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Using Motivational Interviewing to Increase Walking and Functional Ability in Older Adults: A Quasi-Experimental Study

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Using Motivational Interviewing to Increase Walking
and Functional Ability in Older Adults:
A Quasi-Experimental Study

A Dissertation Presented

by

ERIN T. LAMOUREUX

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

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Nursing

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and Functional Ability in Older Adults:
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Approved as to style and content by:

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DEDICATION

This dissertation is dedicated to my supportive husband Michael Lamoureux and to my three beautiful children—Mike Lamoureux, Caitlin Healy, and Christopher Lamoureux. You are the wind beneath my wings. I would also like to dedicate this dissertation to everyone who has played a role in helping me to reach this milestone.

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ABSTRACT

UTILIZING MOTIVATIONAL INTERVIEWING TO INCREASE WALKING
AND FUNCTIONAL ABILITY IN OLDER ADULTS:
A QUASI-EXPERIMENTAL STUDY

SEPTEMBER 2018

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The purpose of this study was to determine if brief motivational interviewing (MI) sessions would increase daily steps and functional ability in older adults. Regular exercise in the older adult can slow the physical, psychological, and functional decline that is often associated with aging. However, only 25% of adults aged 65 and older meet the suggested physical activity recommendations of the American Heart Association and the National Institute of Health. Understanding what may contribute to the initiation and adherence of exercise within the older adult population might identify interventions that would successfully increase physical activity. This study focused specifically on walking since walking is familiar to older adults and requires minimal resources.

The Transtheoretical Model of Behavior Change (TTM) states that individuals move through a series of stages when initiating a new behavior. The stage of change is highly correlated to the initiation or maintenance of a health behavior. Changing behaviors can be challenging because it involves changing established routines. The intervention in this study, MI, is based on the TTM. MI focuses on behavioral skill-building that empowers subjects to learn how to effectively change lifestyle behaviors.

This quasi-experimental study, conducted between May and August 2017, utilized the Senior Fitness Test (SFT), walking logs, and pedometers to assess number of daily steps and functional ability within two groups of older adults living in western Massachusetts. Subjects for this convenience sample were recruited through local senior centers.

The Analysis of Covariance was utilized for data analysis to assess daily steps and functional ability between the MI group and the control group. Posttesting analyses revealed that the intervention group had improved in all senior function tests; however, only the SFT eight-foot up-and-go test demonstrated a significant difference between the two groups ($p = .035$).

This study indicates that MI did have an effect on increasing daily walking within the intervention group; however, future research will need to focus not only on the psychological effects of initiating and maintaining exercise (specifically walking) within the older adult population but also will need to include environmental considerations such as walkable sidewalks and seasonal effects.

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CHAPTER 1

INTRODUCTION AND PURPOSE

Introduction

Regular exercise in the older adult can slow the physical, psychological, and functional decline that is often associated with aging. However, 75% of adults aged 65 and older do not meet the recommended physical activity requirements (Yan, Wilber, & Simmons, 2011). "Physical inactivity has been called a silent epidemic in the United States, accounting for an increasing incidence of many chronic illnesses" (Bennett, Young, Nail, Winters-Stone, & Hanson, 2008, p. 24). Exercise in older adults provides benefits that prevent or treat many causes of morbidity or mortality such as heart disease, hypertension, hyperlipidemia, diabetes, osteoporosis, metabolic syndrome, and some cancers (Snyder, Colvin, & Gammack, 2011).

Mobility is defined as "the ability to move independently around the environment" (Shumway-Cook, Ciol, & Yorkston, 2005, p. 1217). Mobility is essential not only for effective functioning but also for helping the older adult maintain independence in later years, which gives rise to an increased quality of life. Fleischman, Yang, Arfanakis, Arvanitakis, and Leurgans (2015) encourage healthcare providers to promote increased mobility in older adults because it preserves motor function, protecting the ability to move, which then preserves functional independence and consequently preserves quality of life. Older adults living in the community have a better chance of maintaining independence if they sustain aerobic capacity and lower body muscle strength (Fleg et al., 2005). In order to maintain independence, the older adult must be mobile enough to carry out activities of daily living (ADL) such as bathing, dressing,

toileting, and preparing meals (Tinetti & Ginter, 1988). It is suggested that in order for older adults to live independently, they must be able to walk 1,000 feet and carry objects that weigh 6.7 pounds (Lange, 2012). "For most individuals, independent functioning in the community presupposes the ability to walk" (Bohannon, 1997, p. 15).

Participating in a walking program will help older adults strengthen muscles in lower extremities while at the same time improving self-efficacy for walking that may consequently increase gait speed. Gait speed is a useful indicator of ADL function in older adults (Potter, Evan, & Duncan, 1995). A study of 161 older adults, demonstrated that a relationship exists between gait speed and Barthel function (Potter et al., 1995). Gait speed was measured by portable accelerometer in this study. The Barthel Index of ADL is an assessment tool that evaluates independence in ADL, which consist of meal preparation and feeding, dressing and undressing, bathing and grooming, and functional transfers. The Barthel Index consists of 10 ADL tasks that are graded from 0 (unable) to 3 (performs task independently). The Potter et al. study (1995) found that 72.1% of the subjects with a gait speed of 0.35m/sec–0.55m/sec were independent in all ADL.

Promotion of physical activity, specifically walking, is an important strategy for maintaining functional mobility, better overall health status, and independence in the older adult population (Rose & Gamble, 2006). This study focused specifically on walking since walking is familiar to older adults, it carries a low risk of injury, and requires minimal resources (Jitramontree, 2001). Also, based on "physical activity surveys that have been conducted over the past 30 years on representative samples in the United States, walking appears to be the most frequently reported physical activity" (Rose & Gamble, 2006, p. 149).

Systematic reviews with older adults focusing on physical activity compared the activity of walking with exercising at a facility or gym. The reviews concluded that the walkers were more likely to develop sustainable changes in physical activity versus the individuals who visited a facility or gym for exercise (Hillsdon, Thorogood, White, & Foster, 2002).

Statement of the Problem

Promoting health through physical activity helps not only to decrease chronic illness but also to maintain functional ability and independence in the older adult population. Older adults are usually more fearful of loss in function or becoming disabled than of dying (Sloane, 1984). Studies have demonstrated the positive effects of physical activity on physical function within the older adult population (Centers for Disease Control and Prevention [CDC], 2011; Chase & Conn, 2013; Doheny et al., 2013; Ip et al., 2013; Jitramontree, N., 2010; Letourneau & Goodman, 2014; Taylor et al., 2003).

If exercise, specifically walking, is so beneficial for the older adult population, why aren't all older adults partaking in this activity? A gap exists in the literature related to the identified factors that promote exercise within larger populations of older adults because the identified factors that contribute to activity within this population are varied (Resnick, 2000). The barriers to exercise within the older adult population have been identified as internal (personal) and external (environmental; Burbank & Riebe, 2002). Identified internal barriers for older adults consist of lack of time and confidence, apathy for exercise, fear of injury, and inconvenience while external barriers consist of a lack of financial and environmental resources. "The elderly often believe themselves to be too old or frail for exercise" (Tse, Vong, & Tang, 2013, p. 1845).

Purpose of the Study

Understanding what may contribute to the initiation and adherence of a daily walking program in the older adult's life may help to identify those interventions that would encourage increased daily walking. Rothman (2000) states that not enough is known about the psychological factors that increase maintenance of behavior over time such as would be needed with older adults for a daily walking program.

Problem Statement

A large percentage of older adults do not partake in any form of physical activity. This lack of physical activity can lead to functional decline, loss of independence, and increased disease burden. Interventions need to be identified that would help older adults to remain active in the community while maintaining independence.

Purpose Statement

The purpose of this study was to determine if brief motivational sessions would increase daily steps and functional ability in older adults.

Research Questions

1. Will a walking program, consisting of individualized sessions of motivational interviewing (MI), increase the number of daily steps taken by older adults?

2. Will a walking program, consisting of individualized sessions of MI, maintain or increase functional ability in the older adult?

Hypotheses

1. Older adults who participate in a program of individualized MI sessions will have a greater increase in daily steps as compared to those older adults who do not participate in the MI program.

2. Older adults who participate in a program of individualized MI sessions will demonstrate an increase in functional ability, as measured by the Senior Fitness Test (SFT), as compared to those older adults who do not participate in the MI program.

Motivational Interviewing

MI, the intervention utilized in this study, is a psychological approach that may prove effective for promoting an increase in daily steps taken by older adults. It is a patient-centered communication approach that promotes behavioral change within individuals and at the same time increases autonomy and empowerment. When using MI, the healthcare provider assesses an individual's readiness to change and act on a new healthier behavior. Changing behavior can be challenging because it involves changing established routines. MI is based on the Transtheoretical Model of Behavior Change (TTM); it incorporates a stage-based model to identify interventional methods that will work for an individual at each stage of the change process. Focusing interventions on the stage of change is imperative since individuals will make changes, such as increasing daily steps, when they are ready to do so. MI not only helps the individual to initiate or establish the motivation to change but also helps develop the commitment to change.

Advice-giving or educating for change does not work for individuals who are not ready to implement any type of lifestyle change. The Hillsdon et al. study (2002) with 1658 subjects demonstrated that a group of individuals advised to increase their physical activity did not do so any more than the "no advice" control group. Encouraging and insisting that an ambivalent older adult increase daily steps taken is counterproductive until the individual is ready to initiate the change. As healthcare practitioners, we can

educate but, if an individual is not ready to change, then a change of behavior will probably not occur.

MI focuses on behavioral skill-building that helps subjects learn how to change behaviors, which is necessary when making lifestyle changes. The skill-building involved in MI is one of the important concepts that helped older adults increase daily steps in this study. Guiding individuals in change is much more empowering than simply teaching them a skill such as safe walking within the community. The concepts included in the MI process are empathy, self-efficacy, collaboration, autonomy, and evocation.

MI is a collaborative partnership between the client and the healthcare practitioner, a mutual relationship. Within these collaborative conversations, joint decisions are made. MI evokes a client's values and concerns and connects them to the desired behavior change. MI honors a client's autonomy by understanding that individuals alone are responsible for making choices involved in their lives. "Clinicians may inform, advise, even warn, but ultimately it is the client who decides what to do; to recognize and honor this autonomy is also a key element in facilitating health behavior change" (Rollnick, Miller, & Butler, 2008, p. 7).

Empathy is expressed in MI through attentive listening and being fully present in all conversations with the subject. Self-efficacy, an integral component of behavioral change, is developed in the process of MI through positive affirmations along with caring, positive communication approaches. Bandura (1986) defines self-efficacy as people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. "Self-efficacy is not concerned with

the skills one has but with the judgment of what one can do with whatever skills one possesses" (Bandura, 1986, p. 391).

Miller and Rollnick (2013) have identified five general principles in the use of MI: (a) express empathy through reflective listening; (b) develop discrepancy between client's goals or values and their current behavior; (c) avoid arguments and direct confrontation; (d) adjust to client resistance rather than opposing it directly; and (e) support self-efficacy and optimism. The tools that are utilized in this directive communication process consist of (a) open-ended questions, (b) affirmations, (c) reflections, and (d) summaries.

The processes and stages of change identified within MI are precontemplation, contemplation, preparation, action, and maintenance. In the precontemplation stage, individuals are resistant to change and have no intention of participating in health-changing behaviors. Individuals in the contemplation stage are not quite ready for initiating change; they are ambivalent, weighing the pros and cons of change. In the preparation stage, individuals intend to make a behavioral health change in the near future. When planning a walking program for older adults, the preparation stage is an ideal stage for working with subjects. Individuals in the preparation stage have processed the information related to change and are motivated to make this lifestyle change. In the action stage, individuals have initiated the positive lifestyle behavior within the last 6 months. Individuals who are identified in the action stage at the beginning of the study have already initiated walking in to their lifestyle. Individuals in the maintenance stage have implemented the lifestyle change for at least 6 months. Interventions for

encouraging daily steps were developed for subjects on an individual basis depending on their identified stage of change.

The literature on the efficacy of MI is extensive; however, it is limited on the use of MI with older adults 65 years of age and older (Cummings, Cooper, & McClure Cassie, 2009). Many of the studies related to MI with older adults and exercise, specifically walking, have focused on older adults with a specific chronic illness such as congestive heart failure (CHF). This study did not limit subjects to a specific chronic illness; rather, it was open to all older adults who met the inclusion criteria and lived within the communities where the study was conducted.

The MI sessions were delivered in person to the subjects in the intervention group. The individualized MI sessions took place at the Amherst Senior Center. Several of the reviewed walking studies conducted with older adults utilized a telephone intervention; however, this delivery approach lacked the socialization and support that was identified by older adults to be an integral component for exercise initiation and compliance. The studies reviewed related to the use of MI with older adults demonstrated inconsistent results. The inconsistency may be related to varying lengths of the MI intervention, delivery methods, inexperienced practitioners in the use of MI, and incomplete assessment of subjects at the initiation and duration of the study.

This researcher utilized several assessment tools to evaluate whether the MI intervention program increased daily steps and functional ability in older adults. The researcher identified appropriate subjects for this study through the use of the Physical Activity Readiness Questionnaire (PAR-Q). This tool was utilized to determine health issues or barriers that would exclude a subject from participating in the study.

The PAR-Q was utilized to determine the stage of change or readiness for change within each potential subject. The stages of the PAR-Q are the stages of the TTM, which include precontemplation, contemplation, preparation, action, and maintenance.

The SFT was utilized to measure the underlying physiologic parameters associated with independent functioning. "This test measures lower and upper body strength, aerobic endurance, lower and upper body flexibility, and agility/dynamic balance" (Rikli & Jones, 1999, p. 129). The components of the test that assess lower body strength, aerobic endurance, lower body flexibility, and agility/dynamic balance were utilized since the focus of the study was to assess daily steps taken and functional ability. The SFT is an appropriate tool for use with older adults because it measures the major physical parameters associated with functional mobility and is designed for use in the community setting (Rikli & Jones, 2013b). "The test items within the SFT reflect a cross-section of the major fitness components associated with independent functioning in later years" (Rikli & Jones, 2013b, p. 5).

Summary of Chapter 1

As America ages, we will continue to see increased numbers of people within the older adult population. "The percentage of those 60 and over has risen from 8% of the world's population (200 million) in 1950 to around 11% (760 million) in 2011, and has been projected to reach 22% (2 billion) by 2050" (Global Agenda Council in Aging Society, 2012). Aging often brings challenges for older adults, caregivers, and society.

These aging changes often result in an increase in disease along with a decrease in functional ability and independent living (Burbank & Riebe, 2002). Aging changes can be the result of disease, inactivity, or the result of aging itself. Increased activity,

specifically walking, has proven to be an important strategy for maintaining functional mobility, better overall health status, and independence in the older adult population.

A gap exists in the research related to the psychological factors that promote initiation of and adherence to exercise (specifically walking) within the older adult population. MI, a patient-centered communication approach, may be the intervention that promotes the initiation and adherence of exercise. MI incorporates a stage-based model to identify interventional methods that will work for individuals at each stage of the change process. Focusing interventions on the stage of change is imperative since individuals will only make changes, such as increasing daily steps, when they are ready to do so. MI focused on behavioral skill-building to empower subjects within this study to learn how to effectively change lifestyle behaviors.

Changing lifestyle behaviors can be challenging. MI may not only help older adults explore the opportunities in changing behavior but can help to resolve the ambivalence of change. Older adults have lived many years; many of their habits are deeply ingrained into their lifestyles. As healthcare personnel, we understand that advising older adults to change behaviors has not been effective. MI allows the older adult to collaborate with the provider; it is a nonjudgmental process of encouraging change that considers where the older adult is in the continuum of change. It allows older adults the autonomy to make changes in their lifestyles through the process of skill-building.

Previous studies that utilized MI with older adults for exercise promotion have not taken into consideration the needs of the older adult for socialization and convenient in-

person meeting times. The researcher believes this was the first study designed to assess increased walking and functional ability in older adults utilizing MI as the intervention.

CHAPTER 2

REVIEW OF THE LITERATURE

<u>Introduction</u>

The review of literature was focused on the use of MI to increase walking in the older adult population. The following databases were searched: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Pub Med and SPORT Discus, using the keywords "motivational interviewing," "older adults," "exercise," "walking," and related terms. Inclusion criteria were primary research articles related to motivational interviewing, older adults exercise and walking, published in English between 2005 and 2015. Exclusion criteria included literature in which the primary setting was not in the community. The original sample size was 30; however, an ancestry method of retrieving sources cited in reviewed publications greatly increased the original sample size.

America is aging; the current estimate is that there are 40.3 million individuals 65 years of age or older in the U.S. (U.S. Census Bureau, 2011). Older adults experience increased chronic illness and functional decline as they age. Seventy-five percent of older Americans are living with and dying from more than one symptomatic chronic condition (Mathews et al., 2015; National Council on Aging, 2012). The Centers for Disease Control and Prevention (CDC) state that almost one out of every two adults in the U.S. has at least one chronic illness. "These chronic illnesses are largely preventable through behavioral modification" (Chase & Conn, 2013, p. 294).

Regular exercise can improve overall health and functional ability, while mitigating the effects of chronic illness within the older adult population. The terms *exercise* and *physical activity* are used interchangeably; however, the CDC define

exercise as a subcategory of physical activity that is planned, structured, repetitive, and purposive in the sense that the improvement or maintenance of one or more components of physical fitness is the objective (2011). Approximately 25% of adults aged 65 and over meet the recommended physical activity requirements (Yan et al., 2011). "Women are more likely than men to report engaging in no physical activity" (Yelmokas McDermott & Mernitz, 2006, p. 437). Research also demonstrates that, within the group of older adults who initiate an exercise program, approximately 50% will drop out within the first 6 months (Resnick, 2000). Simply advising older adults to exercise has not proven to be effective within this population (Hillsdon et al., 2002). Understanding what may contribute to exercise initiation and adherence within the older adult population may help to identify interventions that would encourage increased participation in a walking program. A gap exists in the literature related to factors that promote initiation and adherence of exercise with older adults over an extended period of time. Rothman (2000) states that not enough is known about the psychological factors that increase maintenance of behavior over time that would be needed for daily walking adherence with older adults.

"The worldwide epidemic of chronic diseases is strongly linked to population ageing" (Prince, Wu, & Guo, 2015, p. 549). Insufficient exercise is a modifiable risk factor for the prevention and improvement of many chronic diseases (Bishop & Jackson, 2013; Letourneau & Goodman, 2014). Regular exercise can improve health and is associated with better functional status in older persons (Michels & Kugler, 1998). Not only does exercise have an effect on physiological well-being, but it also affects psychological well-being. Regular exercise decreases the risk of cognitive decline,

dementia, and clinical depression. Many older adults spend less time in activity/exercise while spending an average of 9 or more hours a day in sedentary behavior (Mathews, Chen, & Freedson, 2008). "Declining activity rates in older adults coupled with physiological aging and disease make exercise very important for older adults" (Bennett & Winters-Stone, 2011, p. 148).

Rowe and Kahn (1997) state that an essential component of successful aging is the maximization of functional status. Small reductions in the capacity to perform physical functions due to decreased mobility may lead to decreased independence in older age. Mobility difficulties in the older adult can lead to falls, increased hospitalizations, and long-term placement. The deconditioning that can occur with a lack of physical activity can lead to a loss of strength that leads the older adult on a slippery slope of disability. "These accelerated declines in functional mobility are associated with the loss of independence" (Doheny et al., 2013, p. 1748). The Medicare Beneficiary Survey indicated that 47% of persons 65 years of age or older have mobility issues ranging from mild to severe physical disability (Shumway-Cook et al., 2005).

In the following review of literature, two areas are presented. First, research focused on the dynamics of exercise with older adults, specifically walking, is presented. Walking, a moderate-intensity exercise was chosen because it requires limited external resources and is easily measured. Then, the use of MI with exercise will be reviewed. Finally, a synthesis of the literature which includes the concepts of walking, MI and older adults, as well as the identified gaps noted within the literature, will be presented.

Exercise in Older Adults

"Exercise is defined as structured, planned and repetitive physical activity with the intent of improving physical fitness" (Yelmokas McDermott & Mernitz, 2006, p. 438). The CDC stress that regular physical activity is one of the most important things an older adult can do to manage their health (CDC, 2011). Recommendations for exercise will depend on the individual's current health status and their personal goals. Yelmokas McDermott and Mernitz (2006) state that initiating an exercise program in older age can be beneficial by reducing health risk factors even if the individual has been sedentary most of their lives. It is important to note that before encouraging any older adult to initiate exercise, it is recommended that a PAR-Q be completed, and if indicated physician approval should be obtained (Jitramontree, 2001). The Department of Health and Human Services, the National Institutes of Health and the American Heart Association have suggested the following guidelines for exercise in older adults:

- Exercise for at least 2.5 hours per week at moderate intensity or 75 minutes per week at a vigorous intensity using aerobic activities
- Perform aerobic activity in at least 10-minute durations that are spread throughout the week.
- Incorporate muscle-strengthening activities of all major muscle groups performed 2 or more days per week (CDC, 2011, pp. 1–5).

Yelmokas McDermott and Mernitz (2006) identify four ways to improve physical fitness: "aerobics, resistance training, flexibility training and lifestyle modification" (p. 437). Aerobic exercise is activity that increases the heart rate for an extended period of time, involves repetitive motions, and uses large muscle groups. Examples of aerobic exercise that older adults might engage in are walking, swimming, or dancing. "Weight resistance can be created using elastic bands, weight cuffs, free weights, weight

machines, or the patient's body weight" (Yelmokas McDermott & Mernitz, p. 437). Joint flexibility, otherwise known as range of motion (ROM), is an important component of muscular fitness. Flexibility or stretching lengthens the muscles and can be accomplished through activities such as tai chi or yoga. Physical fitness can also be improved through lifestyle modifications such as taking the stairs instead of the elevator or parking further from the entrance of buildings. All of the following reviewed studies demonstrated a strong correlation between exercise and increased physical function: Chase & Conn, 2013; Doheny et al., 2013; Ip et al., 2013; Jitramontree, 2010; Letourneau & Goodman, 2014; Taylor et al., 2003.

The time-series interventional study by Ip et al. (2013) is one of many studies reviewed demonstrating a strong correlation between exercise and increased physical function. This yearlong study had a sample of 424 men and women between the ages of 70 and 89. The aim of the study was to reduce the incidence of declining physical function—balance, strength, and mobility—through physical activity. The subjects were randomly assigned to either the physical activity (PA) or control group. The PA intervention consisted of aerobic (walking), strength, balance, and flexibility exercises. The successful aging (SA) group or control group consisted of health topic workshops relevant to older adults. The participants were ranked into classifications of disability, utilizing the Short Physical Performance Battery test (SPPB), ranging from 1–4 with state 1 being the most favorable and state 4 indicating poor function. The SPPB, a performance-based test, includes a four-meter walk, five repeated chair stands, and a balance exam. All subjects were evaluated utilizing the SPPB prior to the initiation of the study and again at 6- and 12-month intervals. Statistical analysis, utilizing the Hidden

Markov Model (HMM), demonstrated that physical activity reduced the likelihood of declining physical function for the older adults enrolled in the trial as compared with those in the SA program. The probability of staying in the highest functioning state was 76% for individuals in the PA group compared to 56% for the SA group subjects. This quasi-experimental study positively demonstrated that PA can help older adults maintain functional well-being more than the use of education alone. The study also demonstrated how important and successful it is to tailor physical activity to the specific needs of the older adult.

Walking in Older Adults

Mobility is defined as "the ability to move independently around the environment" (Shumway-Cook et al., 2005, p. 1217). Balance and gait are the two main components of walking. Normal age-related changes negatively affect balance and gait due to declining strength, muscle mass, bone density, and redistributed body mass. Walking is a facilitation of bipedal locomotion to prevent diseases, or to maintain/increase health and fitness level (Jitramontree, 2001). The ability to walk independently enables an older adult to be mobile and independent within their environment. Many studies have been conducted on walking with older adults.

Health

Neufeld, Machacova, Mossey, and Luborsky (2013), in a study comprising 239 older adults, demonstrated that walking ability was significantly associated with self-assessed overall health. Subjects in this study were asked to rate their health with the following possible responses: excellent, good, fair, or poor/bad. Subjects were then asked to walk three meters (9.84 feet) at a normal pace followed by walking the same distance

at a fast pace. Analysis of data, which was adjusted for health, behavioral, and sociodemographic variables, demonstrated that normal walking speed is a strong determinant of SRH. Data from this study identify the importance of assessing baseline walking speed as well as noticeable changes in walking speed in the older adult.

The lifestyle interventions and Independence for Elders (LIFE) study also compared a successful aging group to a long term structured physical activity group in a randomized clinical trial consisting of 1635 high risk for disability older adults. This study, one of the largest and longest, was one of the first studies to demonstrate that physical activity can prevent or delay the onset of mobility disability over an extended follow up (Pahor, Guralnik, J. Ambrosius, Blair, Bonds, Church., Espeland,, Fielding…..Williamson, 2014). The physical activity in this study consisted of walking, strength, flexibility and balance training.

Socialization and Support

Chiang, Seman, Belza, and Hsin-Chun (2008), in a qualitative study with six focus groups consisting of ethnic older adults, identified that socialization and support were key elements that encouraged older adults to participate in exercise. Many of the subjects in this study identified exercise as a connection to the world. Michels and Kugler (1998) also identified the importance of socialization in promoting exercise with older adults through a survey design study. "Individuals who have more social interaction and more close friends are more likely to exercise" (p. 527).

Pedometers

Pedometers, body-worn motion sensors, have become a popular motivating tool to encourage increased walking among older adults. The question raised in research studies

is How many daily steps should be suggested for older adults? Cheng et al. (2009) recommend approximately 3,200 steps in 27 minutes for older adults emphasizing the benefits to strength and self-rated health status. Tudor-Locke et al. (2011) suggest the goal of 10,000 steps a day (public health guidelines) should also be recommended for healthy older adults; however, this may not be possible for those living with disability or chronic illness. With some older adults, the goal will be to promote a physically active lifestyle to the fullest extent rather than focusing on actual step count.

Snyder et al. (2011), in their prospective observational study of 36 adults aged 65 and older, looked at whether wearing a pedometer could motivate older adults to increase and sustain a higher level of ambulatory activity and improve measures of functional status. The subjects were recruited using posted information from six senior-living communities. Medical and social history, mood, and quality of life were assessed prior to the start of the study. Each subject was given a pedometer to wear daily during the course of the study to measure daily steps. During this 9-week study, the researchers questioned whether pedometer wear would increase the number of daily steps taken. During the first 4 weeks, the subjects wore the pedometers uncovered and were given individualized step goals, educational materials, and weekly meetings. During the next 2 weeks of the study, the pedometers were removed from the subjects and they were encouraged to maintain their "usual" walking pattern. During the final week of the study the subjects wore the pedometers with the screen of the pedometer covered. The researchers discovered that during the 4 weeks that the pedometer was worn uncovered the daily ambulatory activity increased 25%; however, once the pedometer was removed, daily steps declined. The researchers concluded that it was the pedometer itself that was the motivating factor in

increasing daily steps in this study and not the support systems that were set up for the study.

Croteau, Richeson, Farmer, and Jones (2007) also utilized pedometers in their 12-week experimental pretest-posttest study on 147 participants. The purpose of this interdisciplinary study was to determine the influence that pedometers had on daily steps with community-dwelling older adults with various chronic illnesses. This study utilized the subject's individual normal walking activity as baseline data rather than the American Heart Association's recommended daily steps of 10,000. Goal setting, individualized strategy selection, and self-monitoring were also utilized in this study. Again the positive results from this study suggest that feedback received from this study supports the literature that pedometer use is an effective motivational tool to get older adults to increase daily steps.

Accelerometers have been known to be more sensitive to slower accelerations as compared to pedometers. Slower acceleration with movement is frequently demonstrated within the older adult population. However, accelerometers were not utilized in this pilot study because the cost was prohibitive. Accelerometers also have complex data management demands that would require technical expertise to utilize (Tudor-Locke, Washington, & Hart, 2009). The focus of this study was assessing physical activity volume (steps) rather than physical activity intensity, which would make the pedometer an acceptable tool to utilize in this study. Tudor-Locke et al. (2009), experts in the area of walking with older adults, state that pedometers do provide a practical means of capturing walking through a steps/day measurement.

Motivational Interviewing

MI is defined as "a collaborative conversation for strengthening a person's own motivation and commitment to change; it is focused on the resolution of ambivalence to change" (Miller & Rollnick, 2013, p. 12). MI is based on the TTM. MI assesses an individual's readiness to change and act on a new healthier behavior. Changing behaviors can be challenging because it involves changing established routines. Modifying one's behavior often presents overwhelming challenges; many individuals need assistance with this change process (Cummings et al., 2009). While faced with the process of changing, individuals experience a conflict within themselves regarding the pros and cons of change. This conflict, or ambivalence, is like having "a committee inside your mind, with members who disagree on the proper course of action" (Miller & Rollnick, 2013, p. 7). The role of the practitioner when using MI is to assess the client's readiness and self-efficacy for change. The practitioner helps to guide the client in identifying and stating the reasons for change, which "releases the practitioner from the burden of convincing the patient to alter his behavior" (Letourneau & Goodman, 2014, p. 27). Miller and Rollnick (2013) believe that people are more likely to be persuaded to change by what they hear themselves say. MI is based on the assumption that most individuals have the skills and ability to modify lifestyles in order to increase health. Individuals will begin to talk about implementing change into their lives as their motivation for change increases. The goal of MI is not only to initiate or establish motivation to change but also to develop the commitment to change. Advice-giving or educating for change does not work for individuals who are not ready to make a lifestyle change. Arguing for change with an ambivalent client can be counterproductive (Miller & Rollnick, 2013). MI is not talking

at people; rather, it is a process that is based on input from both the practitioner and the individual. MI provides the environment where the individual feels safe to be able to talk about the challenges of initiating change. "The art of MI is therefore a dance between two individuals suspending judgment and avoiding a confrontational style thereby minimizing defensive reactions by the patient" (Shinitzky & Kub, 2001, p. 181).

MI was originally designed to use with substance abuse clients but is now being successfully utilized in support of health-promotion activities within many populations. It is being utilized by a variety of practitioners including psychologists, psychiatrists, physicians, social workers, nurses, midwives, and dieticians. MI has also been effectively utilized within ethnic groups since the communication process is respectful and nonjudgmental (Lundahl & Burke, 2009).

MI consists of four processes: (a) Engaging, (b) Focusing, (c) Evoking, and (d) Planning. "Engaging is the process by which both parties establish a helpful connection and a working relationship" (Miller & Rollnick, 2013, p. 26). Focusing allows both parties to develop a direction within the change process. In the process of evoking, the client identifies his own motivations for change. Evoking is one of the guiding principles within the process of MI, allowing the participant to take ownership in the change process. The planning process begins when ambivalence for change has been overcome and the individual starts talking about when and how to change (Miller & Rollnick, 2013).

Miller and Rollnick (2013) have identified five general principles in the use of MI: (a) Express empathy through reflective listening; (b) Develop discrepancy between client's goals or values and their current behavior; (c) Avoid argument and direct

confrontation; (d) Adjust to client resistance rather than opposing it directly; and (3) Support self-efficacy and optimism. The tools utilized in this directive communication process consist of (a) open-ended questions, (b) affirmations, (c) reflections, and (d) summaries.

Use of Motivational Interviewing With Older Adults

Extensive literature exists on the efficacy of MI; however, it is limited on the use of MI with adults 65 years of age and older (Cummings et al., 2009). While focusing on the aim of this research, the following concepts were reviewed in the literature: MI, older adults, exercise, and walking.

MI has been utilized with older adults to promote physical activity in populations of individuals with CHF, cancer, alcohol and cigarette addiction (Bennett, Lyons, & Winters-Stone, 2007; Brodie & Inoue, 2005).

Brodie and Inoue (2005) evaluated the effects of MI on exercise through a controlled interventional study with 92 older adults (mean age 78) with a diagnosis of CHF. The participants were randomly assigned to a standard care group, which was limited to structured exercise, a MI group or a group that was a combination of both treatments. All subjects were assessed at the initiation of the study utilizing the Medical Outcomes Short Form-36 Healthy Survey, the disease-specific Minnesota Living with Heart Failure questionnaire, and the Motivation Readiness for Physical Activity Scale. The self-report questionnaires utilized in this study may have been a limitation to the study since self-report is not always considered a valid measure of activity.

The MI and combination groups received eight 1-hour sessions of MI. At the end of the 5-month study "the 'motivational interviewing' and 'both treatments' groups

reported an increase in their level and type of activities and demonstrated a significant increase in energy expenditure over baseline" (Brodie & Inoue, 2005, p. 522). The researchers emphasized that the major difference between the MI groups compared to the structured group was the "emphasis on behavioral skill-building" rather than just the act of exercise activity. The MI members learned how to change their behaviors whereas the structured group learned only how to perform exercises. The researcher believes the "behavioral skill building" intervention in this study is the key to increasing walking in the older adult population since 70% of the physical decline attributable to aging is related to modifiable lifestyle factors that require behavioral lifestyle changes such as physical inactivity (National Council on Aging, 2012).

Taylor et al. (2003) compared an exercise program consisting of "two 10-week physical activity interventions; an exercise class (weeks 1–10), and a walking program (weeks 11–20)" that incorporated MI (p. 8). The sample for this study consisted of 38 older adults living in residential homes; the homes were divided into intervention and control homes. Participants in the intervention (MI) group followed the program consisting of an exercise class (weeks 1–10) and a walking program (weeks 11–20), while subjects in the control homes, who did not receive MI, chose to participate in the exercise or walking program. At the end of the study, functional scores were noted to increase within the intervention group whereas an overall decline occurred in functional scores in the control group.

> The increase in some functional scores at the intervention homes compared to an overall decline in the control homes scores indicates that the physical activity program, particularly the exercise component, was associated with a positive outcome. That is, it is likely that without the physical activity program, the decline noted at the control homes would have occurred at the intervention homes as well (Taylor et al., 2003, p. 8).

This study demonstrated a positive correlation between physical activity and functional ability within the older population utilizing an MI intervention.

Several studies explored the effectiveness of MI with older adults through the use of telephone-based communication sessions (Bennett et al., 2005; Bennett et al., 2008; Kolt, Schofield, Kerse, Garrett, & Oliver, 2007; Lilienthal, Pignol, Holm, & Vogeltanz, 2014; Sims, Smith, Duffy, & Hilton, 1998).

Kolt et al. (2007) utilized a randomized control design to assess the effectiveness of Tele Walk, a telephone-based motivational counseling intervention, with 186 low active older adults (65 and older). Subjects for this study were recruited through the databases of three primary care physicians within Auckland, New Zealand. Prior to the initiation of the study and at 3 months (the duration of the study), 6 months, and 12 months, the subjects were evaluated utilizing the Auckland Heart Study Physical Activity Questionnaire and the short Form-36 Health Survey. The treatment group received eight telephone-counseling sessions along with corresponding printed materials over the course of 12 weeks. The calls, which utilized flexible telephone scripts depending on the subject's stage of change as assessed by the TTM, were conducted weekly for the first 4 weeks and then every 2 weeks for the remainder of the study (Kolt et al., 2006). The control group received no intervention. At the conclusion of the study, the treatment group reported a significant increase in both physical activity and functioning. A larger proportion of participants in the intervention group versus the control group were able to meet the goal of increasing moderate or vigorous leisure activity to 2.5 hours weekly after a 12-month period.

Bennett et al. (2005) also utilized telephone calls, as an intervention in the Healthy Aging Project II (HAP II) that was conducted by the Center for Healthy Aging at the School of Nursing at Oregon Health and Science University (OHSU). This demonstration project, which utilized a randomly assigned control group, was conducted by nurses utilizing an MI intervention to help 72 older adults identify and implement healthy behavior lifestyle changes. The intervention, which was based on the TTM, consisted of one session of behavioral counseling followed by six monthly telephone calls that provided the MI intervention. The intervention group (n = 35) received phone calls based on their stage of change, which consisted of "motivational strategies directed at problem solving, offering encouragement, and reformulating goals" (Bennett et al., 2005, p. 26). The control group (n = 37) also received six telephone calls that consisted of five questions in a script with no MI content. The project was unique in that it allowed participants to identify the "healthy behavior" that they would personally like to change in their lives. Goals consisted of losing weight, increasing exercise, managing symptoms of chronic illness, to name a few. The nurses made a total of 523 telephone or email contacts throughout the study. Limited health benefits were noted as a result of the intervention. The difference between groups in health outcomes was small; however, statistical significance was noted to be stronger in those individuals younger than 75 years of age. The reason for the lack of significant results in this project could be contributed to the fact that the study, although geared toward health behavior changes, did not measure changes in the final outcome. The design of the project was broad, looking at a range of behavioral changes that made it difficult to measure behavioral goals. It was also difficult to assess the intervention for the control group since the

researcher did not elaborate on the content of the five questions that were asked in the monthly telephone calls.

Sims et al. (1998) also found insignificant changes in a randomized interventional study that was conducted on 20 older adults (mean age 72.2 years) to determine the effectiveness of MI on physical activity. This pilot study also utilized a telephone delivery approach for MI to encourage home-based, unsupervised, informal exercise; telephone calls were made to the intervention group at 2 and 6 weeks and were based on the TTM. The healthcare provider helped the client develop an individualized activity plan based on where the individual was in the continuum of change. The control group received standard advice about benefits and types of exercise. Limited increased activity was noted in both the intervention and control groups due to reported bad weather and poor health and altered circumstances of the subjects. The researcher felt that the number of recruited subjects could have been increased in this study considering the attrition rates related to older adults and exercise as well as taking into consideration the time of year when weather may interfere with walking ability outside.

Bennett et al. (2008) utilized a randomized control design to evaluate the effectiveness of MI on physical activity through a telephone delivery system. The completed study, which lasted for 6 months, consisted of 72 physically inactive rural adults. The MI intervention group (n = 35) received a pedometer and a total of six MI telephone calls consisting of problem-solving, encouragement, and goal formulation. The control group (n = 37) also received six telephone calls that consisted of a scripted conversation that had nothing to do with MI. The PAR-Q for older adults was utilized to assess physical activity in this study. "The data was collected by mailed surveys and

analyzed using analysis of variance" (Bennett et al., 2008, p. 24). The study results did not demonstrate a significant difference in the amount of activity between the two groups; however, the researchers did note a significant increase in self-efficacy for exercise in the intervention group. Seasonal effects similar to those of the Sims et al. (1998) study could have influenced the results of this study also.

A more recent study completed by Lilienthal et al. (2014) demonstrated a positive result at post-treatment (1 month), utilizing a telephone MI intervention, to increase caloric expenditure from exercise; however, at the 6-month follow-up, subjects, in the intervention group were noted to have no increase in caloric expenditure. In this randomized control study, subjects in the intervention group (n = 43) received four weekly sessions of telephone-based MI while the subjects in the control group (n = 43) received a post-treatment living guide with no weekly telephone calls. A chi-square analysis noted insignificant differences in variables between the intervention and control groups. Older adults who received weekly sessions of MI "had higher caloric expenditures from physical activity at post treatment, higher self-efficacy for physical activity at the six month follow up and demonstrated greater forward stage of change progression from baseline as compared to the control group" (Lilienthal et al., 2014, p. 532). Although this study presented significant results at post-treatment, there was a decline in caloric expenditure noted at 6 months.

<u>Self-Efficacy</u>

Conn (1998) similarly noted an increase in self-efficacy in a mixed-method design study consisting of 147 adults (65 and >) who were independently living. This study utilized individual interviews conducted in private homes as well as utilizing the

Health Promoting Lifestyle Profile, the Baecke Physical Activity Scale, the Self-Efficacy Scale, and the Exercise Benefits/Barriers Scale. The results of the study demonstrated that self-efficacy, perceived barriers, and age were all variables that influenced exercise scores within the subjects. Conn (1998) stated that "self-efficacy expectation is the strongest correlate of exercise behavior or exercise behavior change" (p. 180). Through the qualitative interviews conducted, three major themes were identified as interfering with physical activity: (a) social influences on physical activity, (b) psychosocial benefits of activity, and (c) joint problems and fatigue. The results of this study suggest that an important concept to consider when researching physical activity with older adults is the social environment; hence, future studies should consider the use of a social model in the intervention.

Resnick (2000) also demonstrated that self-efficacy promoted greater adherence in an exercise program consisting of a walking-program intervention. A mixed-method design was utilized to study 23 members of an existing walking group (mean age 81). The individuals within this study were encouraged to walk for 20 minutes three times a week either inside or outside with members of the walking group at the healthcare center office. Walking records were maintained by the healthcare center staff. The original group was then divided between those who adhered to the walking protocol and those who did not. A qualitative data analysis was performed through interview; motivation was measured utilizing the Apathy Evaluation Scale, self-efficacy was measured utilizing the Self-Efficacy–Barriers to Exercise Scale, and outcome expectancy was measured with the Expected Outcomes for Habitual Exercise Scale. The nine members of the group who

adhered to the walking protocol demonstrated fewer functional limitations, better functional performance, stronger self-efficacy expectations and fewer falls.

The concept of self-efficacy has been identified as a positive attribute contributing to increased exercise and walking. The theory of self-efficacy is based on the assumption that a person's self-efficacy will be determined in part by their personal assessment of whether their abilities are adequate to meet a specific behavior. Bandura (1986) defines self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. The theory of self-efficacy is not concerned with the skills one has but with the judgment of what one can do with whatever skills one possesses" (Bandura, 1986, p. 391). Hence, if an individual feels capable of achieving a behavior, they will probably be more successful. Consequently, if older adults feel more confident in their ability to participate in a daily walking program, they will be more likely to be successful.

Transtheoretical Model of Behavior Change

The theoretical model used in the study was the TTM, which was the guiding principle for the initiation of MI. A model of behavior change is necessary to understand how and why individuals initiate and maintain an exercise program. Masse, Nigg, Basen-Enquist, and Atienza (2011) believe that the TTM is helpful for developing effective interventions that would encourage individuals to be more active. The TTM is based on the principle that behavior change occurs through a series of interrelated stages. "The stage dimension defines behavior change as a process that unfolds over time and involves progress through a series of stages: precontemplation, contemplation, action, maintenance, and termination" (Prochaska, 2008, p. 845). The five stages of change are

enabled by 10 processes of change: consciousness raising, self-liberation, self-reevaluation, environmental reevaluation, counterconditioning, stimulus control, reinforcement management, dramatic relief, social-liberation, and helping relationships (Prochaska & DiClemente, 1982). This model looks at behavior change as more of an event that initiates a process for behavior change such as beginning an exercise program, quitting smoking, drinking, or overeating. The constructs that are identified within the model are these: stages of change, processes of change, self-efficacy, temptation, and pros and cons (Horiuchi, Tsuda, Watanabe, Fukamachi, & Samejima, 2012).

In the precontemplation stage, individuals are usually not ready to make any behavioral changes within the next 6 months (Prochaska, 2008). Individuals may be classified within the precontemplation stage because they are either uninformed or underinformed about the consequences of an existing behavior such as smoking or the consequences of not participating in an exercise program. In the contemplation stage, individuals are interested in changing or getting ready to change within a 6-month time frame. In this stage, people realize that their current behavior is problematic and they begin to look at the pros and cons of change; however, the ambivalence of change continues to be a problem within this identified stage.

In the preparation stage, individuals either intend to take action or have taken steps toward action. Prochaska (2008) suggests that individuals in the preparation stage are good candidates for action-oriented treatment programs such as this walking program. Action is the stage in which individuals have already made overt changes in their lifestyles within the last 6 months. Not all modifications of behavior, however, are considered action within this model. Prochaska (2008) states that the action must meet a

criterion that sufficiently reduces the risk of disease to be associated with the action stage. For example, with smoking only total abstinence of cigarettes is eligible to be included in the action stage or an individual has to be consistently exercising for 6 months to be included in the action stage.

Maintenance is the stage in which individuals have made overt modifications in their lifestyles and are working to prevent relapse. Self-efficacy increases during the maintenance stage (Horiuchi et al., 2012). While in the maintenance stage, individuals are less tempted to relapse and grow increasingly more confident that they can continue with the lifestyle change.

The last stage, termination, is defined as a stage when individuals have reached 100% self-efficacy and 0% temptation (Horiuchi et al., 2012). Individuals in this stage have reached the point where the lifestyle change has become an automatic habit. Prochaska (2008) states that the requirement of 100% self-efficacy and 0% temptation may be an unrealistic expectation for most individuals. Many of the reviewed studies that have utilized TTM have blended the maintenance and termination into one stage secondary to the high expectations of the termination stage (Marshall & Biddle, 2001).

Brodie and Inoue (2008) utilized the Motivation Readiness for Physical Activity Scale, which is based on the TTM, while studying 60 older adults with CHF. MI is concerned with helping individuals change behavior on an individual level, depending on where they fall within this readiness-for-change continuum. The tool utilized within the study was the Readiness-to-Change-Ruler; which helps participants visualize the stage of change that they are presently in. At baseline, a majority of the participants, within the study, were identified to fall within the contemplation stage. The MI group and the

"both" treatment group (a group that consisted of both standard care and a physical activity "lifestyle" intervention were given a treatment that incorporated behavior change principles to promote physical activity. As a result of this 5-month intervention study, the majority of participants (48%) were then able to be classified in the preparation stage of the TTM.

A theme identified in the literature was that in order for older adults to successfully incorporate exercise into their lives it must become a part of their existing lifestyle. In order for lifestyle changes to take place, a change in behaviors must occur. "People vary considerably in their readiness and intention to change" (Jitramontree, 2001, p. 6). The TTM is based on the principle that behavior change occurs through a series of interrelated stages. Hence, when planning a walking program for older adults, an individualized approach or a stage-matched approach would be more successful rather than a standardized approach that does not consider where each individual is at in terms of motivation

Summary of Chapter 2

As America ages, there is an increased need to research interventions that would promote healthier behaviors within the older adult population. Continued research is needed to help us identify healthier ways of aging that could promote an increase in wellness and a decrease in chronic illness within this population. Physical activity has been noted to be one of the primary modifiable risk factors for the prevention and improvement of many chronic illnesses, which is important since the incidence of chronic illness increases with age (Letourneau & Goodman, 2014). Routine exercise decreases the risk of cardiovascular disease, higher density lipoprotein levels, lower body fat and

weight, and increases or maintains functional status in older persons (Michels & Kugler, 1998). Not only does exercise have an effect on physiological well-being but it also affects psychological well-being and quality of life (Elsawy & Higgins, 2010). Regular exercise decreases the risk of cognitive decline, dementia, and clinical depression.

Although it is well understood that regular exercise can improve overall health and functional ability, while limiting the effects of chronic illness, only a small number of older adults partake in this activity. The studies presented in the literature review produced inconsistent results concerning the effectiveness of MI in encouraging older adults to initiate and maintain daily exercise in their lives. Many of the studies that utilized MI did not report assessments that identified where individual subjects were in the "stage of change" prior to the start of the intervention. Tailoring interventions to individuals, and basing such interventions to the individual's stage of change is effective for changing health behaviors including those specific to increasing daily steps in the older adult population.

Another difference noted within the studies was the length of the intervention; some studies lasted only a few days while others lasted several months. Bennett et al. (2008) stated that a longer MI intervention might have shown a larger effect size since self-efficacy for exercise significantly increased for participants the longer they were involved in the intervention.

The number of encounters (communication sessions of MI) within the studies also varied. Most of the studies found that significance of success was correlated with an increased number of encounters (Lundahl, Kunz, Brownwell, Tollesfon, & Burke, 2010; Rubak, Sandboek, Lauritzen, & Christensen, 2005). Hardcastle, Taylor, Bailey, and

Castle (2008) also demonstrated that attending multiple sessions of MI increased walking and decreased blood pressure and cholesterol while studying the effects of MI on physical activity. The subjects from the intervention group for the current study met with the researcher for three 30-minute MI informational sessions during the course of the 8-week study.

Older adults have lived many years; many of their habits are deeply ingrained into their lifestyles. As healthcare practitioners, we understand that instructing people to change health behaviors has not been effective and does not work. MI allows the older adult to collaborate with the practitioner; it is a nonjudgmental process of encouraging change that considers where the older adult is in "the continuum of change." It also allows older adults the autonomy to make changes in their lifestyles through the process of skill-building.

In order to change behavior such as initiating or maintaining a daily walking program, a subject-centered approach proves to be most beneficial. MI is a subject-centered communication process; this collaborative conversation strengthens an individual's internal motivation and commitment to change and also deals with the ambivalence associated with change (Miller & Rollnick, 2013).

This researcher also noted that few studies provided a clear explanation of the elements of MI that were utilized. Furthermore, many of the studies reported limited information on the amount of educational training healthcare practitioners had received in MI. This researcher had received approximately 68 hours of MI training before the study began.

This study also considered the social aspect of exercise for older adults. Conn (1998) states that "future research should carefully examine the multiple dimensions of the social environment which may influence physical activity among older women" (p. 376). Established relationships and a sense of community had been noted in the two western Massachusetts senior centers that were utilized in this study.

CHAPTER 3

RESEARCH METHOD AND DESIGN

Introduction

The design, sample, research settings, instruments, inclusion and exclusion criteria, protection of human subjects, methods and procedures and data analysis are discussed within this chapter. The TTM was utilized as the study's theoretical model to examine whether an intervention consisting of three individualized motivational interviewing (MI sessions would increase the number of daily steps and functional ability within an older adult population.

The hypotheses for the study were as follows:

1. Older adults who participate in a program of individualized motivational interviewing (MI) sessions will have a greater increase in daily steps as compared to those older adults who do not participate in the MI program.

2. Older adults who participate in a program of individualized MI sessions will demonstrate an increase in functional ability, as measured by the Senior Fitness Test (SFT), as compared to those older adults who do not participate in the MI program.

The research questions were the following:

1. Will a walking program, consisting of individualized sessions of motivational interviewing (MI), increase the number of daily steps taken by older adults?

2. Will a walking program consisting of individualized sessions of MI, maintain or increase functional ability in the older adult?

Study Design

This study utilized a quasi-experimental approach with a pretest-posttest design. This design was compatible with the study since the use of an experimental treatment (MI sessions) was delivered to the intervention group only. The advantage of utilizing this design was the ability to measure the dependent variables (daily steps, functional ability) over time. Dimitrov and Rumrill (2003) state "Pretest-posttest designs are widely used in behavioral research, primarily for the purpose of comparing groups and/or measuring change resulting from experimental treatments" (p. 159). The pretest-posttest control experimental design allowed for one group to receive the experimental treatment, MI sessions, while the other group received "standard treatment."

A convenience sample was utilized for the study. Burns and Grove (2009) state that "in convenience sampling, subjects are included in the study because they happen to be in the right place at the right time" (p. 353). Convenience sampling does not generally control for all biases; however, the researcher attempted to control for biases in this study by accounting for covariates through Analysis of Covariance (ANCOVA).

Sample and Eligibility Criteria

The target population for the study was community-dwelling older adults who attended one of two senior centers located within western Massachusetts. The first senior center is located in Belchertown, a rural town, with a population of 15,100 individuals, with 14.2 % of these individuals being 65 years of age or older and 51.5% female (www.census.gov/2010census). According to the latest census, the town has seen a 12.96% increase in total population over the last 10 years. The Belchertown Senior Center provides transportation services, classes, clubs, activities, on-site and home-

delivered meals, wellness clinics and an adult supportive day program to all residents 60 years of age and older. The center serves the needs of approximately 175 older adults on a daily basis, with 65% of these individuals being female (www.belchertown.org). The center serves a higher proportion of male participants as compared to average senior centers (W. Korzenowski, personal communication, June 22, 2016). Of the population served at the senior center, approximately 95% are White with the other 5% being Asian, African American, Hispanic, Mexican, Indian, and Filipino (W. Korzenowski, personal communication, June 22, 2016). The director of the senior center, William Korzenowski, states that the center does not track education levels of the participants, so that information is not obtainable. All of the participants attending the Belchertown Senior Center are independent with ambulation, with the exception of a few individuals who utilize wheelchairs.

The second senior center involved in this study is located in Amherst, a rural town, located adjacent to Belchertown. This senior center is located within the Bangs Community Center in downtown Amherst. This center also provides transportation services, classes, clubs, activities, delivered meals, wellness clinics to all residents 60 years of age and older, and serves an average of 300 older adults on a daily basis (www.amherst.org).

The population of Amherst is 37,819; this is an 8.44% increase in population since the 2000 census (www.census.gov/2010census). Approximately 4,654 of these residents are 60 years of age or older. (www.census.gov/2010census). According to the Amherst Senior Center database (https://www.amherstma.gov/269/senior-center), approximately 2,100 older adults, with 70% women, utilized services in the senior center

during 2017. Of this population, approximately 73.8% are White, 3.1% Hispanic, 3.1% Asian American, 0.1% South Asian, 1.1% Mid-Eastern, 0.2% Native American, and 13.5% unknown. No official documentation of education levels is kept for the Amherst Senior Center. All individuals who attend the center are independent with ambulation, with the exception of approximately100 individuals who report using a wheelchair or walker for mobility.

The individuals who attend the two senior centers have similar demographics in terms of geographical area (the towns are located adjacent to each other), diversity of ages, and a 70% ratio of females. In both centers the participants are independent and the majority are ambulatory.

The sample size for this study was 26 subjects: 13 in the intervention group and 13 in the comparison group. The researcher chose a smaller sample size because recruiting older adults to commit to an 8-week activity study can be challenging, especially since only 25% of older adults meet the suggested recommended physical activity requirements (Yan et al., 2011). Hackshaw (2008) suggests that it is better to test a new research hypothesis on a small number of subjects first before spending resources on a larger study.

The sample for this study, as a whole, was female with only one male in the intervention group. The subjects ranged from 65–93 years of age with a majority (n = 24; 92.3%) reporting White ethnicity. In the control group, half (n = 6; 50%) of the sample reported being married, and greater than half (n = 8; 66.7%) stated they did not live alone; whereas in the intervention group only (1; 7.7%) reported being married with (11; 84.6%) stating they lived alone. The percentage of subjects with a graduate degree was

higher (n = 5; 38.5%) in the intervention group as compared to the control group (n = 3; 25%). Many of the subjects in both groups rated their health as good (intervention n = 8; 61.5%, and control = 6; 50%), whereas a greater number of subjects in the control group (n = 6; 50%) versus the intervention group (n = 3; 23.1%) stated they walked only what was necessary for daily function. The number of subjects reporting falls in the last 6 months was small (intervention n = 2; 15.4%; control = 1; 8.3%).

Inclusion Criteria

The inclusion criteria for this study were as follows:

- Age 65 or older

- English speaking

- Ambulatory without assistive devices

- Must answer *No* to all questions on the PAR-Q or receive physician approval to participate

Exclusion Criteria

The exclusion criteria were as follows:

- Cognitive impairment as indicated by a score of 3 or less on the Mini-Cog

- Answering *Yes* to one or more questions on the PAR-Q or no physician approval for exercise

- Unable to commit to an 8-week intervention

Description of Study Variables

The dependent variables were the number of daily steps and the level of functional ability.

The independent variable was MI.

Protection of Human Subjects

Institutional Review Board (IRB) approval was obtained from the University of Massachusetts Amherst prior to the initiation of the study (Appendix A). During the study, the researcher recognized and protected the rights of the human research subjects by following IRB requirements for informed consent, secure management of data, and confidentiality and anonymity of research findings. Each subject signed an approved informed consent form prior to the initiation of the study (Appendix B). The subjects were told that the purpose of the study was to determine whether three person-to-person individualized sessions of MI would increase daily steps and functional ability. Participating in the study involved no identifiable risks. The subjects had the choice of participating without coercion from the researcher and were free to withdraw at any time without penalty. The privacy of the subjects was protected at all times. The researcher met with subjects privately during the course of the study to protect anonymity. Subjects were assigned a number, and data was filed by assigned number rather than name. All confidential data was kept under lock and key. All subjects in the study were treated fairly and respectfully. The intervention carried no risk for harm or discomfort to any of the subjects.

Researcher Qualifications

The researcher for this study had 15 years prior experience as a certified gerontological clinical nurse specialist and 37 years as a registered nurse. She was teaching at a university in the Northeast and practicing as a registered nurse in a local assisted-living facility as well as in an acute care for the elderly (ACE) unit in the local medical center. The researcher had received over 68 hours of MI training; she had taken

two 1-day classes as well as a 1-week intensive course in MI in order to implement the intervention properly.

Recruitment of Subjects

At the end of May 2017, the researcher placed posters on bulletin boards within both senior centers explaining the research project and announcing the informational sessions that would be held. Informational sessions were offered in each setting to explain the research study and to encourage subject participation. Subjects were also recruited through each facility's bimonthly newsletter as well as through senior center personnel. Recruitment also occurred through word of mouth; interested subjects were encouraged to inform friends and neighbors of the research study.

Recruitment for the study began on June 1, 2017. The researcher enrolled subjects from both centers, until the desired sample size was reached. During the week of June 11, 2017, subjects were screened and accepted into the study. Thirteen subjects were accepted into each group.

Data Collection

The administrators for both senior centers granted permission to conduct the study within each facility. Demographic data was collected by the researcher prior to the start of the intervention (Appendix C) and consisted of information related to gender, age, marital status, education level, housing status, blood pressure, and heart rate. The subjects were asked to rate their level of health as well as walking history on the demographic data form.

Prior to the initiation of the study, all subjects were assessed utilizing the PAR-Q (Appendix D) and the Mini-Cog screening tool (Appendix E). The PAR-Q was utilized to

identify any medical contraindications a subject had that would exclude them from exercising and consequently not taking part in the study. The Mini-Cog was utilized to ensure that subjects were cognitively able to give consent to the study as well as their ability to follow directions during its course. All subjects were assessed utilizing the Physical Activity Stage of Change Questionnaire, and the SFT at the initiation of the study and at the end of the 8-week study.

Instruments

Screening Tools

The revised PAR-Q (Appendix D), a screening tool, was utilized to determine health issues that would exclude subjects from participating in the study. The PAR-Q has been recommended for use prior to low-to-moderate exercise involvement (Cardinal, Esters, & Cardinal, 1996). This simple self-administered preliminary questionnaire, which consists of seven questions, was developed as a result of research related to the Canadian Home Fitness Test (Thomas, Reading, & Shephard, 1992). The seven items on the PAR-Q questionnaire were designed to identify those individuals who would be eligible to participate in fitness testing or physical activity without prior physician approval (Jitramontree, 2001). "Unlike the simple exercise screening procedure suggested by the American College of Sports Medicine the PAR-Q outcome is not influenced by age or cigarette smoking" (Shephard, 2015, p. 454). The original PAR-Q, a conservative physical assessment tool, has been successfully utilized worldwide and is "downloaded 2.5 million times per year in Canada alone" (Shephard, 2015, p. 456). However, the original PAR-Q was found to have a high rate of false positive responses. The PAR-Q has been updated to reflect minor clarifications in wording. The literature

surrounding the sensitivity of the PAR-Q does not state specifics related to the sensitivity or reliability of the PARQ; rather, the literature states that "the sensitivity appears adequate; the questionnaire has been utilized to screen as many as a half million people, without any adverse events in subsequent exercise testing" (Thomas et al., 1992, p. 339).

Thomas et al. (1992) conducted a study with 399 subjects comparing responses made from the original and updated PAR-Q questionnaires. There was a significant ($p < .05$) reduction in the number of subjects who were screened out by the revised test: from 68 to 48 of the subjects (Thomas et al., 1992). Cardinal et al. (1996) also utilized the updated PAR-Q in a study comparing the number of excluded subjects that resulted from the PAR-Q as compared to the updated PAR-Q on 197 older adults. This study demonstrated that the updated PAR-Q "was effective in excluding significantly ($P < 0.001$) fewer subjects from physical activity involvement in comparison to the original PAR-Q instrument (66.3% vs. 75.7% respectively)" (p. 6). The updated PAR-Q was utilized as the screening tool of choice for this current study in order to avoid the high rate of false positive responses that were found to be an issue in the original PAR-Q instrument. A factor analysis related to the reliability and validity of the PAR-Q could not be found in the search of the literature; however, Thomas et al. (1992) stated "There is no true gold standard to evaluate the sensitivity and specificity of either the original PAR-Q or the revised PAR-Q" (p. 342).

The Mini-Cog (Appendix E), a screening tool, was utilized to assess whether the older adult had the cognitive function to be eligible to participate in the study. This cognitive screening tool, unlike the Mini Mental Status Exam (MMSE), is not influenced by age, education, or language (Borson, Scanlon, Watanbe, Tu, & Lessing, 2005). The

Mini-Cog met and exceeded the performance of the MMSE in the University of Washington Alzheimer Disease Research study conducted with 371 community dwelling older adults (Borson et al., 2005). The Mini-Cog screening tool "consists of a three-item recall, similar to the MMSE, and a clock drawing item (e.g., draw the face of a clock, number the clock face, and place the hands on the clock face to indicate a specific time such as 11:10)" (Boltz, Capezuti, Fulmer, & Zwicker, 2012, p. 125). The test takes approximately 3 minutes to administer and has a 99% sensitivity as well as a 96% specificity (Borson, S., Scanlon, J., Brush, M., Vitaliano, P., & Dokmak, A., 2000).

The Physical Activity Stage of Change Questionnaire (Appendix F) assessment tool was utilized in this study to determine the stage of change, or readiness for change, for each subject. The questionnaire was completed by the researcher individually face-to-face with each subject, both in the experimental and control groups, prior to the start of the intervention and then repeated with the subjects in the intervention group during the three MI sessions. The questionnaire was administered to all subjects at the end of the 8-week study.

The stages in the Physical Activity Stage of Change Questionnaire are the stages of the TTM that include precontemplation, contemplation, preparation, action, and maintenance. This tool, which was developed as a four-item self-report questionnaire, categorizes subjects into one of five stages. It was originally developed by Dr. Bess Marcus and colleagues in a study conducted with 610 community volunteers in a 6-week physical activity intervention targeted at encouraging stage of change (Marcus, Banspach et al., 1992). The questionnaire, based on the TTM, consists of 5 yes/no statements

related to the subject's daily physical activity level (Marcus & Simkin, 1993). Scoring for the Physical Activity Stage of Change Questionnaire can be found in Appendix F.

Marcus, Rossi, Selby, Niaura, and Abrams (1992) in a study conducted with 1,172 subjects within a worksite environment demonstrated that the model of stages of change, utilizing the Physical Activity Stage of Change Questionnaire measures, could be successfully applied to a study on exercise behavior. The Physical Activity Stage of Change Questionnaire has been successfully utilized within numerous studies (Marcus & Simkin, 1993, Marcus, Banspach et al., 1992).

Courneya (1995) states that it is not enough to identify whether an older adult is physically active or inactive when designing an exercise intervention; rather, "an important step toward the determination of an appropriate intervention strategy is to understand the cognition of subjects at different stages of readiness" (p. 80). The MI intervention that was utilized in this study for encouragement of increased daily steps was developed for individuals in each of the stages of change identified in the transtheoretical model.

The SFT (Appendix G), which consists of six individual tests measured on a continuous scale, was utilized to measure the underlying physiologic parameters associated with functional ability. "This test measures lower and upper body strength, aerobic endurance, lower and upper body flexibility, and agility/dynamic balance" (Rikli & Jones, 1999, p. 129). These tests from the SFT were utilized: 30-second chair-stand, 6-minute walk, and eight-foot up-and-go to measure lower body strength and flexibility, aerobic endurance, and agility/dynamic balance. The SFT is an appropriate tool for use with older adults because it measures the major physical parameters associated with

functional mobility and is designed for use in community settings (Rikli & Jones, 2013b).

"The test items within the SFT reflect a cross section of the major fitness components associated with independent functioning in later years" (Rikli & Jones, 2013b, p. 5).

Senior Fitness Test

The SFT was designed to avoid the ceiling and floor effects that have been noted in other tools that assess functional ability, such as seen in the timed up-and-go test (TUG), a tool frequently utilized to assess mobility in older adults. The subject is allowed to use the arm rests during the sit-stand and stand-sit movements with TUG testing. The SFT identifies functional ability whereas other measures such as the gait speed test and the Short Physical Performance Battery test (SPPB) are utilized to identify disability within the older adult population (Rikli & Jones, 2013a). The following tests in the SFT were utilized in this study: 30-second chair-stand test (assesses lower-body strength), 6-minute walk test (assesses aerobic endurance), chair sit-and-reach test (assesses lower body flexibility), eight-foot up-and-go test (no assistance from hands and arms allowed; assesses agility and dynamic balance), and height and weight. Each test was selected because of its ability to reflect in a reliable and valid way one of the physical parameters of functional fitness (Rikli & Jones, 1999). "Content validity of the SFT was demonstrated through the functional ability framework which indicates the physiological parameters associated with functions required for basic and advanced everyday activities" (Rikli & Jones, 2013a, p. 14). "Criterion validity was demonstrated from a combination of previously published data on measures similar to the SFT items and from studies designed specifically to look at SFT items relative to appropriate criterion measures" (Rikli & Jones, 2013b, p. 25). Construct validity was demonstrated through a pilot that

studied older adults of different ages, health conditions, and activity levels (Rikli &

Jones, 1999). "The intraclass reliability values (R values) for the test items ranged from

.80 to .98 with a majority of the values being .90 or above" (Rikli & Jones, 1999, p. 137).

Validity of the tool has been established by comparing the SFT with other "gold standard

measures" (Rikli & Jones, 2012).

Pedometer

A Fitbit Zip pedometer (Appendix H) was distributed to each subject at the start

of the study to track the number of daily steps taken during the course of the study. The

subjects were given oral and written instructions on the use of the Fitbit pedometer. The

Fitbit Zip pedometer includes an electronic program that can be downloaded to a

computer in order to keep accurate measurement of steps. Subjects were also given 8

weeks of activity logs (Appendix I). The activity logs, similar to a walking journal,

allowed them to track their walking on a weekly basis. Subjects were encouraged to write

down the number of steps they obtained on a daily basis in case there were technological

issues with the pedometers.

The Fitbit Zip was chosen for the study because of its ease in use; it is clipped on

a belt or waist band, it is user friendly, and it is also affordable. The Fitbit Zip has

demonstrated to be an effective means for measuring steps in community-dwelling older

adults. Paul et al. (2015) compared Fitbit Zip step counts and ActiGraph step counts

against manual step counting in a study with 32 community-dwelling older adults. The

study found excellent agreement between a manual count of steps and the Fit Zip

pedometer in a 2-minute walk test (95% CI 0.76–0.94). Paul et al. (2015) state that there

is a low discrepancy (<10%) between Fitbit Zip and visually counted steps "making it sufficiently accurate to be used among community dwelling older adults" (p. 1).

Procedure

The participants belonging to the Amherst Senior Center served as the intervention (MI) group, while participants in the Belchertown Senior Center served as the control group. The selection of the intervention group was determined through an unbiased coin toss. Burns and Grove (2009) suggest that flipping an unbiased coin is an acceptable approach in group assignment since both groups have a 50% chance of being in either the experimental or control group. "Random assignment is most commonly used in nursing and medicine to assign subjects obtained through convenience sampling methods to groups for purposes of comparison" (Burns et al., 2009, p. 252).

Once informed consents were signed, subjects attended a 1-hour informational session on the benefits and safety concerns of walking. These sessions were conducted at each of the senior centers (Appendix J). Safety with walking is a concern with all populations, especially with the older adult population since they are at a higher risk for falls related to a decrease in strength, muscle mass, bone density, and redistribution of body mass (Rose & Gamble, 2006). The researcher educated all subjects about safe walking techniques and paths during the informational session. This session also included a presentation/demonstration on the use of the Fitbit device. The subjects from both groups were given a copy of the book *Exercise & Physical Activity*, a publication from the National Institute on Aging at the National Institute of Health (NIH; http://www.nih.gov/nia.) during the informational session. This book is a guide that can

be utilized by the older adult to develop healthier life choices; it includes information on exercise and diet.

During the first week of the study, subjects in both groups met individually with the researcher. Subjects in the intervention group met with the researcher for a 30-minute MI informational session that was based on the subject's stage of change according to the Physical Activity Stage of Change Questionnaire (Appendix K). During the session, the researcher utilized the techniques of careful listening, summarizing, and positive affirmation to help each subject to focus on decreasing their ambivalence related to walking. The researcher attempted to guide subjects in the development of healthier skill-building techniques (Appendix K). During this meeting, the researcher synced (transferred data) from the subject's Fitbit device to the Fitbit program installed on the researcher's laptop computer. The researcher also reviewed the subject's pedometer monitor log (Appendix I) during this session. The control group subjects did not receive MI during their first session, or in the following two sessions; rather, the researcher socialized with them, answered questions and synced (transferred data) from the Fitbit device to the Fitbit program installed on her laptop computer. The researcher also reviewed each control group subject's pedometer monitor log (Appendix I) during this session. The researcher met individually with subjects from both groups during weeks 1, 4, and 7 (Appendix L). The agenda for the meetings in week 4 and week 7 were the same as described for week 1. The researcher called each subject during the off weeks (weeks when subjects did not meet with the researcher weeks 2, 3, 5, and 6) to assess how they were doing with walking, answer questions, and remind them of their next scheduled appointment with the researcher.

The researcher reassessed subjects at week 9 utilizing the same tests from the SFT that were used at baseline: 30-second chair-stand, 6-minute walk, and eight-foot up-and-go. The stage of change was also assessed for subjects in the MI and control groups.

Subjects in the study were able to keep their Fitbit at the end of the study as a token of appreciation for participating. They also received a $10.00 gift card to a local supermarket for their participation in the study.

Threats to Internal Validity

In order to maintain internal validity, the researcher attempted to control for any extraneous variables that might influence the dependent variables by providing the intervention to one community of older adults while the other community did not receive the intervention, thus avoiding treatment diffusion and compensatory rivalry.

Threats to External Validity

The use of a convenience sample within this study limits the generalizability of the findings to the general older adult population.

CHAPTER 4

RESULTS

<u>Introduction</u>

The results of the data analysis are reported in this chapter, as well as the sample characteristics and study variables. The MI group will be compared, utilizing descriptive statistics, to the control group to determine differences. The "stages of change'" that occurred within the subjects during the course of the study will be discussed. Lastly, the researcher will present a discussion related to the hypotheses of the study.

The aim of this study was to determine if three brief personalized MI sessions would increase daily steps and functional ability within a group of older adults. This study utilized a quasi-experimental approach with a pretest-posttest design to evaluate the therapeutic effects of MI sessions on daily steps taken and functional ability. The study, which utilized evidence-based walking guidelines by Jitramontree (2001), recorded lower body strength, aerobic endurance, lower body flexibility, agility/dynamic balance, and the number of daily steps taken in a group of older adults who received MI sessions and compared them to a control group who received standard treatment. The hypotheses for the study were as follows: (a) Older adults who participate in a program of individualized MI sessions will have a greater increase in daily steps as compared to those older adults who do not participate in the MI program; and (b) Older adults who participate in a program of individualized MI sessions will demonstrate an increase in functional ability, measured by the SFT, as compared to those older adults who do not participate in the MI program.

The Statistical Package for Social Sciences Version 24 was used to determine differences between groups, utilizing independent/paired t-tests, and analysis of covariance tests (ANCOVA). The process of the SFT assessments and the study findings will be presented in this chapter.

Presentation of Findings

The findings of the data analysis are presented in two sections. The demographics section presents descriptive statistics related to the demographic characteristics of the subjects including the mean, median, standard deviation, frequencies, and percentages. Information on group equivalence can be found here. The findings section presents findings for the hypotheses tested in the study and provides data results related to testing of subjects with the SFT, which includes the 30-second chair-stand test, the eight-foot up-and-go test, the 6-minute walk test, and body mass index (BMI), with subjects as an entity and by cohort.

Demographics

Twenty-six subjects were enrolled into the study; 25 subjects successfully completed the 8-week study. Among the 25 subjects who completed the study, 24 (96%) were female and one (4%) was male. The mean age of the subjects was 74.32 years (SD = 7.37); their median age was 75 years; their modal age was 76 years. They had an age range of 21 years, with the youngest being 66 and the oldest being 87 years old. Sixteen (68%) of the 25 subjects lived alone (see Table 1).

Table 1: Demographics by walking group (N = 25).

Variables		Motivational Interviewing Group (n = 13)		Control group (n = 12)		Total (n = 25)		P[a]
		N	*%*	*N*	*%*	*N*	*%*	
Gender	Male	1	7.7	0	0	1	7.7	1.00 [b]
	Female	12	92.3	12	100.0	24	92.3	
Ethnicity	White	11	84.6	12	100.0	23	84.6	.37[b]
	Hispanic	1	7.7	0	0	1	7.7	
	Other	1	7.7	0	0	1	7.7	
Marital Status	Single	7	53.8	0	0	7	28.0	.01[b]
	Married	1	7.7	6	50.0	7	28.0	
	Divorced	3	23.1	3	25.0	6	24.0	
	Widowed	2	15.4	3	25.0	5	20.0	
Education	High School Diploma/GED	3	23.1	5	41.7	8	32.0	.61[b]
	Associate of Arts Degree	0	0	1	8.3	1	4	
	Bachelor of Science/Arts Degree	4	30.8	2	16.7	6	24	
	Master's Degree	4	30.8	2	16.7	6	24	
	Doctorate Degree	1	7.7	1	8.3	2	8	
	Other	1	7.7	1	8.3	2	8	
Housing Status	Lives alone	11	84.6	4	33.3	15	60	.01[b]
	Not living alone	2	15.4	8	66.7	10	40	
Self-Reported Health Rating	Good	8	61.5	9	75	17	68	.77[b]
	Fair	5	38.5	3	25	8	32	
		Mean (years)	*SD*	*Mean (years)*	*SD*	*Mean (years)*	*SD*	
Age		74.5	5.41	74.0	7.03	74.3	6.2	.86[c]

[a] Significance of comparing MI group and control group on variables
[b] Chi Square p-value
[c] Independent t-test p-value

Pearson chi-square tests were performed on the following covariates of the study to determine if the MI group and control group were comparable in composition: gender, ethnicity, marital status, education level, housing status, health status, estimated daily

steps taken. No statistically significant difference existed between the groups; hence, the two groups were comparable on all variables except for marital status, as more subjects in the control group stated they were married.

The results of the analysis of the variables are as follows: Gender = χ^2 = .00, df = 1, p = 1.00; Ethnicity = χ^2 = .2.007, df = 2, p = .37; Marital Status χ^2 = .10,75, df = 3, p = .01; Education χ^2 = 2.70, df = 4, p = .61; Living Status χ^2 = 4.87, df = 1, p = .08; Health Rate χ^2 = .09, df = 1, p = .77

An independent sample t-test was run to determine if there was a difference in age between the MI and the control group. There was no significant mean age difference between the intervention (mean = 75, SD = 5.41) and the control group (mean = 74, SD = 7.03); independent t (23) = -.18, p = .86. Ages for both groups were normally distributed; there were no outliers in the data, as assessed by inspection of a boxplot. (Information on age is noted at the bottom of Table 1.)

Prior to the initiation of the study the researcher asked all subjects whether they had fallen within the last 6 months. Three subjects out of the 25 (two in the intervention group and one in the control group), reported falling within the past 6 months. The three subjects who had reported falling denied injuries that would affect their ability to participate in this study. The history of falling is important to ask about when conducting a walking study since falls are a leading cause of mortality and morbidity in older adults and could have affected the study results since history of falling is considered a risk factor for future falls. Subjects had no reported falls during the 8-week study.

The subjects in both groups were assessed, prior to the start of the study, for stage of change using the Physical Activity Stage of Change Questionnaire and again at the end

of the study. At the start of the study, nine control subjects were assessed to be in the contemplation stage, whereas only four subjects in the MI group were assessed to be in the contemplation stage.

By the end of the study, 10 MI subjects had advanced to the higher action stage of change, whereas less than half of the control group subjects had advanced to the action stage of change.

By the end of the study, the majority, 19 subjects (76%), had advanced in stage of change, while six subjects (24%) remained in the same stage of change (Table 2). More subjects in the intervention group (n = 8) advanced to a higher stage of change than those subjects in the control group (n = 4). One as compared to two subjects, intervention and control group, respectively, remained in a lower stage of change for the duration of the study.

Table 2: Comparison of pre- and post-intervention stage of change by group.

| | Pre-Stage of Change | | Post-Stage of Change | |
	MI	Control	MI	Control
Contemplation	4	9	1	2
Preparation	7	2	2	5
Action	2	1	10	5
Totals	13	12	13	12

Note. MI = motivational interviewing.

Results of the Hypotheses

Hypothesis 1

Hypothesis 1 states the following: Older adults who participate in a program of individualized MI sessions will have a greater increase in daily steps as compared to those older adults who do not participate in the MI program.

The intervention group averaged more steps in week 1: 5,586 (SD = 2,855) compared to the control group: 4,704 (SD = 3,189); consequently the intervention group began the study at a higher average number of weekly steps as compared to the control group. See Table 3 for a comparison of steps walked by both groups at baseline and at week 8.

Table 3: Group step-count comparison.

	Intervention Group		Control Group	
	Baseline *Mean (SD)*	Week 8 *Mean (SD)*	Baseline *Mean (SD)*	Week 8 *Mean (SD)*
Step Count	5,586 (2,855)	6,223 (1,943)	4,704 (3,189)	5,774.5 (3,192)

To evaluate the difference between the number of steps taken at week 1 to the number of steps taken at week 8, a paired sample t-test was run on IBM SPSS Statistics 24 software. The results demonstrated that, although there was an increase in the average number of steps taken during week 8, for both groups, the increase in steps was not statistically significant for either the MI or control group. The results in Table 4 (MI group) and Table 5 (control group) show no significant difference between the pre- and post-number of steps; $t(11) = -.136$, $p = .894$ in the MI group; $t(10) = -1.635$, $p = .133$ in the control group (see Tables 4 and 5).

Table 4: Paired sample t-test for MI group comparing baseline step count to post-step count (n = 13).

Average Weekly Steps Week 1 = 5,586 Week 8 = 6,223		Paired Differences			
	Mean	Std. Deviation	t	df	Sig (2-Tailed)
Baseline Step Count vs. Post-Step Count	-72.65	1,847	-.136	11	.894

Table 5: Paired sample t-test for control group comparing baseline step count to post-step count (n = 12).

Average Weekly Steps Week 1 = 4,705 Week 8 = 5,775			Paired Differences		
	Mean	Std. Deviation	t	df	Sig (2-Tailed)
Baseline Step Count vs. Post-Step Count	-992.06	2,012.72	-1.635	10	.133

After statistically controlling the pre-intervention step counts (average steps for week 1) and covariates (average steps per day, living status, education and marital status), ANCOVA results demonstrate no significant difference in post-intervention step counts between the two groups $F(1, 17) = 2.27$, $p = 0.15$ as shown in Table 6. This finding is not consistent with Hypothesis 1; thus, the hypothesis is not supported with the results from this test.

Table 6: ANCOVA difference between step count for MI and control groups (week 8).

	SS	df	MS	F	P
Constant covariate	7,383,066.23	1	7,383,066.23	2.76	.12
Average steps week 1	430,363,028.70	1	40,363,028.70	15.11	<.001
Steps per day	4,126,352.94	1	4,126,352.94	1.54	.23
Living Status	4,116,348.64	1	4,116,348.64	1.54	.23
Education	293,571.46	1	293,571.46	.11	.74
Marital Status	461,531.42	1	461,531.42	.17	.68
MI (between-subject effect)	6,062,405.33	1	6,062,405.33	2.27	.15
Error (within-subject effect)	45,407,255.2	17			
Total	1.019E+9	24			

Note. SS = sum of square; df = degree of freedom; MS = mean square; MI = motivational interviewing.

In review of the data, a decrease was found in the average number of steps for the MI group, noted at week 8, the final week of the study as compared to week 6 of the study. During week 6, the intervention group averaged 6,926 steps (SD = 2,418). An increase in steps was noted from week 1 through week 6, for the intervention group, and then there was a slight decline in steps noted from week 6 (6,926) to week 8 (6,223). Even though there was a greater number of steps noted between week 1 and week 6 in the intervention group, it was not a statistically significant difference. The difference was noted through a paired sample t-test t-value = -.1.982, sig. (2 tailed) = .073 and df = 11.

An increase in the average weekly number of steps was noted in both groups during week 8 of this walking study as compared to week 1; however, the increase in the average number of weekly steps taken by the MI group as compared to the control group

in week 8 was not statistically significant. This finding is not consistent with Hypothesis 1; thus, this test does not support the stated hypothesis.

Hypothesis 2

Hypothesis 2 states the following: Older adults who participate in a program of individualized MI sessions will demonstrate an increase in functional ability, as measured by the SFT, as compared to those older adults who do not participate in the MI program.

Functional ability was assessed on all subjects prior to the initiation of the study, utilizing the following components of the SFT: 30-second chair-stand, 6-minute walk, eight-foot up-and-go, and BMI. To test the second hypothesis, the pretesting results from the SFT were compared to the results of the SFT at the end of week 8, utilizing a paired t-test (Table 7). The results from the chair sit-and-reach test are not included in Table 7 because it was determined from posttesting that the test had been completed inaccurately during pretesting and its results could not be analyzed; therefore, this test was omitted from the study.

Table 7: Senior Fitness Test comparison baseline and week 8.

		Intervention Group		Control Group	
		Baseline	Week 8	Baseline	Week 8
		Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
SFT	30-Second Chair-Stand	9.5 (3.4)	11.0 (3.1)	10.4 (2.4)	12.4 (3.8)
	6-Minute Walk Test	21.3 (5)	25.75 (4.7)	21.21 (6.8)	23.25 (8.3)
	Eight-Foot Up-and-Go	9.1 (2.6)	8.0 (2.2)	9.3 (2)	7.6 (1.9)
	BMI	26.5 (1.97)	25.67 (5.68)	29.4 (2.75)	28.79 (4.50)

Note. SFT = Senior Fitness Test.

The first test assessed in the SFT was eight-foot up-and-go. This agility timed balance test measures the number of seconds required for a subject to get up from a chair, and to walk around a cone that is placed eight feet away and then to return to the chair

sitting in an upright position. Table 7 shows the comparison of the eight-foot up-and–go

test during pre- and posttesting.

All subjects but three (two in the MI and one in the control group) demonstrated a

decrease in the number of seconds it took to complete the eight-foot up-and–go posttest

as compared to the pretest. The intervention group (n = 13) completed the test in an

average of 9.1 seconds (SD = 2.6) pretest and 8 seconds (SD = 2.2) posttest, while the

control group (n = 12) completed the test in an average of 9.3 seconds (SD = 2.0) pretest

and 7.6 seconds (SD = 1.9) posttest. After statistically controlling for pre-eight-foot up-

and-go test and covariates, ANCOVA demonstrates a significant difference in the post-

intervention eight-foot up-and–go test between the two groups $F(1,18) = 5.18$, p = .035

(Table 8). This finding is consistent with Hypothesis 2; thus, this test supports the stated

hypothesis.

Table 8: ANCOVA results for post-eight-foot up-and-go test.

	SS	df	MS	F	P
Constant covariate	4.33	1	4.33	2.55	.13
Pre-Up-and-Go	29.75	1	29.75	17.55	<.001
Steps per day	1.74	1	1.74	1.02	.32
Living Status	.477	1	.477	.28	.60
Education	11.60	1	11.6	6.85	.02
Marital Status	5.46	1	5.46	3.22	.090
MI (between-subject effect)	8.78	1	8.78	5.18	.035
Error (within-subject effect)	30.50	18			
Total	1,631.17	25			

Note. SS = sum of square; df = degree of freedom; MS = mean square; MI = motivational interviewing.

The second test completed in the SFT was the 30-second chair-stand. Twenty

three out of the 26 subjects were able to increase the number of chair stands completed at

posttest. The intervention group (n = 13) completed an average of 10 chair stands (SD =

3.38) pretest and completed an average of 11 chair stands (SD = 3.12) posttest, while the

control group (n = 12) completed an average of 10 chair stands (SD = 2.43) pretest and

12 (SD = 3.77) chair stands posttest. The intervention group did not demonstrate a

statistically significant (p value = .311) increase in the number of chair stands completed

at posttest.

After statistically controlling for the pre-30-second chair-stand count and

covariates, ANCOVA results show no significant difference in post-30-second chair-

stand count between the two groups $F(1,18) = 2.40$, p = .55, as shown in Table 9. This

finding is not consistent with the hypothesis; thus Hypothesis 2 is not supported with the

results of this test.

Table 9: ANCOVA results for post-30-second chair-stand.

	SS	df	MS	F	P
Constant covariate	.21	1	.22	,034	.86
Pre-30-second chair-stand	71.99	1	71.99	11.42	<.001
Steps per day	13.74	1	13.74	2.18	.16
Living Status	11.31	1	11.31	1.79	.20
Education	1.66	1	1.66	.27	.61
Marital Status	2.78	1	2.78	.44	.52
MI (between-subject effect)	2.40	1	2.40	.38	.55
Error (within-subject effect)	85.77	18	4.77		
Total	16,119.31	25			

Note. SS = sum of square; df = degree of freedom; MS = mean square; MI = motivational interviewing.

The third test assessed within the SFT was the 6-minute walk test. Table 10

demonstrates the comparison of the 6-minute walk test during pre- and posttesting. The

protocol for this test requires measurement to be the number of laps completed during the

6-minute time period rather than the number of steps completed in 6 minutes. The 6-

minute walk test has been successful in detecting expected performance differences

across different age groups and in people with different levels of physical activity (Rikli & Jones, 1999, 2012, 2013a, 2013b). This aerobic endurance test measures the subject's ability to walk distances required for daily living in the community-dwelling older adult.

The intervention group (n = 13) walked an average of 21.3 laps (SD = 5.0) pretest and completed an average of 25.8 laps (SD = 4.7) posttest, while the control group (n = 12) completed an average of 21.2 laps (SD = 6.8) pretest and 23.3 laps (SD = 8.3) posttest. The difference (p value = .957) was not significant in the number of laps walked in the intervention group as compared to the control group during posttesting.

After statistically controlling the pre-6-minute walk test and covariates with ANCOVA, results demonstrate that the difference was not significant in the post-intervention 6-minute walk test between the two groups $F(1,18) = 4.77$, p = .39, as shown in Table 10. This finding is not consistent with Hypothesis 2; thus, the stated hypothesis is not supported.

Table 10: ANCOVA results for post-6-minute walk test.

	SS	df	MS	F	P
Constant covariate	18.86	1	18.86	3.9	.06
Pre-6-minute walk	556.57	1	556.57	116.80	<.001
Steps per day	9.79	1	9.79	2.05	.17
Living status	5.47	1	5.47	1.14	.30
Education	35.73	1	35.73	7.50	.01
Marital status	48.13	1	48.13	10.10	.01
MI (between-subject effect)	3.70	1	3.70	.777	.39
Error (within-subject effect)	113.5	18	6.30		
Total	16,119.31	25			

Note. SS = sum of square; df = degree of freedom; MS = mean square; MI = motivational interviewing.

The fourth and final test assessed within the SFT was body mass index (BMI). BMI measures the ratio of weight to height. "Body mass index can be determined by multiplying weight in pounds by 703 and dividing height in inches squared [BMI = (LB

X703/in^2]" (Rikli & Jones, 2013b, p. 17). The suggested BMI for older adults is between 19 and 25.

The intervention group (n = 13) had an average BMI of 26.5 pretest and an average BMI of 26 posttest. The control group (n = 12) had an average BMI of 29.4 pretest and an average BMI of 29 posttest (Table 11). After statistically controlling for pre-BMI and covariates with ANCOVA, results show no significant difference in the BMI between the two groups, $F(1,18) = 1.39$, p = .25, as shown in Table 11. This finding is not consistent with Hypothesis 2; thus, the stated hypothesis is not supported.

Table 11: ANCOVA results for post-BMI.

	SS	df	MS	F	P
Constant Covariate	.193	1	4.33	2.55	.13
Pre-BMI	405.97	1	405.97	1438.28	<.001
Steps per day	.523	1	.523	1.85	.19
Living status	.782	1	.782	2.77	.11
Education	.006	1	.006	.023	.88
Marital status	.058	1	.058	.206	.66
MI (between-subject effect)	.393	1	.393	1.39	.25
Error (within-subject effect)	30.50	18			
Total	19,120.68	25			

Note. SS = sum of square; df = degree of freedom; MS = mean square; MI = motivational interviewing.

The data results from the SFT are disappointing; however, many of the subjects within the study did demonstrate improvement during posttesting. Only one out of the four tests produced statistically significant results for the MI group. The MI group did demonstrate a statistically significant decrease in the amount of time it took to complete the eight-foot up-and-go test. The findings are partially consistent with Hypothesis 2; hence, this hypothesis is not totally supported or rejected.

Chapter 4 Summary

In summary, on average, the 25 subjects who completed the study demonstrated an increase in the number of daily steps walked. The increase in the number of steps taken by subjects in the MI group was not statistically significant, as compared to those in the control group; however, all the subjects did become more physically active than they had been at the start of the study. Although three out of four of the SFT tests were not statistically significant, the intervention group did demonstrate a statistically significant decrease in the amount of time it took to complete the eight-foot up-and-go test.

CHAPTER 5

DISCUSSION

<u>Overview</u>

This quantitative study examined the effects of MI on daily steps walked and functional ability among older adults. The aim of the study was to determine if three brief personalized MI sessions, over an 8-week course, would increase daily steps and functional ability within a group of older adults. The theoretical framework utilized for the study was the TTM. The study incorporated Jitramontree's evidence-based practice guidelines for walking (Jitramontree, 2001). The research hypotheses stated that a program consisting of brief motivational sessions would increase (a) daily steps and (b) functional ability in older adults. Findings of the study will be discussed in this chapter, as well as strengths, limitations, and implications.

Sample

A majority of subjects within the study were White (92.3%), with the other 7.7 % (2 subjects) noted to be Hispanic or other. The two non-White subjects were part of the MI group. This highly White sample reflects the composition of the population where the study took place; 73.8% of the population served at the Amherst Senior Center are White (https://www.amherstma.gov/269/senior-center), while 95% of the population served at the Belchertown Senior Center are White (W. Korzenowski, personal communication, June 22, 2016).

The sample size for this study was smaller than some MI studies cited in the literature review (Bennett et al., 2005; Brodie & Inoue, 2005; Kolt et al., 2007); however, Taylor et al. (2003) and Resnick (2000) had previously cited studies that also utilized

smaller sample sizes in studies that focused on physical activity with older adults. Hackshaw (2008) suggests that smaller sample studies are quicker to conduct because they do not need as much time to recruit subjects and also require fewer resources to conduct. However, in future quantitative studies with older adults, the researcher will increase the sample size in order to have sufficient power to detect significant relationships or differences.

Two (15.4%) subjects in the MI group stated they did not live alone, whereas eight (66.7%) subjects in the control group stated that they did not live alone. As stated, women live longer than men, which may account for the larger number of subjects living alone in the intervention group. It was also of interest to identify whether living alone would have an effect on the number of daily steps taken by each subject. Twelve out of the 13 subjects in the MI group were single, and eight out of those 12 subjects increased their daily step count during the course of the study. Sallis et al. (2006) state that having a potential partner for physical activity in the home increases the chances of performing physical activity; however, in a systematic review of the literature, Picorelli, Pereira, Pereira, Felicio, and Sherrington (2014) found that living alone was associated with greater adherence to exercise programs. Further research on this variable as it relates to older adults and exercise will need to be completed in the future.

The gender composition for this study was predominately female with only one male subject in the intervention group. The researcher would have liked to have seen more men included in the study however this sample appears to be reflective of published walking studies with older adults. In a systematic review of 26 walking studies with older adults, Bravata, Smith-Spangler, and Sundaran (2007) found that 85% of the

subjects in the studies were female; on the other hand, Yelmokas and Mernitz (2006), authors of prescribing guidelines for exercise in older adults, state that "women are more likely than men to report engaging in no physical activity" (p. 437). Lastly, the subjects, White older adult females, may have been reflective of the study community composition; however, these study results might not apply to populations that are substantially different.

<h3 style="text-align:center">Attrition</h3>

The attrition rate for this study was exceptionally low. Only one subject withdrew after losing her Fitbit. Resnick (2000) estimated that 50% of older adults who initiate an exercise program will drop out of the program within the first 6 months. The low attrition rate for the present study may be explained by the shorter length of the intervention as compared to longer exercise intervention studies that last up to 1 year (Bennett et al., 2005; Kolt et al., 2007; Taylor et al., 2003). Another possible reason for the low attrition rate could be contributed to the higher educational level of the subjects. According to Shaw and Spokane (2008), education is a factor in exercise participation. Individuals who are more highly educated are more likely to exercise. The sample in this study was highly educated, with an average education of 15.5 years (range 12–22 years). Finally, the intervention itself may have contributed to subject retention. A hallmark of the intervention for this study was attentive supervision. The researcher was in regular contact with the subjects in both the intervention and control groups. The researcher met all subjects in person six times and telephoned subjects four times during the course of the 8-week study. Adherence in exercise studies with older adults is generally better in studies that are more supervised (Picorelli et al., 2014), and telephone communication has

been found to be effective in encouraging walking behavior in older adults (Bennett et al., 2005; Lilienthal et al., 2014); Melnyk and Morrison-Beedy (2012) suggest that attrition is higher in studies when subjects in the control group receive minimal contact. As stated, the subjects in our control group did have frequent contact with the researcher throughout the study. This attentive supervision may have contributed to a low attrition rate; however, it may inadvertently have become part of the intervention, which may have altered the study findings. The researcher had planned for attrition in this study by increasing the enrollment to 13 subjects per group to ensure that there were at least 11 subjects per group. In the future, the researcher will plan to conduct a similar study with a larger sample size, thus increasing power and the likelihood of producing statistically significant results.

Motivational Interviewing as an Intervention to Enhance Walking

MI incorporates a stage-based model to identify interventional methods that will work for individuals at each stage of the change process. Focusing interventions on the stage of change is imperative since older adults will only make changes, such as increasing daily steps, when they are ready to do so. MI focuses on behavioral skill-building that empowers subjects to learn how to effectively change lifestyle behaviors such as incorporating a daily walking program.

The strength of this study was the individual personalized communication that the researcher had with each subject. The individualized sessions were conducted in private rooms within the two senior centers. This privacy allowed the subjects to talk freely about activity goals or concerns they were having related to walking. Although the results of this study had limited statistical significance, the researcher believes it provided older

adults the opportunity to change lifestyle habits by increasing their daily walking. The interventions within the study did encourage older adults to become more active, hence decreasing the risk of functional decline, loss of independence, and increased disease burden.

Most walking studies do not include step goals within their aims. However, Mayo et al. (2014) did develop individualized walking goals for cancer subjects who participated in a study to reduce cancer fatigue. In this study goals were developed according to the subject's pretesting walking status. Subjects who averaged less than 5,000 steps a day were asked to increase their number of steps per day by 10% every week. Subjects who walked an average of steps between 5,000 and 8,000 steps per day were to increase the number of steps per day by 5% per week. Those subjects with a baseline step count between 8,000 and 10,000 steps were asked to increase daily steps by 2.5% every week, and lastly those subjects with an average step count greater than 10,000 steps were encouraged to continue their current level of activity. A limited number of subjects within this study were able to increase their number of steps to this expectation. These expectations would be unrealistic for older adults to achieve. A realistic goal for older adults might be a 5% increase in daily steps over the course of the 8-week study. Eleven of the 25 older adults in this MI study did demonstrate a 5% increase in daily steps walked over the course of the study.

The subjects entered into this study with the intention of increasing their daily walking. By posttesting, 16 of the 25 subjects had increased their average steps taken. In the MI group, 8 of the 13 subjects successfully increased their average steps. Two subjects, one in each of the groups, remained in the lower contemplation stage throughout

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the study. Resnick (2007) identifies that motivation as it relates to older adults and exercise is complex and consists of some of the following concepts: removal of barriers, efficacy expectations, removal of unpleasant sensations, goals, psycho-social benefits, and individualized care. Some of these concepts were addressed with the subjects in the MI group; however, it was beyond the scope of this study to address all motivating factors suggested by Resnick.

During the course of the study, two subjects were unable to increase their daily steps secondary to acute exacerbations of chronic medical conditions. Medical concerns should be expected when working with older adults, even if they are considered "healthy" at the start of the study. Medical concerns may have played a role in the number of daily steps taken by subjects within this study.

Activity studies with older adults that have focused solely on walking are rare; rather, many of the studies have focused on exercise classes in collaboration or in comparison to walking activity. Brodie and Inoue (2005) and Taylor et al. (2003) are two studies that demonstrated positive correlations between physical activity and functional ability within the older population utilizing MI interventions. Kolt et al. (2008) and Resnick (2000) also reported positive results in walking studies conducted; however, specific statistical analysis was not offered in these studies. As compared to these cited studies, the results from this study were positive although limited in statistical significance.

In the future, when designing a walking study for older adults, this researcher will be more cognizant of the neighborhood sidewalk conditions. Subjects in Amherst complained about the poor condition of sidewalks, while Belchertown subjects

complained of the lack of sidewalks. Some older adults are fearful of falling while

walking outdoors, especially if the walkways are either in disrepair or not present.

Outdoor falls often occur on sidewalks, curbs, streets, and crosswalks where older adults

walk (Li et al., 2014). In future studies, the researcher will consider utilizing the

neighborhood walkability index, a tool to measure the quality of walkability in the

community (Van Cauwrenberg, Van Holle, DeBourdeaudhuij, Van Dyck, & Deforche,

2016).

Outcomes

Discussion of the outcomes will focus on the research hypotheses, study results,

and possible explanations regarding the study outcomes.

Daily Step Count

One of the major outcomes measured in this study was the average number of

steps walked on a weekly basis. There was not a significant (p = .894) difference between

the pre- and post-number of steps walked in the MI group. There also was no significant

(p = 0.73) difference in step count from week 1 to week 8 between the MI and control

groups.

Several factors in the design may have contributed to the lack of significance in

step count between groups. The sample size was small (n = 25), which may have led to a

lack of power and consequently a lack of statistical significance in step count between the

MI and control groups. The control group started the study at a slightly lower average

weekly step count (5,053) versus the intervention group who averaged 5,855 steps during

week 1. Hence at the start of the study the subjects within the MI group, were a more

active group, as measured by daily steps; this might imply that the control group had a

higher potential for growth because they appeared to be less active according to average step count at pretesting. Another factor that could have contributed to an insignificant difference in step count between groups could be contributed to researcher error. The researcher included into the average step count the days when subjects forgot to wear their Fitbits. Unbeknownst to the researcher, these days should have been eliminated from the average weekly step count. Gretebeck and Montoye (1992) suggest that pedometer non-wear periods need to be considered when calculating steps since wear time affects physical activity analyses, which in turn affects physical activity estimates.

On average, both groups increased the number of steps walked by the end of the 8-week study; however, the MI group did not demonstrate an increase in steps that was statistically greater than the number of steps taken by the control group. This finding might suggest that other variables besides the MI, such as attentive supervision, use of pedometers, or socialization, may have played a role in increasing step count for both groups. In the following paragraphs, the researcher will address these variables in more detail.

Pedometers

None of the subjects in this MI study had previously worn an electronic activity tracker. The subjects within the study found the pedometers extremely fascinating and helpful. As one subject remarked, "It is amazing that this little thing can keep track of the number of steps." The subjects were excited and encouraged with the use of the Fitbits and challenged themselves through their use. The pedometers, in themselves, could have been a variable that encouraged increased steps within all of the subjects of the study.

Croteau et al. (2007), in a 12-week walking intervention, discovered that subjects increased daily steps when wearing pedometers versus when pedometers were not worn. Other studies have utilized pedometers to increase daily steps in older adults (Croteau, Richeson, Vines, & Jones, 2013; Snyder et al., 2011).

Socialization

Socialization may have also played a role in the increase of daily steps taken by all subjects within the study. Many of the older adults appeared to enjoy the socialization that occurred through the individual meetings and biweekly phone calls with the researcher. The subjects in the MI group met to walk together, independent from the study. The researcher identified a sense of loneliness in some of the older adults who were involved in this study. "Loneliness and social isolation play a significant role in the health and well-being of older adults" (Hwang, Wang, Siever, Del Medico, & Jones, 2018, p. 1). Hwang et al. found that subjects felt a sense of "belonging" after participating in a community-based exercise program entitled "Walk 'n' Talk." This sense of belonging and engagement may have been a factor in explaining why both the intervention and control groups increased their daily steps by week 8.

Weather

The weather can have a significant effect on walking studies with older adults. The researcher chose to complete this study during the summer months to avoid the snow and ice that hinders the winters in the northeast part of the country. The seasonal effects of winter (cold temperatures and snowy days) have had a negative influence on the results of exercise studies with older adults (Bennett et al., 2008; Sims et al., 1998). However, in avoiding the winter months the researcher did not take into consideration the

drawbacks of conducting a walking study during the "dog days" of summer in the northeast. Approximately 33 days during the study had temperatures of 80 degrees Fahrenheit or higher, and approximately 18 days had a humidity level of 80% or higher (https://www.weather.gov/). Older adults are unable to tolerate the heat as well as younger adults secondary to increased heat loads causing a greater heat storage and consequently contributing to increased body temperatures (Stapleton, Larose, Simpson, Flouris, & Sigal, 2014). Increased body temperatures for older adults can be deadly. The elevated temperatures and humidity during the course of this study may have contributed to a decrease in step count. The National Oceanic and Atmospheric Administration (www.noaa.gov/weather) reported that 2017 was the 10th warmest year on record in Massachusetts. The researcher recommends that future walking studies, conducted with older adults, in the northeast take place either during the autumn or spring months to allow subjects the opportunity to develop the habit of daily walking. Due to the high temperatures and humidity some subjects did not walk daily interrupting the formation of habit development. Habitual behaviors are more likely to be consistently engaged in than non-habitual behaviors (Neal, Wood, & Drolet, 2013).

In summary, the difference in the number of steps taken by the MI group versus the control group was not significant; however both groups on average were able to increase the number of daily steps taken over the course of the 8-week study. The lack of significance between the two groups may be attributable to several factors: small sample size, seasonal effects, use of pedometers, social encounters with control group, and flawed step calculations.

Senior Fitness Test

The SFT was utilized in this study to measure the underlying physiologic parameters associated with functional ability. "This test measures lower and upper body strength, aerobic endurance, lower and upper body flexibility, and agility/dynamic balance" (Rikli & Jones, 1999, p. 129). The following tests from the SFT were utilized in this study: 30-second chair-stand, 6-minute walk, eight-foot up-and-go, and BMI. In the following paragraphs, the researcher will review the posttesting results from the SFT.

MI had a statistically significant positive effect on the post-eight-foot up-and-go test (p value = .001). The subjects in the MI group were able to complete the eight-foot up-and-go test in a significantly shorter period of time versus the subjects in the control group. This means that the subjects in the MI group demonstrated a higher level of agility and dynamic balance.

The results from the other tests within the SFT (30-second chair-stand, 6-minute walk test, and BMI) were not found to be statistically significant. Nonetheless, at posttesting, the subjects in the MI group on average were able to successfully increase the number of chair stands and walking laps completed. The MI group also decreased the amount of time it took to complete the eight-foot up-and-go test and also decreased their BMI at posttesting.

Utilizing MI to increase functional ability did not have the significant results the researcher had expected. The researcher hypothesizes that the results from the tests within the SFT may have been significant if the duration of the intervention had been longer. Another possible suggestion would be to combine the walking with lower-extremity-strengthening exercises to increase functional ability. Rikli and Jones (2013)

suggest that, when subjects do not do as well as expected on tests within the SFT, it is best to focus on well-rounded activities such as practicing the test items within the SFT. The researcher hypothesized that increased daily steps would increase functional ability for subjects in the intervention group. Jitramontree (2010) also suggested that walking could increase muscle mass and bone strength, which would then help older adults to become stronger and active. In this present study, subjects were encouraged to walk every day at a rate that felt comfortable and safe for them while also keeping in mind the American Heart Association and NIH recommendation of 2.5 hours per week of moderate intensity exercise.

Stage of Change

MI, the intervention in this study, is based on the stages of change. Individuals must pass through a series of changes in order to adopt healthier behaviors (such as increasing daily walking). The role of the healthcare provider is to guide the individual in the process of change by understanding what stage of change they currently are in. Interventions are specific to the stage of change (Appendix K).

At pretesting, 13 of the subjects were in the contemplation stage, nine were in the preparation stage, and three were in the action stage. A difference in stage of change existed between the MI and control groups. At pretesting, two subjects from the MI group and one subject in the control group were in the action stage. Eight of the subjects in the MI group did advance to a higher stage of change (six went from preparation to action, one went from contemplation to action, and one subject went from contemplation to preparation). Seven of these eight MI subjects who had advanced in stage of change increased their average weekly step count by 1,520. The study also demonstrated that

subjects in the action stage had a higher weekly step count than those subjects in either

the contemplation or preparation stages. This demonstrates that as a subject progressed in

stage of change, there was a lifestyle behavior change of increased walking. Based on the

TTM, an individual's self-efficacy and duration of walking should increase as that

individual progresses through the stages.

Strengths

The researcher for this study is a certified Gerontological Clinical Nurse

Specialist with extensive experience working with older adults, the target population for

this study. The study was methodically designed, utilizing two separate senior centers in

order to avoid compensatory rivalry between subjects. The researcher adhered to ethical

research principles while conducting the study. Subjects' confidentiality was maintained

and protected throughout the study. The researcher was attentive to the needs of the older

adult subjects, maintaining good communication throughout the study.

Limitations

Limitations arise even in the best planned research studies. Although this study

was thoughtfully designed, there are limitations to share. The limitations for the study

will be discussed in the following sections.

Design

An identified limitation of this study was the small sample size of 25 subjects.

The researcher believes that this small sample size may have contributed to some of the

insignificant findings of the study. "The smaller the sample size, the smaller the power of

the study" (Burns & Grove, 2009, p. 357). The study utilized a nonprobability method

(convenience sampling) for recruitment of subjects. The researcher chose convenience

sampling because it can be challenging to find a sample of eligible older adults who are willing to commit to participating in an 8-week walking study. Burns and Grove (2009) identify convenience sampling as weak because of the limits in controlling biases.

Implementation

There was an identified error in the chair sit-and-reach pre/posttesting. It was determined by the researcher at posttesting that errors had been made in the pretesting of the sit-and-reach assessment, and consequently the results of this test were not included in the final analysis of the tests within the SFT.

Environment

Environmental factors may have played a role in the number of daily steps taken by subjects within this study. Two of the subjects from the Belchertown group complained of a lack of sidewalks within their neighborhoods, and two of the subjects within the Amherst group complained about the condition of sidewalks within the town of Amherst. The researcher should have paid more attention to the physical environment (specifically sidewalks). Fear of outdoor falling is one of the major barriers preventing older adults from meeting the recommended levels of physical activity. If older adults are afraid to walk outside, then daily steps will be limited (Ory, Towne, Won, Forjuoh, & Lee, 2016). Lee et al. (2017) also suggest a direct connection between the physical conditions of sidewalks and fear of falling. The subjects in this walking study who were afraid of falling secondary to unkempt sidewalks chose to walk indoors at times. Gunn, Lee, Geelhoed, Shiell, and Giles-Corti, (2014), in a secondary analysis, utilized data from the Study of Environmental and Determinants of Physical Activity to suggest that individual and social environmental factors have had limited effects on behavioral change

and that placing emphasis on the built environment (sidewalks) would promote a more sustainable means of increasing walking. This researcher believes future research should focus on sustainable walkways (sidewalks) in order to allow older adults the opportunity to walk safely outdoors. The results of safe-walkway research studies need to be addressed with city planners in order to make changes within policy and practice in our communities.

Tools

The literature surrounding the sensitivity of the PAR-Q does not state specifics related to the sensitivity or reliability of the PAR-Q; rather, the literature states that "the sensitivity appears adequate; the questionnaire has been utilized to screen as many as a half million people, without any adverse events in subsequent exercise testing" (Thomas et al., 1992 p. 339). The researcher utilized this tool not only because it was included within Jitramontree's (2001) evidence-based practice walking guidelines but also due to a lack of available exercise screening tools designed specifically for older adults.

<u>Implications for Clinical Practice</u>

The results from this study indicate that MI did not have an effect on the number of daily steps and in fact the subjects in the control group increased steps by a higher percentage than the MI group. However the use of MI as an intervention did have a significant effect on the eight-foot up-and-go test, which is part of the SFT. Subjects in the intervention group were able to significantly reduce the number of seconds it took them to get up from a seated position, walk eight feet, turn, and return to the seated position.

MI may be an effective approach for healthcare personnel to utilize while encouraging older adults to become more physically active. MI may not only help older adults to explore the opportunities in changing behavior but also help them to resolve the ambivalence of change. Older adults have lived many years; many of their habits are deeply ingrained into their lifestyles. As healthcare professionals, we understand that telling people to change health behaviors has not been effective and does not work. MI allows the older adult to collaborate with the healthcare professional; it is a nonjudgmental process of encouraging change that considers where the older adult is at in "the continuum of change." It allows older adults the autonomy to make changes in their lifestyles through the process of skill-building.

Implications for Future Research

Findings from this study indicate that MI is an effective communication process that may be utilized with older adults to help develop internal motivation in order to make behavioral changes within their lives. Promoting motivation within subjects appears to be a key factor in successful activity studies with older adults. Pahor et al. (2014) suggest that a strength within the LIFE study was the lifestyle motivation procedures.

Future research should focus on repeating this study with a larger, more diverse sample. Research to increase activity in older adults may focus on combining MI with additional interventions such as lower body muscle-strengthening exercises and social groupings. This research will take place during the autumn or spring months. Some of the subjects from the MI group enjoyed walking together at the Hadley bike trail. This was not part of the study; rather, the subjects arranged it independently. Future studies may

incorporate a group-walking experience since some subjects within this study enjoyed this "walk and talk" experience.

It is imperative that future activity-related research focus on a more diverse population of subjects. The majority of subjects in this study were White due to the composition of this rural population. The researcher would suggest completing this study in an urban setting. A limited number of walking studies with older adults noted racial or ethnic diversity within the sample. Cummings et al. (2009) stated that "limited information exists concerning the differential effect of MI by race or gender" (p. 203). The study conducted by Conn (1998) noted a sample of "1 Asian, 1 Hispanic, 6 African Americans, and 139 Caucasian subjects" (p. 4). The researcher also noted that there appear to be a limited number of studies that incorporate the Latino population. Many of the studies that have been conducted within the U.S. have limited their samples to English-speaking individuals. This is an area for future research since the older adult Hispanic population is increasing. In 2014, Hispanics made up 8% of the older adult population; this is expected to increase to 22% by 2060 (www.acl.gov/aging-and-disability-in America/).

Lastly, future studies should focus on neighborhood walkability. As stated, walkability was an issue within this study secondary to a lack of accessible kempt sidewalks. Access to well-kempt neighborhood walking paths is essential in order for older adults to be able to walk within their neighborhoods. Future research should focus on socioecological models that encourage congruence between individuals, health, and environment.

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Conclusion

Approximately 25% of the older adults in our society meet the suggested physical activity requirements (Yan et al., 2011). This lack of physical activity may lead to decreased mobility and motor function, functional dependence, and a decreased quality of life (Fleischman et al., 2015). The literature is lacking related to the processes that are needed to encourage the initiation and sustenance of exercise within the older adult population.

The results of this study on walking demonstrate that MI may be one intervention that could easily be utilized to help older adults initiate and maintain a personal walking program in order to maintain functional independence. Findings from this study suggest that other variables should also be considered in future walking studies with older adults such as seasonal timing of walking, and safe accessible walkways.

Lastly, this study was conducted on a small sample of older adults over a short period of time. Further research is therefore needed to determine the long-term effects of MI on a larger number of diverse older adults before generalized conclusions can be drawn.

APPENDIX A

CERTIFICATION OF HUMAN SUBJECTS APPROVAL

University of Massachusetts Amherst
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Research Compliance
Human Research Protection Office (HRPO)
Telephone: (413) 545-3428
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Date: To:

Other Investigator:

November 1, 2017

Erin Lamoureux, Nursing Cynthia Jacelon, Nursing

From: Lynnette Leidy Sievert, Chair, UMASS IRB

Protocol Title:Utilizing Motivational Interviewing to increase walking and
functional ability in older adults Protocol ID: 2016-3425
Review Type:EXPEDITED - RENEWAL
Paragraph ID: 7
Approval Date: 11/01/2017
Expiration Date: 11/30/2018
OGCA #:

This study has been reviewed and approved by the University of Massachusetts Amherst IRB, Federal Wide
Assurance # 00003909. Approval is granted with the understanding that investigator(s) are responsible for:

Modifications - All changes to the study (e.g. protocol, recruitment materials, consent form, additional key
personnel), must be submitted for approval in e-protocol before instituting the changes. New personnel must
have completed CITI training.

Consent forms - A copy of the approved, validated, consent form (with the IRB stamp) must be used to consent
each subject. Investigators must retain copies of signed consent documents for six (6) years after close of the
grant, or three (3) years if unfunded.

Adverse Event Reporting - Adverse events occurring in the course of the protocol must be reported in e-protocol
as soon as possible, but no later than five (5) working days.

Continuing Review - Studies that received Full Board or Expedited approval must be reviewed three weeks prior to
expiration, or six weeks for Full Board. Renewal Reports are submitted through e-protocol.

Completion Reports - Notify the IRB when your study is complete by submitting a Final Report Form in e-protocol.

Consent form (when applicable) will be stamped and sent in a separate e-mail. Use only IRB approved copies of the
consent forms, questionnaires, letters, advertisements etc. in your research.

Please contact the Human Research Protection Office if you have any further questions. Best wishes for a successful
project.

APPENDIX B

RESEARCH INFORMED CONSENT FORM

Title of research: Utilizing Motivational Interviewing to increase walking and functional ability in older adults.

Student Investigator: Erin T. Lamoureux PhDc, RN, GCNS-BC

Purpose of Research: The purpose of this pilot study is to determine whether 3 person to person individualized sessions of Motivational Interviewing will increase daily steps taken and functional ability in older adults.

Procedure: Subjects in this study will be assigned to either the intervention group or the control group. All subjects in this study will attend a one hour informational sessions on the benefit of walking. All subjects in the study will receive a Yamax Pedometer to be worn for the duration of the study. All subjects, with the help of the PI, will be asked to complete the PARQ, Mini Cog, Physical Activity Stage of Change Questionnaire, SFT, Demographic Data and consent form. The subjects in the intervention group will receive 3 MI sessions which will be individualized depending on the subject's stage of change. At the end of the 8 week study all subjects will be evaluated utilizing the Physical Activity Stage of Change Questionnaire and the SFT.

Benefits: The benefits of participating may be increased daily walking and improved functional ability. It is also possible that the subject may not receive significant benefit from participating in this study.

Risks: There are no identifiable risks involved in participating in this study.

Compensation: Participating in this study is voluntary; each subject will receive a $10.00 gift card from the Big Y Supermarket as a token of appreciation for participating.

Subject enrollment/Length of study: 20 older adults, from 2 different Western Massachusetts senior centers will be enrolled in this pilot study. The study is expected to last 8 weeks.

Confidentiality: Information from this study will be confidential and private. Each subject will be identified by number on the demographic form. No individual or facility names will be utilized if the results of this study are published in the future. All data will be kept under lock and key in the PI's home office.

Further Information: Questions please contact Erin Lamoureux (413-575-8373) elamoureux@nursing.umass.edu or Cynthia Jacelon (413-545-9576) Jacelon@nursing.umass.edu. If you would like to speak with someone at the University of Massachusetts Amherst (413-545-3428)humansubjects@ora.umass.edu

SUBJECT STATEMENT OF VOLUNTARY CONSENT:

I am agreeing to voluntarily participate in this research study. I understand that, by signing this document, I do not waive any of my legal rights. I have read this consent form and understand the purpose of this study. I have had the opportunity to ask questions related to the study. A copy of this signed informed consent form has been given to me.

Print Name:
Signature:
Date:

APPENDIX C

DEMOGRAPHIC DATA

Initials _____
Date: _____
ID number:_____
Center: _____
BP: _____
HR: _____

Score on:

PARQ ____
Mini Cog ____
PASCQ _____
SFT ____

Gender:

1. Male
2. Female

Date of Birth: _____

Ethnicity:
1. Native American
2. White or Caucasian
3. African American or Black
4. Asian or Asian American
5. Hispanic or Latino
6. Other (describe) _____

Marital Status:
1. Single
2. Married
3. Separated
4. Divorced
5. Widowed

Education:
1. Grammar school
2. High school diploma/GED
3. Associate of Arts degree
4. Bachelor of Science/Art degree
5. Master's degree
6. Doctorate degree
7. Other (describe) _____

Housing Status
1. Live alone
2. Does not live alone.

How would you rate your health?
Good___
Fair___
Poor___

How much walking do you do on a daily basis?

Only what is needed for daily function_____

Walk on average 10-15 minutes/day_____

Walk on average 16-30 minutes/day_____

Walk over 30 minutes/day_____

APPENDIX D

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day.   Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active. If you are planning to become much more physically active than you are now, start by answering the seven questions below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before your start. I you are over 69 years of age, and you are not accustomed to being very active, check with your doctor.

Directions: Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly, check YES or NO.

<u>YES</u>   <u>NO</u>   1. Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor?

_____   _____   2. Do you feel pain in your chest when you do physical activity?

_____   _____   3. In the past month, have you had chest pain when you were not doing physical activity?

_____   _____   4. Do you lose your balance because of dizziness or do you ever lose consciousness?

_____   _____   5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?

_____   _____   6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?

                                    7. Do you know of <u>any other reason</u> why you should not do physical activity?

If you have answered YES to one or more questions – Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.
-   You may be able to do any activity you want – as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those that are safe for you. Talk with your doctor about the kids of activities you wish to participate in and follow his/her advice.
-   Find out which community programs are safe and helpful for you.

If you answered NO to all PAR-Q questions, you can be reasonably sure that you can:
-   Start becoming much more physically active – begin slowly and build up gradually. This is the safest and easiest way to go.

- Take part in a fitness appraisal – this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively.

Delay becoming much more active:
- If you are not feeling well because of a temporary illness such as a cold or a fever – wait until you feel better; or
- If you are or may be pregnant – talk to your doctor before you start becoming more active.

Please note: If your health changes so that you then answer YES to any of the questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

APPENDIX E

MINI-COG

Mini-Cog™

Instructions for Administration & Scoring

ID:_____Date:_____

Step 1: Three Word Registration

Look directly at person and say, "Please listen carefully. I am going to say three words that I want you to repeat back to me now and try to remember. The words are [select a list of words from the versions below]. Please say them for me now." If the person is unable to repeat the words after three attempts, move on to Step 2 (clock drawing).

The following and other word lists have been used in one or more clinical studies.[1-3] For repeated administrations, use of an alternative word list is recommended.

Version 1	Version 2	Version 3	Version 4	Version 5	Version 6
Banana	Leader	Village	River	Captain	Daughter
Sunrise	Season	Kitchen	Nation	Garden	Heaven
Chair	Table	Baby	Finger	Picture	Mountain

Step 2: Clock Drawing

Say: "Next, I want you to draw a clock for me. First, put in all of the numbers where they go." When that is completed, say: "Now, set the hands to 10 past 11."

Use preprinted circle (see next page) for this exercise. Repeat instructions as needed as this is not a memory test. Move to Step 3 if the clock is not complete within three minutes.

Step 3: Three-Word Recall

Ask the person to recall the three words you stated in Step 1. Say: "What were the three words I asked you to remember?" Record the word list version number and the person's answers below.

Word List Version:_____   Person's Answers: _____   _____   _____

Word Recall: _____ **(0-3 points)**	1 point for each word spontaneously recalled without cueing.
Clock Draw: _____ **(0 or 2 points)**	Normal clock = 2 points. A normal clock has all numbers placed in the correct sequence and approximately correct position (e.g., 12, 3, 6 and 9 are in anchor positions) with no missing or duplicate numbers. Hands are pointing to the 11 and 2 (11:10). Hand length is not scored. Inability or refusal to draw a clock (abnormal) = 0 points.
Total Score: _____ **(0-5 points)**	Total score = Word Recall score + Clock Draw score. A cut point of <3 on the Mini-Cog™ has been validated for dementia screening, but many individuals with clinically meaningful cognitive impairment will score higher. When greater sensitivity is desired, a cut point of <4 is recommended as it may indicate a need for further evaluation of cognitive status.

Clock Drawing

ID: _____ Date: _____

(circle)
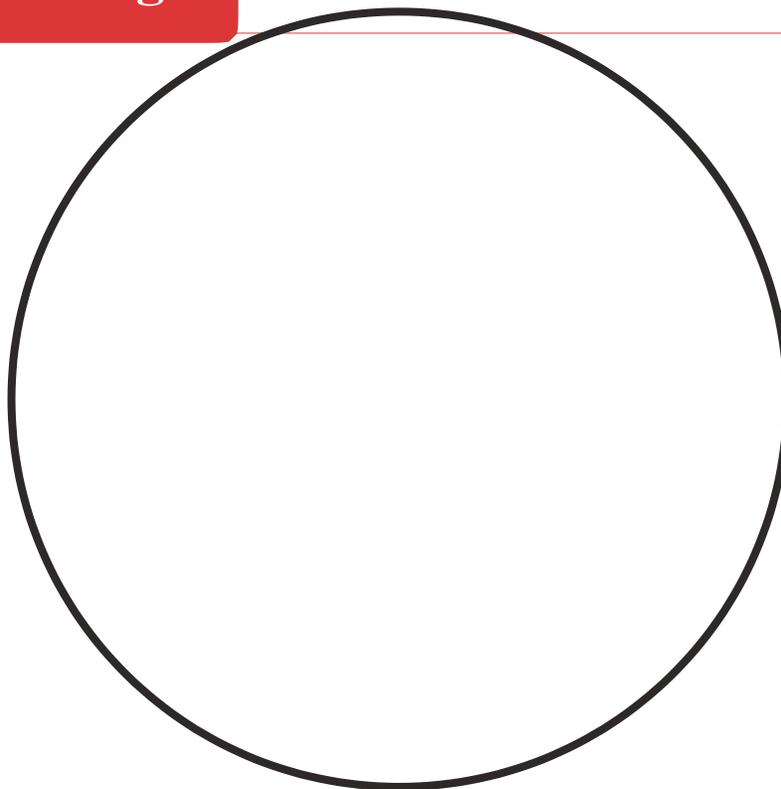
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PHYSICAL ACTIVITY STAGE OF CHANGE QUESTIONNAIRE
(USDHHS, 1999)

Moderate physical activity or exercise includes such activities as walking, gardening, and heavy housecleaning. For moderate activity to be regular it must add up to 30 or more minutes per day and be done at least 5 days per week. For example, in one day you could achieve your total of 30 minutes by taking a brisk 10-miute walk, raking leaves for 10 minutes, and washing your car for 10 minutes.

Directions: For each question below, check Yes or No.

		Yes	No
1.	I currently participate in moderate physical activity.	A. ___	B. ___
2.	I intend to increase my participation in moderate physical activity in the next six months.	C. ___	D. ___
3.	I currently engage in regular moderate physical activity.	E. ___	F. ___
4.	I have been participating in moderate physical activity regularly for the past six months.	G. ___	H. ___
5.	In the past, I was regularly physically active in moderate activities for at least three months.	I. ___	J. ___

Scoring Instructions to Determine Stage of Change:
If lines B and D are checked = Precontemplation (not active, currently has no intention of being active).
If lines B and C are checked = Contemplation (not active, but intends to be soon).
If lines A and F are checked = Preparation (trying, but not regularly active).
If lines A, E, H are checked = Action (regularly active, but for less than 6 months).
If lines A, E, G are checked = Maintenance (regularly active for 6 months or more).
If line I is checked = Perhaps Relapse (if score indicates a relapse, also designate the person's current stage).
Complete the following questions. (Note: If you are not currently physically active or do not exercise at all, please write 0 [zero] to the questions below.)

This scale was developed by Dr. Bess Marcus, Brown University Medical School, and the Miriam Hospital Division of Behavioral Medicine. It has been reproduced with minor adaptation with permission by United State Department of Health and Human Services.

APPENDIX G

SENIOR FITNESS TEST

Overview of Test Items

30-Second Chair-Stand Test
Purpose
To assess lower-body strength needed for numerous tasks such as climbing stairs; walking; and getting out of a chair, tub, or car (increased ability in performing this exercise may reduce the chance of falling)
Description
Number of full stands from a seated position that can be completed in 30 seconds with arms folded across chest

6-Minute Walk Test
Purpose
To assess aerobic endurance – important for walking distances, climbing stairs, shopping, sightseeing while on vacation, and so on.
Description
Number of yards (or meters) that can be walked in 6 minutes around a 50-yeard (45.7 m) course.

Chair Sit-and-Reach Test
Purpose
To assess lower-body flexibility, which is important for good posture, normal gait patterns, and various mobility tasks such as getting in and out of a bathtub or car
Description
From a sitting position at the front of a chair, with leg extended and hands reaching toward toes, the number of inches (centimeters) (plus or minus) between the extended fingers and the tip of the toe

Eight-Foot Up-and-Go Test
Purpose
To assess the agility and dynamic balance important in tasks that require quick maneuvering such as getting off a bus in time, getting up to attend to something in the kitchen, going to the bathroom, or answering the phone
Description
Number of seconds required to get up from a seated position, walk 8 feet (2.4 meters), turn, and return to the seated position

Height and Weight
Purpose
To assess body weight relative to body height, because of the importance of weight management for function mobility
Description
Involves measuring height and weight, then using a conversion table to determine body mass index

APPENDIX H

FITBIT

APPENDIX I

PEDOMETER MONITOR LOG

D A Y	Date	Day (Sun – Sat)	Time out of bed	Time put pedometer on	Time pedometer removed	Time into bed for the night	List times during the day the pedometer was not worn. (Make sure to include AM or PM)	Notes about activity
1	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		
2	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		
3	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		
4	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		
5	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		
6	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		
7	/ /		___:___ am/pm	___:___ am/pm	___:___ am/pm	___:___ am/pm		

APPENDIX J

PLAN FOR 1-HOUR INFORMATIONAL SESSION ON WALKING

1) The benefits of walking
    a) Help maintain and improve physical strength and fitness
    b) Help improve your ability to do the things you want to do
    c) Help improve balance
    d) Help manage and prevent diseases
    e) Help reduce feelings of depression; improve mood and overall well-being

2) How much walking is enough?
    a) Identify your walking starting point (increase steps weekly, goal is 3,000 to 10,000 daily)
    b) Important to walk in 10 minute intervals (if you can do more than this, great!)

3) How can I incorporate walking into my life?
    a) Develop a schedule for walking
    b) Think of ways you can break up the time you spend sitting or not moving
    c) Identify a walking buddy or group to walk with daily
    d) Set realistic and attainable goals

4) Walking safety
    a) Walk during the daylight
    b) Utilize sidewalks, be aware of curbs
    c) Use cross walks; cross streets only when you have the pedestrian crossing light
    d) Be aware of bikes and runners
    e) Wear bright colored clothing for visibility

INTERVENTIONS BASED ON STAGE OF CHANGE
(adapted from Jitramontree [2001] protocol)

Precontemplation Stage

- Allow subject to discuss the pros and cons of change
- Subject will be encouraged to keep a journal of daily activity (including how much time spent in sedentary behavior, average daily steps taken)
- Provide subject with step-tracking device in order for them to track daily steps
- Provide information about benefits of exercise/walking (exercise manual from the National Institute on Aging)
- Educate on ways to gradually increase daily exercise/walking
- Share information on positive and fun ways to increase exercise/walking
- Arrange for subject to meet with an older adult who enjoys and incorporates exercise/walking in daily life

Contemplation Stage

- Provide subject with step-tracking device in order for them to track daily steps. Allows subject to monitor steps and compare progress toward goals. Pedometers have been found to increase physical activity with older adults.
- Assess subject's efficacy for exercise/walking
- Assess subject's barriers to exercise/walking
- Praise change talk related to exercise/walking
- Provide information related to walking resources (walking paths or tracks and malls)
- Provide information related to exercise/walking safety
- Assist subject with the selection of appropriate clothes/shoes for exercise/walking
- Assist subject to identify physical activity plan and measurable short terms

goals (I will walk for 10 minutes every day or I will walk to pick up the mail every morning) (Subjects perform better with clear, specific and challenging goals (Locke & Latham, 2002).

Preparation Stage

- Provide subject with step tracking device in order for them to track daily steps. Allows subject to monitor steps and compare progress towards goals. Pedometers have been found to increase physical activity with older adults.
- Encourage/praise subject's efficacy for exercise/walking
- Help subject to design realistic, measurable short terms goals (I will walk for 10 minutes every day or I will walk to pick up the mail every morning) (Subjects perform better with clear, specific and challenging goals (Locke & Latham, 2002).
- Encourage subject to share plans for exercise/walking with family and friends
- Encourage subject to exercise/walk with family and friends
- Provide information related to walking resources (walking paths or tracks and malls)
- Provide information on walking safety
- Share information on positive and fun ways to increase exercise/walking
- Praise and affirm all exercise/walking

Action Stage

- Provide subject with step-tracking device in order for them to track daily steps. Allows subject to monitor steps and compare progress toward goals. Pedometers have been found to increase physical activity with older adults.
- Assist subject in developing long-term goals (I will participate in a 2-mile walking event in the spring) (Subjects perform better with clear, specific and challenging goals (Locke & Latham, 2002).

- Set up regularly scheduled walking dates with friend/s or family (it is more difficult to skip walking if you are letting someone down)
- Reward any and all successes

APPENDIX L

DATA COLLECTION PROTOCOL

1. Meet with subject in assigned confidential room

2. Prior to the start of study have subject sign consent form.

   Complete baseline intake form with subject.

3. Subject to complete with PI:

   The Physical Activity Stage of Change Questionnaire (Appendix F)
   The Senior Fitness Test (SFT) (Appendix G),
   Review of pedometer use

4. Week 1
   Intervention group subjects will receive a 30-minute one-on-one personalized MI intervention related to walking by researcher (Appendix K), sync pedometer, review activity log
   Control group subjects meet for socialization with researcher, sync pedometer, review activity log

5. Week 2, 3, 5, 6
   Phone calls placed to subjects to assess how they were doing with walking, answer questions and remind them of their next scheduled appointment with the researcher.

6. Week 4 and 7
   Intervention group subjects will receive a 30-minute one-on-one personalized MI intervention related to walking by researcher (Appendix K), sync pedometer, review activity log
   Control group subjects meet for socialization with researcher, sync pedometer, review activity log

7. Week 9
    The Physical Activity Stage of Change Questionnaire (Appendix F)
           The Physical Activity Stage of Change Questionnaire (Appendix F)
           The Senior Fitness Test (SFT) (Appendix G),
           Review number of average daily steps taken on pedometer

8. Thank each subject for participating in the study.

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