory and

concentration problems. Looking at comparison age groups (N=5), the most common symptoms of depression in participants under the age of 65 included little interest or pleasure in doing things, feeling down, depressed, or hopeless, and trouble falling asleep or sleeping too much. In the geriatric population (>65 years), the most common symptoms of depression reported included: trouble concentrating (N=6) and trouble falling asleep or sleeping too much (N=5). Associations between the number of chronic conditions and severity of depression were not significant ($r = -0.18$, $p > 0.58$).

Current Cell Phone Use

All, except one participant (N=14) reported having a cell phone, and 11 had a smart phone. Seven participants used their phone less than five times per day for both talking and texting. About 28% of participants talked on their phone between 5-10 times per day, and only 14% of participants used their phone to send between 5-10 text messages on a daily basis. Fifty Five percent of participants over the age of 65 (N=5) endorsed never sending or receiving text messages on a daily basis. Comparatively, 50% of participants under the age of 65 (N=3) used their phone their phone less than five times per day for text messaging. Regarding talking on the phone, 33% participants over the age of 65 (N=3) spoke on the phone less than ten times compared to 66% of participants (N=4) under the age of 65. Responses that were categorized as "other" included descriptive phrases such as "not often," "very seldom," or "2 hours per day", and we were not able to count the frequency with which they used their phone. (See Table 2).

Current Exercise Practices

Participants (N=15) reported an average (M=3.5) days per week when they performed physical activity or exercise. Participants were asked to describe the types of exercise they currently perform. The most common exercises reported included walking, strength-based

exercises, and activities around the house such as yard work and body weight exercises. Types of exercises reported were categorized into the four broad categories recommended for the aging population: cardiovascular endurance, resistance training, balance and flexibility. All participants (N=15) reported currently engaging in cardiovascular exercises. These exercises included walking, biking, using cardiovascular equipment at the gym such as the elliptical and treadmill, running and swimming. Almost all, 86% of participants (N=13) reported performing resistance-training exercises. These exercises included using weights, body weight exercises such as push-ups and abdominal exercises, and arm strengthening machines and exercises. Twenty percent of participants (N=3) reported engaging in flexibility training, specifically stretching. One participant reported engaging in balance exercises.

Participants were asked to describe what they liked and disliked about exercising. The most commonly reported reason for engaging in exercise was maintenance of a healthy lifestyle. Participants reported time commitment and physical limitations or exertion as the most common dislikes about exercising. Each participant reported various reasons for performing exercise and also identified most common barriers and dislikes about exercising. Each response was organized thematically (See Table 3).

Perceived Interest in the Intervention

All participants (N=15) said that the text messaging exercise intervention would be beneficial and useful to their age group. Almost half, 46% of participants (N=7) felt the test-message intervention would be extremely useful for the management and continued implementation of exercise. The remaining participants endorsed moderate usefulness for the program. One participant reported that "[the perceived intervention] would help for some, for

others it would help 50/50." In participants under the age of 65, 66% (N=4) perceived the intervention as highly useful for the management of an exercise routine in comparison to 55% (N=5) of participants over the age of 65.

Regarding mood management, 66% of participants (N=10) endorsed high-perceived usefulness in the intervention. In participants under the age of 65, 100% (N=6) reported high-perceived usefulness in the intervention for mood management in comparison to 55% (N=5) from the elderly age group. One participant over the age of 65 reported that the exercise intervention would be "very supportive, some days I don't want to go, messages would get you in the mood to go." However, another participant over the age of 65 reported minimal perceived usefulness of the text messages for mood regulation, reporting, "some people have problems that are beyond help."

Regarding chronic disease management as a component of the texting intervention, 40% of participants (N=6) considered it would be useful and 60% of participants (N=8) reported moderate-perceived usefulness, such as "could help control diabetes" and "certain limitations, depends on the person." In the elderly age group, 55% of participants (N=5) endorsed high-perceived usefulness of the texting intervention for chronic disease management. Similarly, 50% of participants under the age of 65 (n=3) agreed that the intervention could provide effective chronic disease management strategies. One individual reported low perceived usefulness of the program for chronic disease management, stating "good support, but will they listen?"

Over half (53%) of participants perceived the overall intended intervention as highly useful. One participant reported the intervention would be "very useful, anything along these lines removes stresses of inputting these things themselves; activity [is] realistic." When looking

at age group comparisons regarding perceived interest in the overall intervention, 83% of participants under the age of 65 (N=5) endorsed high overall interest in the texting intervention in comparison to 33% of individuals 65 and older (N=3). One participant, age 55, reported the intervention as "useful, easy way to get info on a regular basis, provides help, motivates people to exercise more."

Preference for Categories of Text Messages

When prompted to report what types of categories of health-focused messages would be beneficial for them, three most commonly mentioned were diabetes, mental health, and cardiovascular health. Many participants (N=12) were primarily interested in texts related to diabetes and mental health management, but provided suggestions to add categories of texts related to diet and nutrition. Regarding the mental health category, participant suggestions encompassed messages related to "depression," "mood" and "anxiety." Suggestions for text messages related to cardiovascular health included "hypertension," "heart disease," and "heart health." The "other" category included suggestions for messages related to "sleep" and "stroke recovery." In participants over the age of 65, the most commonly endorsed health category desired was messages related to diabetes (N=4) in comparison to mental health/depression in participants under the age of 65 (N=4).

Based on the current categories of messages created in the text library, participants were asked to report how important each of these categories were to them on a scale of 1 to 10, "10" having exceptionally high interest texts related to that category and "0" meaning little to no interest in receiving those particular types of messages. The group most commonly endorsed messages regarding their health (M=8.9), messages that provided some type of encouragement

(M=8.5), and messages detailing the benefits of exercise (M=8.5). Less importance was assigned to messages pertaining to goal setting in an exercise program (M=7.4) and accommodations for barriers to exercise (M=7.1).

Suggestions for Intervention Improvement

Improvements for types/content of messages

Information regarding specific text messages was reviewed to determine changes that should be made to the developed library. Participants provided qualitative feedback to example text messages presented to them after the four major instruments were completed. After examination of example categories of messages in the Exercise Vet Questionnaire, participants reported their level of interest, preferred types or categories of messages, and suggestions to improve the study. The most common category of messages desired by participants were messages regarding health and disease management (M=8.9). When asked what types of specific messages the participant's would like to receive on a regular basis, motivation and progress related messages were the most common suggested (N=5). Another handful of participants (N=4) reported a desire to receive messages that would hold them accountable for exercising, reminding the participants to exercise, and to follow-up with participants if they did not do the recommended exercise (or message) of the day. One participant stated that the use of emoticons, or emojis, would help personalize the texts better (See Figure 1). Examples of these suggestions included increasing the number of "Get up and Go!" messages and texts directly asking the participant if they completed the scheduled exercise activity for the day.

General recommendations specific to the exercise program

As to suggestions for general improvement to the exercise program, many of the participants (N=6) desired an intervention with a pre-established set of messages sent each day. Participants (N=11) reported an average (M=3.0) minimum number of texts per day and an average (M=5.0) maximum number of text messages received per day. Four participants chose not to respond to these questions on the Text Message Interview (See Figure 2). Participants also provided recommendations regarding intervention format. Half of the sample, (N=7) stated that they would rather meet in person once per week and 46% (N=7) reported that would prefer to meet by phone with a clinical coordinator of the study; one participant did not answer this question. To assess participant's willingness to partake in the evaluation of the GetFitVet Exercise intervention, some indicated that payment would be helpful but not an essential component to motivate them to enroll in the intended intervention.

Chapter IV: Discussion

In the current study we examined whether a mobile phone intervention could be an effective method of behavioral change in the elderly veteran population. It was hypothesized that participants would perceive the intended intervention as beneficial. It was necessary to gain insight regarding appropriateness of the language, categories of messages developed and suggestions for improvement by individuals from the specific population.

Are mobile phone technologies effective with aging veterans?

Results from this exploratory investigation suggest that mobile health interventions could be beneficial with older veterans. It was hypothesized, that both elderly and non-elderly veterans will find text messaging to be a potentially effective method of behavioral change to reduce barriers to treatment for chronic disease and symptoms of depression. Results indicated that this age group would be highly interested in participating in a mobile texting exercise intervention. The majority of the participants used their phone less than 5 times per day. Although participants reported a low frequency of daily phone use, the average number of desired text messages received per day was 3-5. This desire can be interpreted as a willingness to use their phone more if need be. These self-reported frequency scores on cell phone use are consistent with the equivalent desire to either meet by phone or in person once per week. In a study on the barriers to technology use in the aging population, authors reported that only 35% of individuals aged 65 and up used a computer in 2007 (Charness & Boot, 2009). The authors concluded that barriers to implementing programs via technology with the elderly population are multifaceted, and can be associated with perceptual, cognitive, and motor concerns (Charness & Boot, 2009). In regards

to perceptual concerns, age-related changes in vision such as visual acuity, color perception and susceptibility to glare should be accounted for when designing technology for older adults. Older adults have greater difficulties with auditory perception, including difficulties with background noise and perceiving high-pitched sounds. Cognitive concerns become more prevalent with the aging population, including slower cognitive processes, decreased memory capacity, and decreased attentional control. Increased difficulties with fine motor control and coordination pose concern with using technology as an elderly person. With these considerations in mind, it may be necessary to implement a face-to-face session at the start of the intervention that would assist participants in learning how to use the smart phone or design text messages and technologies that accommodate for as many as possible of these functional limitations. Making phones and received texts user friendly for the elderly can help optimize success with a mobile-technology based exercise program. Many older adults may feel intimidated by technology; therefore a technology assistance session prior to the start of the intervention would encourage an orientation and understanding of the various features on a smart phone. This would in turn promote empowerment through understanding how to use the phone, encouragement meaningful participation, and minimize the various barriers directly related to cell phone use (i.e. not knowing how to find text messages on the smart phone) that could cause a decrease in active participation throughout the intervention. A face-to-face session would further assist in the navigation of the various accommodations a smartphone provides including using larger fonts and buttons, minimizing scrolling and providing navigation aids and instructional support (Charness & Boot, 2009).

A recent exercise text-messaging intervention conducted with elderly Malaysians aged 55 to 70 who were not currently exercising, enrolled participants in a 12-week study designed to

implement a regular exercise routine. Participants were randomized into two groups: one that received SMS text messaging and one that did not receive SMS text messages. All participants were provided a home-based exercise booklet that included information regarding the benefits of exercise, safety instructions, and descriptions of age-appropriate strengthening exercises that could be executed without specific equipment or environments. The SMS texting group received daily texts that were tailored to participant preference. Results indicated that individuals in the SMS text message group exercised significantly more days per week during the intervention that the non-SMS group. One particular component of this intervention is the use of a printed booklet with descriptions of exercises and psychoeducation regarding exercise benefits for health and well-being. This addition to the proposed intervention could help reduce technology concerns with this age group (Muller, Khoo & Morris, 2016).

Prevalence of Co-morbidities

It was hypothesized that the number of chronic conditions would correlate with the severity of depressive symptoms. Although this was observed for some participants, it cannot be inferred through the study that a greater number of chronic conditions causes an increase in depressive symptoms. However, all but one participant indicated experiencing difficulties related to a symptom of depression within the last week and every participant had at least one diagnosed chronic condition. In a research study on the relationship between chronic disease, current depressive symptoms and health risk behaviors, researchers found that major depressive disorders was associated with increased risk for cardiovascular disease and individuals with depression have an increased likelihood of developing type 2 diabetes (Strine et al., 2008). A meta-analysis on the prevalence of diabetes and depression found that 26% of individuals with

diabetes had depressive symptoms (Anderson et al., 2001). Results also indicated that participants would like to have categories of messages directly related to diabetes and mental health. Based on these suggestions, along with the research on the link between both chronic disease and depression, it would be important to develop a program that incorporated disease management and depressive symptom reduction through regulated exercise.

Regarding prevalence of depression, an expected differentiation based on the literature was found with the self-reported number of depressive symptoms. Participants over the age of 65 reported less number of depressive symptoms (M=4.9) as well as severity of current symptoms that participants under the age of 65 (M=8.8). Participants over the age of 65 were more inclined to endorse depressive items that were consistent with somatic distress (i.e., trouble sleeping or memory and concentration difficulties) rather than mood distress (i.e., anhedonia and low mood). These findings are consistent with research that shows that the elderly struggles with acknowledging affective symptoms and more likely to endorse cognitive changes and somatic symptoms that younger adults (Fisk, Wetherell, & Gatz, 2009). Though there were no significant correlations between the number of chronic conditions and the severity of depression, likely due to the low number of participants in the study, it is important to be aware of the comorbidity of depression and chronic disease. Depression is particularly more prevalent in individuals with cardiovascular disease and diabetes, the two most prevalent conditions reported by participants in the evaluation (Fiske et al., 2009). Approximately 20-25% of individuals with heart disease meet criteria for major depression, and nearly 20-25% report symptoms of depression that do not meet full criteria. The prevalence of depression in individuals with type 2 diabetes ranges from 15 to 20% (Fiske et al., 2009). This current exploratory evaluation presented the researchers

with an understanding regarding the relationships between depression and chronic disease in the aging veteran population. It further provided insight in the nature of the etiology and prognosis of depression in the elderly population.

Content and Format of the Future Intervention: GetFitVET

Based on participant data, the most strongly desired/preferred categories of messages included texts on diabetes and mental health management as well as messages directly related to exercise encouragement, motivation, and accountability. Participants were also particularly interested in receiving daily feedback regarding the progress of their exercise. Participants were interested in receiving at least three text messages per day, with a maximum of five messages each day during the intended intervention. Muller et al. (2016), designed an intervention to send 60 messages during 12 weeks. Each participant received one message on the weekdays that included a behavior change techniques and rewards/praise for efforts towards exercise behavior (Muller et al., 2016). Based on these findings as well as the feedback from participants, a low number of messages per day would deem most effective with the aging population.

Many participants reported having a desire to meet in person on a regular basis throughout the intervention. This feedback is of particular importance as the researchers had originally hypothesized only having a baseline participant evaluation prior to the start of the 8-week intervention. With this feedback in mind, it will be important to restructure the format of the intended intervention to provide the participants with opportunities for direct communication throughout the duration of the intervention. Such communication could include weekly check-in phone calls by the clinical coordinator.

A systematic review on maintenance of behavior change found that face-to-face interactions led to ongoing behavior change (Muller et al., 2016). Though this could be relevant to the elderly population who likely struggles with technology and prefers personal contact, however it can also lead to increased cost thus limiting access for a broader group. One significant component of SMS text messaging is to provide individuals with increased communication while decreasing barriers to care. Therefore, including a baseline visit to introduce participants to the study and provide technology assistance would be beneficial.

One notable suggestion was the use of visual cues, or graphs and emoticons, also known as emojis. One participant suggested that using emojis (graphic smiley faces) could be helpful in making the intervention more personable. Including these visual cues could enhance motivation and promote encouragement as participants progress throughout the intervention.

Implications for Rehabilitation Counseling Practice

Rehabilitation counselors should be able to understand the unique population of veterans, particularly the aging veteran. With 40% of the current veteran population over the age of 65, it is necessary to understand the long-term impact military service has on both mental and physical well-being(Chatterjee et al., 2009). Many of these individuals experience debilitating chronic disease and compromised physical health. It is essential to have knowledge on the impact of chronic disease on mental, physical, and emotional well-being. One unique factor of the aging population is that many of these individuals are retired or unemployed with no desire to return to work. As rehabilitation counselors, it is important that we work with these individuals to find meaning and value in their lives in retirement as well. Exercise can be incorporated into one's life as a pleasant activity, can increase physical functioning, reduce the rate of chronic disease

progression, decrease risk for falls, and increase social inclusion. It is important for rehabilitation counselors to be aware of the benefits of exercise for mental health and chronic disease to better provide holistic treatment options for consumers. Many individuals with mental health disorders exhibit high comorbidity of chronic disease ranging from cardiovascular and neurological diseases, to autoimmune diseases such as diabetes and rheumatoid arthritis. Many of these conditions are linked to unhealthy lifestyle such as obesity and smoking and therefore lifestyle interventions, such as exercise interventions, can be promising approaches to reducing comorbidities (Zschuke, Gaudlitz, & Strohle, 2013).

It is also important for rehabilitation counselors to understand the various treatment options with mobile phone technologies and text messaging. Evaluation of these communication platforms has shown promising results with clinical monitoring and counseling, managing medical appointments and medication, smoking cessation, weight loss, and chronic disease management (Boulos, Brewer, Karimkhani, Buller, & Dellavalle, 2014.) Text messaging and mobile apps can also provide clients with universal access to medical information, particularly individuals in low resource settings (Boulos et al., 2014). Furthermore, as mobile technologies become more prevalent treatment options, rehabilitation counselors should understand how to assist the elderly population in learning how to use smartphones and smart technology.

Limitations

One primary limitation of this study was the small number of female participants. Although expected with this population, it makes it nearly impossible to describe differences across genders. Furthermore, the small sample size provides rich qualitative data, however makes it difficult to make generalized conclusions regarding this population.

All participants were currently exercising, so results come from a sample that may benefit in terms of maintenance. A non-active sample would be important to also evaluate, to better understand preferences, barriers and facilitators of an exercise program in their care, and also on their thoughts about a program delivered via a smart phone. Ideally, the intervention would increase participation in an exercise routine on a regular basis while focusing on the benefits of exercise for chronic disease and depression management. It could prove difficult to notice changes from baseline data if a person that regularly exercises and continues to maintain that behavior throughout the intervention.

Another limitation to this study is that the evaluation of motivation was based on self-report. Results were concluded based on each participant's interest and desire to participate in the intervention, not on actual behavior change. The desire to participate cannot fully predict adherence to the program once it begins. One way to screen for this behavior could be to specifically include individuals that incorporate exercise and physical activity into their lives however may not make it a primary activity on a regular basis. Researchers could then compare these individuals to participants that do incorporate exercise or physical activity into their daily lives to participants that do not currently exercise or perform physical activity but have interest in implementing the behavior into their lives.

Chapter V: Conclusions

The overarching purpose of GetFitVet is to increase health literacy, minimize barriers to exercise, help individuals engage with and maintain an exercise program through text messages, and educate participants on the importance of adherence to an exercise routine. The current study examined user preferences for text message-directed exercise intervention, and examined users' feedback to specific messages and recommendations for improvement in the approach. This information will be used to improve Get fit Vet. An overwhelming majority of participants agreed that the intervention seemed usefulness, effective, and necessary for this population. The geriatric-aged veteran accounts for over 12.4 million of the U.S. population and many of these individuals experience worsening symptoms of chronic disease and depression. Implementing a mobile phone intervention to increase exercise would allow participants the opportunity to gain the necessary treatment and support needed to promote an active lifestyle/physical activity.

Based on the feedback from the participants, the text-messaging library should be updated to include more messages regarding chronic health conditions and mental health, accountability, and motivation. These messages should include general health education coupled with messages of encouragement to engage in continued exercise. It will be important to educate each participant on how to use a smart phone prior to the start of future research. Although participants of the present study did not provide the feedback, review of the literature has shown that similar study designs have given participants printed booklets of exercise information and tips. This will be an important component of the study to consider when implementing the future GetFitVET intervention. A specific module of this participant booklet could include various

instructions on how to use the smartphone in order to reduce barriers to success throughout the intervention.

Table 1: Self-reported Number of Chronic Conditions by Participant

Participant ID Number	*Diabetes*	*Epilepsy*	*Head Injury*	*Ulcer*	*Liver Problems*	*Heart Problems*	*Kidney Disorder*	*Hypertension*	*Hearing Loss*	*Cancer*	*Allergies*	*Respiratory disease*
1	✓		✓					✓				
2								✓			✓	
3			✓					✓	✓			
4	✓											
5	✓					✓		✓				
6	✓							✓		✓		
7			✓			✓		✓				✓
8									✓		✓	
9			✓							✓		
10						✓		✓		✓		
11	✓					✓	✓	✓	✓		✓	
12								✓	✓			
13						✓		✓			✓	
14			✓			✓			✓	✓		
15	✓					✓			✓	✓		✓

Table 2: Current Cell Phone Use By Age Group

	< 65 years (N=6)	65 years or older (N=9)
Percentage of self-reported text messaging use daily (N=15)		
Never	0%	55%
Less than 5 times per day	50%	11%
5-10 times per day	16%	22%
More than 10 times per day	0%	11%
Other	33%	0%
Percentage of self-reported phone call use daily (N=15)		
Never	0%	11%
Less than 5 times per day	50%	11%
5-10 times per day	16%	11%
More than 10 times per day	0%	11%
Other	33%	55%

Note: Other refers to answers that were not specific enough to categorize (e.g. “everyday,” “a lot” or “not often”)
Note: One participant did not own a cell phone

Table 3: Self-Reported Likes and Dislikes Regarding Exercise

Themes of Exercise Enjoyment (N=33)	
Healthy Lifestyle (N=14)	42%
Mood Management/Stress Relief (N=9)	27%
Socialization (N=4)	12%
Self-perception and Physical Appearance (N=3)	9%
Positive Motivation (N=3)	9%
Dislike Themes of Exercise (N=16)	
Physical Exertion/Limitation (N=)	25%
Time Commitment (N=3)	18%
4Pain/Soreness (N=3	18%
Fatigue (N=1))	6%
None reported (N=5)	31%

Note: N= the number of responses given, as some participants provided more than one response for each question

Figure 1: Participant Responses to Preferred Types of Text Messages: Themes and Sample Comments

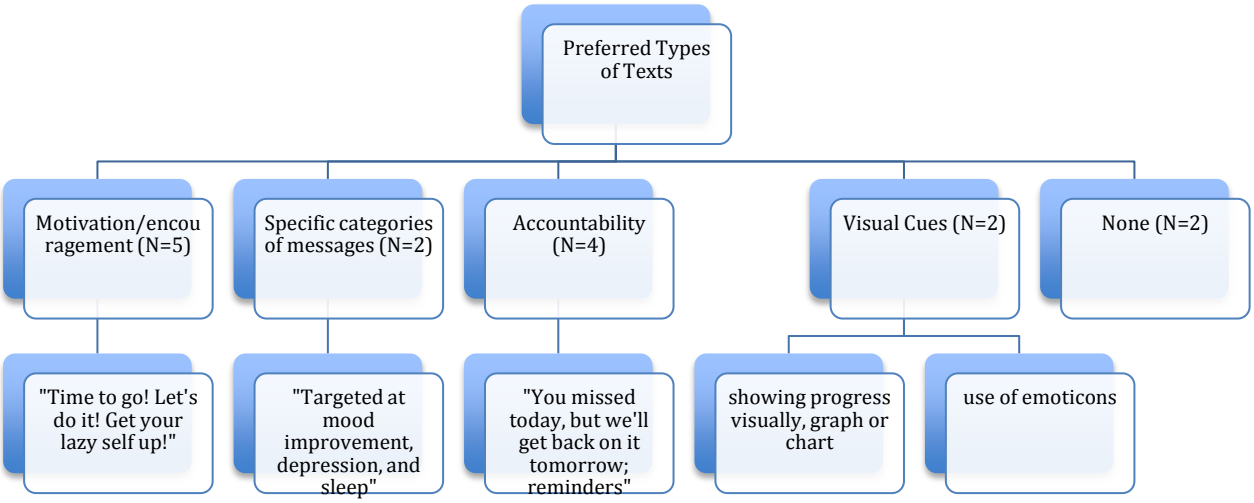
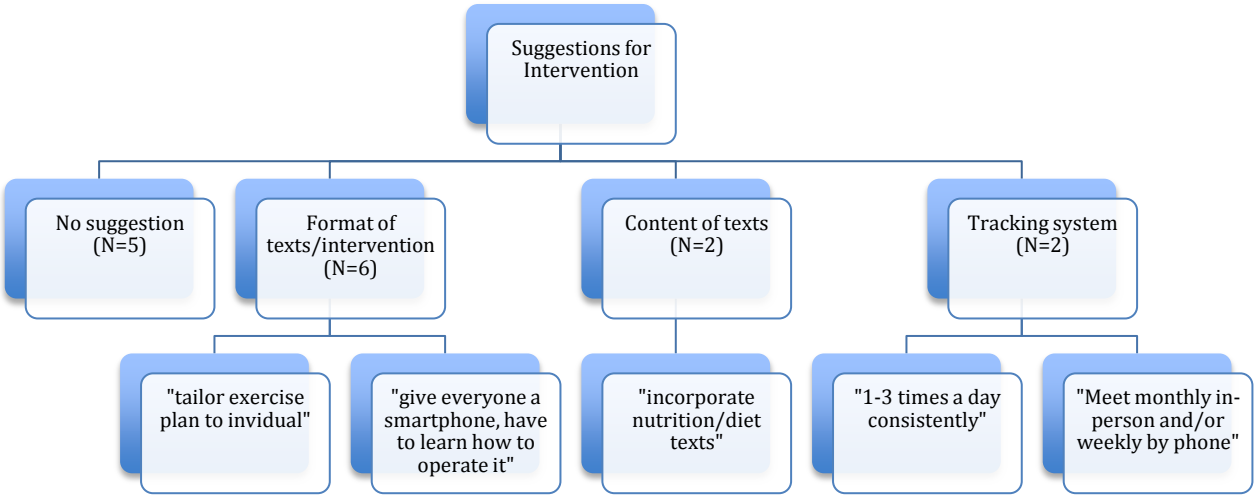


Figure 2: Participant's Suggestions for Intervention Improvement: Themes and Sample Comments



Appendix A

Interview and Questionnaire:
Introduce yourself and the project and thank the Veteran for their willingness to participate.

-Do you have a cell phone?

-When did you first get a cell phone?

-How often to do you talk on it?

-Is your cell phone a smart phone?

-Would you prefer using your own phone or a study phone for a exercise application?

-Do you have a data plan?

-How much do you text?

-How many text messages do you receive and send in a typical day?

-Do you ever access the internet with your cell phone?

-What types of sites do you access?

-What other types of technology do you have? Computers? Laptops? Tablet?

-How often do you use your computer vs. your cell phone?

Exercise Information

-Are you currently exercising? If yes, when did you start? How long have you been exercising?

-How many days do you exercise per week?

-When you do exercise, how long is your workout?

-What type of exercise to you do?

-What do you like about exercising?

-Where is your favorite place to exercise?

-Who, if anyone, do you like to exercise with?

-Are there things you do not like about exercising?

-Do you think you will ever start exercising? (do not ask if already exercising)

-If you were to try to start exercising, what would be difficult for you? (do not ask if already exercising)

-What would be easy? (do not ask if already exercising)

-Where do you go to find information about health?

-Do you ever go online/use the internet to find information about health?

-Do you use/are you interested in using any mobile health apps (e.g., for tracking diet, exercise)? (ask only if have a smartphone)

-If you wanted to start exercising, where would you turn for information and help? If already exercising, where did you turn for information and help?

I will be presenting to you some possible messages for a program.
The text program is based on clinical research about how to best help people start to exercise regularly in order to increase overall quality of life, improve mood and promote self-care:

1. *Provide text messages about cardiovascular, muscular strength, balance and flexibility exercises*
2. *Help to keep the person motivated to exercise and make positive changes*
3. *Offer useful tips about health, nutrition, and overall wellness and the benefits of exercise*
4. *Provide ways to overcome barriers to exercise (i.e. weather, financial barriers, time, etc.)*
5. *Messages regarding goal setting, how to maintain goals, and how to track your goals as you continue through the program*

The program sends participants 3-5 text messages a day regarding exercise information, including different types of exercises to perform and directions on how to perform each exercise. Other text messages include general health information on the benefits of exercise, messages on ways to improve mood, suggestions and alternatives to any barriers to exercising, and motivational messages to help each participant stay on track of their goals.

-Based only on that description, how curious are you about learning more?

-What would you think about the idea of receiving text messages to help you start exercising?

-What are your initial thoughts about the text program?

-In general, do you think it might be useful?

-How appropriate is the frequency of texts per day? Is it enough to be helpful? Is it too many to be helpful?
-Minimum texts/day: ___ Maximum texts/day: ____

[DISTRIBUTE the messages to be discussed]

Now let us take a closer look at some sample messages.

[REVIEW each group of messages and get feedback]

-How useful do you believe this text communication will be as a support to start exercising?

-How useful do you believe this text communication will be as a support to improve your mood and overall well-being?

-How useful do you believe this text communication will be as a support to improve any symptoms of your chronic condition?

-How appropriate is the language for Veterans? Any changes you recommend?

-How useful do you think this program will be? Why?

-What suggestions do you have to make it more useful?

Appendix B

Exercise Vet Questionnaire:

On a scale of 1-10 (1 being the least and 10 being the most)…

How important are messages of encouragement to you?

1 2 3 4 5 6 7 8 9 10

How important are messages about the benefits of exercise (like cardiovascular, physical appearance, or mood improvement) to you?

1 2 3 4 5 6 7 8 9 10

How important are messages about barriers to exercise (like time or weather) to you?

1 2 3 4 5 6 7 8 9 10

How important are messages about exercise progression to you?

1 2 3 4 5 6 7 8 9 10

How important are messages about your health?

1 2 3 4 5 6 7 8 9 10

How important are messages about goal setting to you?

1 2 3 4 5 6 7 8 9 10

If you were to miss a day of exercise, how likely would you be to try again the next day based on the messages you received in the text program?

1 2 3 4 5 6 7 8 9 10

If you were to use the texting program, how likely to you think this texting program would be in helping you start and continue exercising?

1 2 3 4 5 6 7 8 9 10

How helpful do you think it would be to meet with someone before getting started with the texting program to help set exercise goals?

1 2 3 4 5 6 7 8 9 10

How helpful do you think it would be to meet with someone weekly and receive texts in between meetings during the duration of the texting program?

1 2 3 4 5 6 7 8 9 10

If you think meeting with someone regularly to review your progress (like weekly) would you prefer meeting

___ In person

Or

___By phone

Appendix C

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✓" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute.

Appendix D

MEDICAL QUESTIONNAIRE

Please indicate if you have been diagnosed with any of the following problems by checking "yes" or "no":

1. Diabetes yes _____ no _____
2. Epilepsy yes _____ no _____
3. Head Injury yes _____ no _____
4. Ulcer yes _____ no _____
5. Heart Problems yes _____ no _____
6. Kidney Disorder yes _____ no _____
7. Liver Problems yes _____ no _____
8. Hypertension yes _____ no _____
9. Hearing Loss yes _____ no _____
10. Cancer yes _____ no _____
11. Allergies yes _____ no _____
12. Respiratory Disease yes _____ no _____

Please indicate if you have any of the following health problems by checking "yes" or "no":

1. Headaches yes _____ no _____
2. Dizziness yes _____ no _____
3. Black-out spells yes _____ no _____
4. Ringing in ears yes _____ no _____
5. Blurred Vision yes _____ no _____
6. Shortness of breath yes _____ no _____
7. Rapid breathing yes _____ no _____
8. Racing heart yes _____ no _____
9. Irregular heartbeat yes _____ no _____
10. Heart flutters yes _____ no _____
11. Sexual disinterest yes _____ no _____
12. Impotence yes _____ no _____
13. Inability to achieve orgasm yes _____ no _____
14. Constipation yes _____ no _____
15. Diarrhea yes _____ no _____
16. Nausea yes _____ no _____
17. Butterflies yes _____ no _____
18. Gas yes _____ no _____
19. Stomach cramps yes _____ no _____
20. Muscle aches yes _____ no _____
21. Nail Biting yes _____ no _____
22. Backache yes _____ no _____

HAVE YOU EVER HAD THIS PROBLEM? **(circle one)**	**IF YES, HOW OLD WERE YOU WHEN IT STARTED?**	**IF YES, HAVE YOU HAD THIS PROBLEM IN THE PAST YEAR? (circle one)**
1. ASTHMA yes no		yes no
2. TUBERCULOSIS yes no		yes no
3. ANY OTHER TROUBLE BREATHING SUCH AS EMPHYSEMA, CHRONIC BRONCHITIS, OR BROWN LUNG? yes no		yes no
4. ARTHRITIS, RHEMATISM, OR GOUT? yes no		yes no
5. HIGH SUGAR OR DIABETES? yes no		yes no
6. HARDENING OF THE ARTERIES (ARTEROSCLEROSIS)? yes no		yes no
7. HIGH BLOOD PRESSURE OR HYPERTENSION? yes no		yes no
8. A STROKE (OR CEREBROVASCULAR ACCIDENT)? yes no		yes no
9. A MYOCARDIAL INFARCTION OR HEART ATTACK? yes no		yes no
10. ANY OTHER HEART TROUBLE OR CONDITION AFFECTING BLOOD CIRCULATION? yes no		yes no
11. CANCER OF ANY KIND, INCLUDING LEUKEMIA? yes no		yes no
12. A NON-CANCEROUS OR BENIGN TUMOR, GROWTH OR CYST? yes no		yes no
13. CIRRHOSIS OF THE LIVER, HEPATITIS, JAUNDICE, OR OTHER LIVER CONDITION? yes no		yes no

HAVE YOU EVER HAD THIS PROBLEM? **(circle one)**	**IF YES, HOW OLD WERE YOU WHEN IT STARTED?**	**IF YES, HAVE YOU HAD THIS PROBLEM IN THE PAST YEAR? (circle one)**
14. ULCERS OF THE DIGESTIVE SYSTEM? yes no		yes no
15. A DIGESTIVE DISORDER OTHER THAN ULCERS OR LIVER PROBLEMS, SUCH AS GALL BLADDER TROUBLE, STOMACH, OR INTESTINAL PROBLEMS? yes no		yes no
16. ANEMIA OR "TIRED BLOOD" yes no		yes no
17. RHEUMATIC FEVER OR RHEUMATIC HEART DISEASE? yes no		yes no
18. A CHRONIC SKIN CONDITION SUCH AS ECZEMA, PSORIASIS, CHLORACNE, OR DERMATITIS ? yes no		yes no
19. DEAFNESS IN ONE OR BOTH EARS, OR ANY OTHER SERIOUS TROUBLE WITH HEARING? yes no		yes no
20. BLINDNESS IN ONE OR BOTH EYES, OR ANY OTHER SERIOUS TROUBLE WITH SEEING, EVENT WHEN WEARING GLASSES? yes no		yes no
21. STAMMERING, STUTTERING, OR ANY OTHER SPEECH DEFECT OR IMPAIRMENT? yes no		yes no
22. A KIDNEY, BLADDER, OR URINARY TRACT PROBLEMS? yes no		yes no
23. **IF MALE**, PROSTATE TROUBLE? yes no		yes no
24. **IF FEMALE**, AMENORRHEA, IRREGULAR MENSTRUAL PERIODS, OR OTHER TROUBLE WITH MENSTRUATION? yes no		yes no

HAVE YOU EVER HAD THIS PROBLEM? **(circle one)**	**IF YES, HOW OLD WERE YOU WHEN IT STARTED?**	**IF YES, HAVE YOU HAD THIS PROBLEM IN THE PAST YEAR? (circle one)**
25. **IF FEMALE**, A TUMOR, OR CYST, OR GROWTH OF THE UTERUS OR OVARIES? yes no		yes no
26. **IF FEMALE**, A HYSTERECTOMY? yes no		yes no
27. **IF FEMALE**, ANY OTHER DISEASE OF THE UTERUS OR OVARIES? yes no		yes no
28. **IF FEMALE**, ANY OTHER FEMALE TROUBLE? yes no		yes no
29. REPEATED SEIZURES, CONVULSIONS, BLACKOUTS, OR FAINTING SPELLS (INCLUDING EPILEPSY)? yes no		yes no
30. A MISSING FINGER, HAND OR ARM? SPECIFY:_____ yes no		yes no
31. A MISSING TOE, FOOT, OR LEG? SPECIFY:_____ yes no		yes no
32. A MISSING BREAST, KIDNEY OR LUNG? SPECIFY:_____ yes no		yes no
33. REPEATED TROUBLE WITH YOUR NECK, BACK, OR SPINE? yes no		yes no
34. PERMANENT STIFFNESS (JOINTS WILL NOT MOVE AT ALL) OR ANY DEFORMITY OF THE FOOT, LEG, OR BACK? yes no		yes no
35. PERMANENT STIFFNESS OR ANY DEFORMITY OF THE FINGERS, HAND OR ARM? yes no		yes no
36. PARALYSIS OF ANY KIND? yes no		yes no
37. ANY OTHER PHYSICAL OR MENTAL PROBLEM OR ILLNESS THAT SERIOUSLY AFFECTS YOUR HEALTH? SPECIFY:_____ yes no		yes no

Appendix E

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Federalwide Assurance (FWA) #4801

To: Julia Neal
Allied Health - Rehabilitation Counseling and Psychology

From: Office of Human Research Ethics

Date: 6/26/2015
RE: Determination that Research or Research-Like Activity does not require IRB Approval
Study #: 15-0947

Study Title: User Preferences for a Text-Messaging Exercise Intervention for Older Veterans: An Integrative Study for Mental Health Management

This submission was reviewed by the Office of Human Research Ethics, which has determined that this submission does not constitute human subjects research as defined under federal regulations [45 CFR 46.102 (d or f) and 21 CFR 56.102(c)(e)(l)] and does not require IRB approval.

Study Description:

Purpose: This study investigates the appropriateness of a text-messaging library for behavioral change in an exercise intervention for veterans. The purpose of the study is to receive input and feedback from the target population, review text messages for appropriateness and preferences, and determine the perceived utility of a text messaging exercise intervention.

Participants:

Geriatric-age veterans from the Veterans Affairs Medical Center in Durham, NC will be enrolled in the study. 15-20 participants will be interviewed. For comparison purposes, both male and female elderly veterans as well as 5 younger veterans will be interviewed to evaluate age and gender effects. Because depressive symptoms and chronic medical conditions may impact user responses, standardized questionnaires will be administered in order to describe the sample and provide qualitative observations regarding responses based on depressive symptoms and the presence of one or more chronic medical conditions. In order to gain sufficient insight into the appropriateness of the text library, an interviewer in the Traumatic Stress and Health Laboratory will complete interviews with each veteran. Each participant will be paid $100 for their time and completion of the interview.

Procedures (methods): Data collection will be performed by members of the Traumatic Stress and

Health Laboratory at the Veteran's Affairs Medical Center in Durham, NC. Upon completion of each interview, I will have access to the database for summary and review and will complete the data analysis portion of the study. Each participant will complete four questionnaires. Although there is no time limit, it is expected that the interview process will take approximately 60 minutes. After completion of the study, the data from each participant will be summarized to determine the attitudes towards the text messages and categories of messages, and perceived willingness to engage in the proposed exercise intervention.

Please be aware that approval may still be required from other relevant authorities or "gatekeepers" (e.g., school principals, facility directors, custodians of records), even though IRB approval is not required.

If your study protocol changes in such a way that this determination will no longer apply, you should contact the above IRB before making the changes.

CC:
Eileen Burker, Allied Health - Rehabilitation Counseling and Psychology
Eniko Rak, Allied Health - Rehabilitation Counseling and Psychology
Valerie Tan , Allied Health Sciences

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