HELPING OLDER ADULTS SUSTAIN THEIR GAINS:
A THEORY-BASED INTERVENTION TO PROMOTE ADHERENCE TO
HOME EXERCISE FOLLOWING PHYSICAL THERAPY

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by

Kristel M. Gallagher

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Dissertation written by

Kristel M. Gallagher
B.A., Waynesburg College, 2007
M.A., Kent State University, 2009
Ph.D., Kent State University, 2012

Approved by

John A. Updegraff, Ph.D.            Chair, Doctoral Dissertation
                                       Committee

Kristin D. Mickelson, Ph.D.
Mary Ann Parris Stephens, Ph.D.
John Gunstad, Ph.D.
Nichole Egbert, Ph.D.

Members, Doctoral Dissertation
Committee

Accepted by

Maria S. Zaragoza, Ph.D.            Chair, Department of Psychology

Timothy Moerland, Ph.D.             Dean, College of Arts and Science
“It takes a village” is a popular saying we have probably all heard before, though more than likely in the context of raising a child, not in a piece of scholarly work. However, many times when we reach a long-awaited highpoint in our personal or professional lives we (falsely) believe we are responsible for our own successes. And this is easily done – cards congratulating us for our hard work; emails telling us we deserve this moment; announcements filled with pride and joy. It is not hard to get caught up in our own success. But behind it all, there is a village. My village is much bigger and much stronger than me and I know that without them, I certainly would not be where I am today.

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TABLE OF CONTENTS

LIST OF FIGURES.....................................................................................viii
LIST OF TABLES........................................................................................ix

CHAPTER
I. INTRODUCTION
   Background ......................................................................................... 1
   Current Study ...................................................................................... 4
   Theory and Health Communications .............................................. 5
   Theory and Message Content ............................................................ 9
   Translating Theory into Message Content ..................................... 14
   Exercise Efficacy ................................................................................ 20
   Study Hypotheses .............................................................................. 24

II. METHOD
   Design .................................................................................................. 25
   Participants ......................................................................................... 26
   Materials ............................................................................................ 29
   Procedures .......................................................................................... 33
   Measure Descriptions ....................................................................... 36
   Analytic Strategy ............................................................................... 41
III. RESULTS

Descriptive Statistics .................................................. 45
Statistical Assumptions ................................................. 47
Hypotheses A and B ...................................................... 48
Hypotheses C and D ...................................................... 53
Mediational Analyses ................................................... 54

IV. DISCUSSION

Adherence to Home Exercise and Extra Exercises ............ 59
Outcome Expectations and Self-Efficacy ......................... 63
Limitations ............................................................... 68
Practical Implications ................................................... 73

REFERENCES .................................................................. 77

APPENDICES

A. Home Exercise Messages .......................................... 89
B. Measures ................................................................. 92
C. Recruitment and Screening Documents ....................... 112
D. Consent Form .......................................................... 118
LIST OF FIGURES

FIGURE

1. Randomization chart used to assign participants to either receive the emotion and meaning message (E) or the facts and information message (F) .......................... 27

2. Meditational model examining the proposed mediating effect of emotion- and meaning-based outcome expectations for exercise on the relationship between the emotion and meaning message and the number of extra exercise reported by participants .......................... 57

3. Sampling of patient exercise brochures from the American Physical Therapy Association’s Section on Geriatrics with exercise benefits highlighted ...................... 75
LIST OF TABLES

TABLE

1. Descriptive Results by Message Condition .......................... 30

2a. Bivariate Correlations – Potential Covariates
    and Dependent Variables ........................................ 49

2b. Mean Differences – Potential Covariates .......................... 50
CHAPTER I

Introduction

Background

Today, one in eight Americans is over the age of 65, classified as an older adult. Compared to the year 2000, this is a 15% increase, with a 36% increase expected by 2020. Further, these older adults can be expected to have, on average, an additional 19 years of life ahead of them (Administration on Aging, 2009). With an increase in the older adult population and average life expectancy now approaching 80 years in the United States, demands on the healthcare system can be expected to increase accordingly. One area of the healthcare system typically overrepresented by older adults is physical therapy (American Physical Therapy Association, 2000). Consequently, the American Physical Therapy Association recognizes geriatric physical therapy as a unique branch of therapy that focuses on treating a wide range of physical issues that adults face as they age.

In particular, older adults are at a high risk for falls and fall-related injuries that stem from lower extremity weakness and instability. These injuries can result in prolonged pain, functional impairments, reduced quality of life, excess health-care costs, and even mortality (Karinkanta, Piirtola, Sievanen, Uusi-Rasi, & Kannus, 2010). Older adults do, however, benefit from participation in therapist-supervised exercise programs
on the dimensions of balance, walking, and falls-prevention (see Chang et al., 2004 for a review).

Further, the benefits of physical activity are well-established in the older adult population. Older adults who are physically active have longer life expectancies, increased living independence, less frailty, reduced health care costs, as well as reduced risk for cardiovascular disease, diabetes, and osteoporosis (see Bean, Vora, & Frontera, 2004). Despite these known benefits, nearly 85% of older adults fail to achieve the recommended amount of physical activity (Centers for Disease Control, 2010) as prescribed by most major national health organizations (i.e., American College of Sports Medicine; American Heart Association; Centers for Disease Control and Prevention). Thus, a great deal of research has been aimed at understanding older adult participation in physical activity and developing programs to encourage older adults to be active.

Much less research has focused on the large number of older adults whose engagement in physical activity reflects being part of a monitored physical therapy program. In such a program, trained therapists instruct and engage patients in a series of exercises that are individually tailored to the needs and abilities of the patient, frequently centered around strength and balance training exercises. These exercises often build on one another and eventually form the patient’s full program of physical therapy, as well as contributing to the make-up of their home exercise program (American Physical Therapy Association, 2011). It is well-documented that the benefits of exercise gained by older adults during physical therapy are often not maintained once the program is over. Studies have shown that the gains made by older adults in physical therapy begin to decline
anywhere between 1 and 9 months after discharge (Hardage et al., 2007). Some have speculated that this lack of sustained benefits may be the result of poor adherence to the therapist-prescribed home exercise program designed to be continued once therapy is completed (Forkan et al., 2006).

That is, the purpose of a prescribed home exercise programs is to uphold and maintain the progress made during supervised physical therapy. For this reason, the home exercise program has been termed the “cornerstone” of the plan of care for physical therapy (Collins, Beissner, & Krout, 1998). Unfortunately, rates of adherence to home exercise programs do, in fact, decline over time, with the greatest drop beginning "the moment of discharge" (p. 193; Sluijjs & Knibbe, 1991). At best, a limited body of research provides an estimate of a 44% rate of adherence to prescribed home exercise (Hardage et al., 2007). These suboptimal rates of adherence have important clinical implications. In the older adult population, for instance, the lack of adherence to a prescribed home exercise program may lead to a cyclical affair in rehabilitation. The cycle may include an experience of short-term gains for patients while in a program of physical therapy, followed by a resultant decline once the monitored therapy program is complete, leading to further adverse events such as injury from falls, and finally re-entry back into the healthcare system.

Unfortunately, most of what is known about older adults’ adherence to physical therapy and home exercise programs comes from research seeking only to identify and understand predictors of adherence. Numerous important psychological variables, such as attitudes towards exercise and exercise control beliefs (Jette, et al., 1998), as well as self-
efficacy beliefs and outcome expectations (Resnick, 2001; Resnick & Spellbring, 2000), have been shown to be related to increased levels of adherence to exercise for older adults. Still, there is a surprising lack of any attempt to intervene with this vulnerable population, as no adherence-enhancing interventions have been identified in the literature to date. Indeed, it has been pointed out that research should seek to "examine what strategies help patients… increase adherence to a home exercise program" (p. 409; Forkan et al., 2006).

Current Study

The primary goal of this study is to test a theoretically-grounded approach to promoting adherence to home exercise in older adults with lower extremity diagnoses following physical therapy. The intervention will involve having older adults currently in a program of physical therapy for issues related to the lower extremities read and take home one of two print messages promoting the benefits of being adherent to their prescribed home exercise program. The design of the messages will be guided by psychological theories of human decision making (prospect theory; Tversky & Kahneman, 1981) and motivation (socioemotional selectivity theory; Carstensen, Isaacowitz, & Charles, 1999). One message will highlight the benefits of adhering to a home exercise program in terms of facts and information about physiological outcomes (facts and information message), while the other will highlight the benefits in terms of emotion- and meaning-based outcomes (emotion and meaning message). Corresponding levels of adherence to the home exercise program and additional exercises outside of the home exercise program will be assessed two weeks after discharge from physical therapy.
Self-efficacy expectations and outcome expectations will be assessed immediately after message exposure.

In the subsequent sections of this chapter, an overview of the theoretical basis for the current message-based intervention will be presented, including the use of theory to inform health communications and health message content, as well as the role of two classes of efficacy beliefs in motivating health behavior change. The chapter concludes with the specific hypotheses that were investigated as part of the intervention.

*Using Theory to Inform Health Communications*

For nearly thirty years, the United State’s Office of the Surgeon General has publically recognized the importance of motivating healthy behavior among Americans. Since its conception in 1979, the *Healthy People* report has laid the foundation for a national prevention agenda by outlining health objectives to serve as the basis for widespread health promotion initiatives. *Healthy People 2010* details the importance of sound research and evaluation in the establishment of effective health communication programs. More specifically, this report cites an “increase in the proportion of health communication activities that include research and evaluation” (U.S. Department of Health and Human Services, 2000) as a central objective for the decade. In accordance with this objective, recent research has sought to take advantage of the important interplay between theory and practice in designing effective health communication strategies. Health messages are one strategy that public health advocates may use to persuade people to adopt healthy behaviors or modify unhealthy ones. Further, health messages are also one simple strategy often used to promote exercise.
The growing need for cost-efficient and easily disseminated interventions to increase exercise in the general population has prompted many health researchers to examine the elements that constitute effective health messages. From a theoretical stance, this task is best carried out by effectively using theory to generate evidence-based practices. It has been noted that there is often a “15 year lag between theory and practice” (p. 1; Bartlett, 1987) and one way this lag can be dissolved is by examining possible ways in which theoretical variables can be presented and tailored toward specific populations in health messages (cf., Maibach & Parrott, 1995).

One important consideration in the effective communication of tailored health information is how you “frame” the health outcomes and behavior recommendations in a health message. Health message framing, based on the theoretical underpinnings of prospect theory (Tversky & Kahneman, 1981), takes a unique approach to the presentation of health information by manipulating the consequences associated with performing or not performing a particular health behavior. A health message can be framed to highlight either the benefits of engaging in a particular behavior (gain-frame) or the consequences of failing to engage in a particular behavior (loss-frame). For example, a gain-framed message aimed at increasing exercise might be “Regular exercise decreases your risk of developing heart disease”. On the other hand, a loss-framed message might be “Lack of regular exercise increases your risk for developing heart disease”. This variation in how health information can be presented is important because research has shown that although often conveying essentially identical information, one type of message frame may be more effective than another at promoting behavior change.
depending on the person and the situation (cf., Rothman & Salovey, 1997).

Indeed, research has provided a great deal of guidance regarding when to most effectively employ a gain- or loss-framed message. For example, when promoting exercise, a behavior that can prevent the onset of disease or injury, quantitative reviews have shown that the gain-framed approach is particularly effective (O’Keefe & Jensen, 2011; Gallagher & Updegraff, 2012). O’Keefe and Jensen (2011) report that compared to loss-framed messages, gain-framed messages are significantly more persuasive at encouraging intentions to exercise. Further, this effect (mean $r = .17$) is quite large when compared to the persuasive effect of other components that can vary in a health message, such as high versus low credibility communicators, one-sided versus two-sided arguments, statistical versus narrative evidence, and type of communication medium (i.e., print versus audio-visual versus audio) (O’Keefe, 1999). The long-term effect of gain-framed messages (versus loss-framed messages) specifically on obesity-reducing behaviors (including physical activity) is also quite large in magnitude (mean $r = .12$) (Gallagher & Updegraff, 2012), suggesting the power of highlighting the benefits associated with exercise (i.e., using a gain-framed message), rather than the consequences of not exercising (i.e., a loss-framed message), in motivating actual behavior change.

One would certainly predict that a message highlighting the benefits of adherence, as opposed to the consequences of non-adherence, would be perceived as more positive overall. Indeed, empirical studies have shown that gain-framed health messages do indeed induce more positive thoughts (Maheswaran & Meyers-Levy, 1990) and emotions (Cox & Cox, 2001; Millar & Millar, 2000) than loss-framed messages. O’Keefe and
Jensen (2008) surmise that “gain-framed messages seem more optimistic or more infused with positive affect than loss-framed appeals” (p. 62). These positive thoughts and emotions may lend themselves well to enhancing the persuasive effect of a gain-framed message.

For one, research has shown that positive thoughts in response to health information increases the extent to which an individual agrees with the message (Millar & Millar, 2000). Further, information that is not perceived as posing a threat, such as positive or gain-framed health information, increases people’s motivation to be accurate (Liberman & Chaiken, 1992). Because positive, preference consistent information, as a gain-framed message is likely to contain, is often perceived as valid and accurate (Ditto & Lopez, 1992), favorable gain-framed information is most apt to be received with little skepticism. Lastly, positive mood states can trigger one to engage in mood maintenance (Forest, Clark, Mills, & Isen, 1979; Isen & Simmonds, 1978). Since mood maintenance involves deliberate acts to preserve positive feelings, if a gain-framed message elicits positive emotions in a person, that person may be more likely to comply with the recommendations in the message to preserve those feelings.

What all of this suggests is that because gain-framed messages tend to elicit more positive thoughts and emotions, there is often little motivation to challenge those favorable thoughts and feelings and adherence with a message may be enhanced. However, while knowing the persuasive effect of gain-framed information over loss-framed information for the promotion of exercise is definitely useful in aiding message design, it does not say much about the specific content that should be gain-framed. The
lack of research examining what information should be included in a message promoting physical activity has led to a lack of “definitive recommendations for optimal message content” (p. 12; Latimer, Brawley, & Bassett, 2010). In other words, the empirically evidenced guide for designing physical activity messages is incomplete- what should we tell people that will effectively motivate them to be physically active? Of interest to the current study, what should we tell older adults that will motivate them to be adherent to their home exercise program?

*Using Theory to Inform Health Message Content*

In answering the question of what specifically we should tell older adults to motivate them to be adherent to their home exercise program, one important point to consider can be borrowed from the literature on persuasion. Specifically, it has been suggested that people are more persuaded by messages that are related to their goals. The literature on persuasion is replete with evidence speaking to the general idea that when motivational factors in a message are matched to an individual’s goals, needs, or values, persuasion is enhanced (i.e., Clary, Snyder, Ridge Miene, & Haugen, 1994; Han & Shavitt, 1994; Lavine & Snyder, 1996; Lee & Aaker, 2004). For that reason, optimal persuasion may be best achieved by understanding the goals of the intended audience of a message and tailoring the specific motivational content to those goals. Socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999) offers a unique framework for classifying the types of goals people may be motivated by with a particular focus on the older adult population.

According to socioemotional selectivity theory (Carstensen, Isaacowitz, &
Charles, 1999), the goals people tend to have shift in a very systematic manner as they begin to develop the awareness that the time they have left in life is shorter than the time they have already spent (i.e., as they age). This shift in goals is thought to be the result of the fact that people see time in one of two ways – either expansive or limited. As people age, they progress from the expansive view to the more limited view of time, a progression that influences goal selection. Goal selection in aging adults is characterized by an increasing pull toward goals that are present oriented and that can be experienced and enjoyed in the moment, rather than goals that are future orientated and will only be experienced and enjoyed later (Carstensen, 1992).

In particular, socioemotional selectivity theory classifies the types of goals people can have into two categories (Carstensen, Isaacowitz, & Charles, 1999). The first category, knowledge-related goals, are defined as goals that can help a person prepare for and optimize their future by gathering new information. These expansive goals tend to motivate people to acquire knowledge and make new social contacts with the hopes of becoming better suited for future endeavors. The second category of goals are those that are emotionally meaningful goals. These feeling-related goals tend to motivate people to balance their emotional states and seek out and maintain those relationships that give them a feeling that they are needed by others. Emotionally meaningful goals are thought to become more important as people perceive time to be limited because the feelings represented within these goals can be realized simply in their own pursuit, making them immediately gratifying. The pursuit of knowledge-related goals, on the other hand, does not provide the same gratification. The gathering of new information often does not
provide immediate rewards, but is more useful when stored and built upon later on down the road. Hence, knowledge-related goals are prioritized only when a person perceives time to be expansive or open-ended with sufficient opportunity to make use of the stored information (Carstensen, Isaacowitz, & Charles, 1999).

Because perceptions of time remaining and chronological age are often inversely correlated, socioemotional selectivity theory is considered a lifespan theory of human motivation. Compared to other lifespan models of motivation, however, socioemotional selectivity theory is somewhat unique. Rather than focusing on chronological age as the motivational determinant, socioemotional selectivity theory focuses on subjective perspective of time (Carstensen, Isaacowitz, & Charles, 1999). The proposition here is that regardless of age, people who are approaching (and recognize that they are approaching) the end of their lives should be motivated by goals that provide emotional meaning. Indeed, younger adults living with a health condition that shortens their lifespan (HIV) make decisions and place emphasis on emotional goals that are similar to older adults (Carstensen & Fredrickson, 1998). Further, when time perspective is experimentally manipulated, older and younger adults report similar social goals (Fung, Carstensen, & Lutz, 1999).

The effectiveness of persuasive messages with goals that relate to the pursuit of knowledge or the pursuit of emotional meaning can also be influenced by time perspective. To illustrate, in one study older and younger adults were presented with one of two advertisements that differed only in the featured slogan—either promising to expand knowledge or provide emotional rewards. Compared to their younger
counterparts, older adults showed a preference for the emotion-related advertisement, remembering both the slogan and the product better than the knowledge-related advertisement (Fung & Carstensen, 2003). However, when older adults were instructed to imagine that a doctor had just told them about a medical advance that would guarantee them 20 additional years of life, the persuasive effect of the emotion-based advertisement was reduced (alternatively, the persuasive effect of the knowledge-based advertisement was strengthened). What both this research manipulating time perspective and other research examining naturally formed perspectives of time (Carstensen & Fredrickson, 1998) suggest is that having an understanding of how people view time may be an important key for developing persuasive communications. Further, it may have important implications for guiding the selection of content that appears in persuasive health communications directed towards older adults.

Indeed, the goals that motivate older adults to change their current health behaviors should be ones that reflect the desire to enhance a meaningful and fulfilling part of their lives because they are more apt than younger adults to view life as short and fleeting. However, in the healthcare domain, only a single study has empirically tested the tenets of socioemotional selectivity theory (Mikels et al., 2010). Older and younger adults were presented with a series of hypothetical choices among pairs of health care plans, physicians, medical treatments, and homecare aides. One group was instructed to focus on their emotional reactions to the options, report their feelings about the options, and then make a choice. Another group was instructed to focus on the specific details of the choices before reporting on those details and making a choice. The older adults who
were instructed to focus on and report specific information and details made poorer decisions across all scenarios than those instructed to focus on and report their emotional reactions. On the other hand, younger adults made better decisions by focusing on and reporting specific information and details.

These results in particular highlight an important oversight in our current assumption about health communication. Namely, it is assumed that the more knowledge you have about a health problem, the better decision you will be able to make regarding the management of that problem (Hibbard, Slovic, Peters, Finucane, & Tusler, 2001). And, in reality, researchers do find that when people actively seek out information about health concerns, they tend to report positive experiences, such as a change in their approach to maintaining good health or a better understanding of how to treat an illness, as a result (Tu & Cohen, 2008). Most health messages, therefore, are centered around this belief that knowledge is power and with the most amount of knowledge, people will make the best decisions.

However, when older adults are the ones making those decisions, this may not be the case at all (cf., Mikels, at al., 2010). Alas, since patient autonomy is increasingly being stressed when it comes to decisions about healthcare in the United States (Botti & Iyengar, 2006), our approach to health communication for older adults may be more harmful than helpful. Indeed, “well-intended attempts to encourage older adults to focus on specific facts and details may be detrimental to their decision quality” (p. 93; Mikels et al., 2010). Putting the emphasis on emotion and meaning, rather than factual information, may be a better way to communicate with older adults about their health and
motivate them to make decisions that promote health and well-being. Deciding to be adherent to a home exercise plan, for example, is a healthcare decision that promotes optimal health and well-being after completion of a physical therapy program.

As the goal of a home exercise program is to uphold the physical gains made in therapy, and therapy sessions are often prescribed in doses of 3-4 sessions per week for a variable amount of time, maintaining the gains after discharge requires a substantial time commitment. Patients prescribed a home exercise program are not monitored, and thus must deliberately decide when and how to exercise. As socioemotional selectivity suggests, older adults should be motivated by goals that are representative of their subjective sense of time left in life. In the case of physical therapy, these older adults may be especially sensitive to their limited time as therapy may force them to acknowledge the physical weakness associated with their aging. From a health communication standpoint, understanding this unique process of decision making may help researchers tailor optimal message content that is effective at motivating health behavior change. Given that the persuasive appeal of a message can be enhanced by matching the motivational factors in the message with the goals of the audience, messages that target older versus younger adults should be very different if they are to be effective.

*Translating Theory into Health Message Content*

As socioemotional selectivity theory suggests that older adults may be motivated to achieve different goals than their younger counterparts (Carstensen, Isaacowitz, & Charles, 1999), older adults may need to be persuaded or communicated with in a different manner as well. Thus, the content of the two messages in the current study were
informed by the tenets of socioemotional selectivity theory. In the development of the emotion and meaning message (see Appendix A), particularly, both the social and emotional components of socioemotional selectivity theory were considered. In order to translate the social and emotional components of socioemotional selectivity theory into the content of a persuasive health message, it is first important to recognize the theoretical role of emotion regulation (Carstensen, Fung, & Charles, 2003).

Socioemotional selectivity theory proposes that the increased value placed on the regulation of emotions by older adults is the result of the concurrent shift toward valuing emotional goals (Carstensen & Mikels, 2005). Viewing time as limited, older adults pay more attention to their emotions and to the management of their emotions. As such, older adults commit more social and cognitive resources to the task of emotion regulation than do younger adults (Carstensen, 2006). Cognitively, the use of antecedent-focused emotion regulation, or preventing negative emotions before they can occur, is especially utilized by older adults (Gross, et al., 1997). It stands to reason, then, that older adults may have learned to avoid certain encounters, such as exercise, that have comprised their experience of positive emotions in the past (i.e., because of the pain felt while exercising). If this is the case, older adults may benefit from a message that highlights the positive emotional benefits exercise can offer to help counteract the inclination to view exercise as something that takes away from their experience of positive emotion. The idea that exercise can enhance positive emotions is captured in the “live, laugh, love” slogan of the emotion and meaning message in the current study, as well as the carefully chosen graphics depicting older adults engaging in a range of upbeat activities showcasing life,
laughter, and love.

Further apparent in the graphics of the emotion and meaning message in the current study, as well as a large portion of the written text, is the emphasis on the manner in which home exercise adherence can positively impact social relationships (i.e., spending more time with loved ones). This emphasis on social relationships is consistent with socioemotional selectivity theory in that relationships are thought to serve as a medium to help regulate emotions (Charles & Carstensen, 2007). Both younger and older adults may use social relationships to achieve their respective goals – younger adults put stock in relationships that could have instrumental value in the future (Charles & Carstensen, 2007), while older adults tend to “prune” back relationships that are less emotionally rewarding to focus on long-term relationships with family and friends that are likely to increase the experience of positive emotion in the present (Charles & Carstensen, 2010).

To be sure, there is strong evidence that older adults prefer social relationships with people who are well-known to them and provide them with meaning, consistently choosing social partners who are emotionally close to them over new social partners who could offer them information (Fredrickson & Carstensen, 1990; Fung, Carstensen, & Lang, 2001; Fung, Carstensen, & Lutz, 1999). Preference for these small, but emotionally close, social networks typical of older adults (Carstensen, Fung, & Charles, 2003) have been shown to be related to emotionally meaningful goals. For instance, Lang and Carstensen (2002) found that having a social network that includes more relatives than non-kin friends and partners is associated with a preference for emotionally meaningful
goals – both of which were also related to having a limited time perspective. In addition, Carstensen and colleagues (see Lockenhoff & Carstensen, 2004 for a review) have shown that older adults will choose to spend time with an immediate family member (a familiar social partner who represents an emotionally meaningful goal) over an author of a book they have just read or an acquaintance that has similar interests (both novel social partners who represent goals related to gathering information and developing new relationships) when given the choice to spend thirty uninterrupted minutes with one person (Fredrickson & Carstensen, 1990; Fung, Carstensen, & Lutz, 1999). Thus, research on social preferences further supports the idea that older adults are more likely to emphasize emotionally meaningful goals. More importantly, the link between the social preferences of older adults and the emphasis placed on emotionally meaningful goals by older adults highlights the significance of considering social relationships when communicating with this population about the benefits of taking care of their health.

Theoretically, the basic tenets of socioemotional selectivity theory outlined above have been proposed to be of value in the health context (Lockenhoff & Carstensen, 2004; 2007). For those with goals that are aimed at enhancing the future (i.e., younger adults), a strong emphasis is thought to be placed on acquiring health information that can inform preventive measures, such as diet and exercise behaviors. In contrast, for those with goals that are aimed at enhancing present-state feelings (i.e., older adults), the emphasis is instead placed on alleviating aversive symptoms that interfere with participation in events that emotionally meaningful, such as spending time with loved ones. Consequently, it would seem that the traditional manner of health communication that focuses on the ways
in which performing a specific health behavior can improve one’s health may be more useful to younger adults than older adults. While knowledge of how certain health behaviors affect the body, like how exercise improves strength and balance, may be somewhat informative for older adults, it certainly does not take into account the whole picture. The whole picture, from the perspective of socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999), needs to also focus on how those improvements in health can contribute to the attainment of emotionally meaningful goals.

In a persuasive health message, this idea can be captured by focusing on the outcomes of the health behavior that may positively contribute to the maintenance of close and meaningful relationships. For instance, the emotion and meaning message in the current study emphasizes four specific outcomes of home exercise and how those outcomes may enhance one’s close and meaningful relationships. The first is that home exercise will enable an older adult to better take care of himself, thereby reducing the burden he places on other people to take care of him. The second is that home exercise increases an older adult’s ability to be mobile and active, thus allowing him to spend more time with loved ones. Third is the idea that home exercise allows an older adult to generally feel better about himself by knowing he can be there for his family. Finally, the fourth outcome of home exercise that may positively contribute to one’s relationships is having more energy to go places that enable an older adult to be with the people that matter most. These four points are summed up in the subheading of the emotion and meaning message - “Doing your home exercises regularly means doing more of the things you love with the people that you love!”.
Health messages that focus on the attainment of emotionally meaningful goals, such as the one described above for the current study, may be better suited for older adults since people become more motivated to pay attention to emotional information over non-emotional information as they age (i.e., Labouvie-Vief & Blanchard-Fields, 1982). Importantly, as people age they also have a tendency to focus more on emotional content when making decisions (Peters, Hess, Vastfjall, & Auman, 2007). As factual information, one example of non-emotional information, often comprises the bulk of the content of health messages, it is not surprising that older adults tend to avoid seeking out health information and suffer negative outcomes as a result (Willis, Dolan, & Bertrand, 1999). Empirically, this distaste for factual information by older adults has been demonstrated in the literature.

Williams and Drolet (2005) found that older adults preferred and better recalled coffee and film advertisements that talked about the feelings, senses, and experiences related to the product, rather than the price, reliability, and quality of the product. Similar findings related to the preference and memory of products have been documented by Fung and Carstensen (2003) who compared persuasive messages that highlighted the different types of goals a product could provide. An emotionally meaningful version highlighted how the product was related to love and caring, while a knowledge-related version highlighted how the product was helpful in acquiring novel information or being successful in the future. For instance, the emotionally meaningful version of a juice advertisement read, “Stay healthy for the people you love”, while the knowledge-related version of the same advertisement read, “Stay healthy for your bright future”. Other
emotionally meaningful advertisements read, “Take time for the ones you love” (watch), “Protect those you cherish” (smoke detector), and “Brighten the world with love” (lamp). The corresponding knowledge-related advertisements read, “Take time for success” (watch), “Protect your bright future” (smoke detector), and “Brighten the world with hard work” (lamp). In each case, older adults preferred and recalled the former to the latter appeal, supporting the idea that messages focusing on the attainment of emotionally meaningful goals may be better suited to older adults (Fung & Carstensen, 2003).

In light of these findings, it stands to reason that when ‘selling’ a health behavior, as opposed to a product, the same logic would apply. Unfortunately, there is yet to be an empirical test to determine the validity of such a claim. The present study is the first to apply the logic of this claim to inform the design of a persuasive health message aimed at motivating health behavior change.

The Role of Exercise Efficacy

One potential pathway through which persuasive health messages work to motivate health behavior change is through efficacy expectations. Social cognitive theory (Bandura, 1977, 1986) proposes that specific expectations about one’s ability to perform a behavior (self-efficacy expectations) and belief that performing the behavior will lead to a desired outcome (outcome expectations) can influence a myriad of basic human processes, including behavior. These basic processes, like behavior, are said to be regulated by systematic patterns of thinking and planning, or forethought. In other words, social cognitive theory contends that behavior is the result of planned cognitive control. Further, beliefs about personal efficacy expectations, like self-efficacy and outcome
expectations, provide the foundation for this cognitive control, and thus may be influential in behavior change.

The idea is that with increases in an individual’s efficacy expectations (both self-efficacy and outcome expectations) also comes increases in behavior. Indeed, efficacy expectations are malleable, as Bandura (1997) cites four sources from which we can obtain information concerning personal efficacy – performance accomplishments, vicarious learning, physiological and affective states, and verbal persuasion. Using a message-based form of verbal persuasion, Maddux and colleagues (1982) were able to experimentally manipulate efficacy expectations successfully, suggesting that message-based interventions can influence efficacy expectations. Self-efficacy expectations and outcome expectations, therefore, may be important constructs to consider in message-based behavior change interventions.

However, it is also important to consider self-efficacy and outcome expectations as independent constructs (Bandura, 1977). While self-efficacy and outcome expectations can often times be related, this may not always be the case. Take for instance the case where an individual believes that he or she is capable of performing a behavior, such as doing a push-up, but does not believe the outcome of performing that behavior is worthwhile, because maybe doing push-ups have not provided results in the past. In this situation, the efficacy constructs are indeed not related – the individual has high self-efficacy for the behavior, but low expectations for the outcome of that behavior. It is unlikely, in this case, that the individual will perform the behavior since there is no value attached it. Maddux and colleagues (1982) provided experimental evidence that these
constructs may be independent of each other by manipulating self-efficacy and outcome expectations separately. More importantly, they empirically tested the idea that self-efficacy and outcome expectations can exert independent effects on behavior, finding that increases in outcome expectations as an individual entity, not related to self-efficacy, increased intentions to perform an advocated behavior.

In the exercise literature, there is also empirical evidence to suggest the importance of examining self-efficacy and outcome expectations separately. For example, several studies have found that outcome expectations are actually better predictors of exercise behavior in older adults than self-efficacy expectations (Jette, et al., 1998; Resnick, 1998; Schuster, Petosa, & Petosa, 1995). In one such study, outcome expectations of exercise (measured as perceived benefits) accounted for close to an additional 3% of the variance in exercise behavior, after controlling for the effect of self-efficacy, social support, and barriers to exercise (Schuster, Petosa, & Petosa, 1995).

More generally, outcome expectations do play a role in the adoption and maintenance of exercise behavior in older adults (i.e., Resnick, Palmer, Jenkins, & Spellbring, 2000; Resnick & Spellbring, 2000), as do self-efficacy expectations (i.e., Clark, 1999; King, Stokolos, Talen, Brassington, & Killingsworth, 2002; Resnick, 2002). Furthermore, empirical reports have documented the success of interventions using verbal persuasion techniques at successfully improving exercise behavior in older adults (Gilliss et al., 1993; King, Haskell, Taylor, Kraemer, & Debusk, 1991; Resnick, 1998) and at increasing both types of exercise efficacy expectations alongside these behaviors (Lee, Arthur, & Avis, 2007; Yardley, Donovan-Hall, Francis, & Todd, 2007). Overall,
there is sufficient evidence to suggest that exercise efficacy expectations should play an integral role in the adoption and maintenance of home exercise in older adults.

While the current study does not attempt to experimentally manipulate the dimensions of self-efficacy and outcome expectations directly, it stands to reason that any differences in exercise behavior between the experimental groups may perhaps be the result of differential changes in efficacy expectations. Specifically, the experimental manipulation to the content of the study materials does not speak necessarily to one’s belief in his or her ability to perform the home exercise program (i.e., self-efficacy expectations), but rather to the physiological versus emotional value of performing the home exercise program (i.e., outcome expectations). Outcome expectations, therefore, may be more pertinent and influential in the current study than self-efficacy. While still important, self-efficacy expectations should not be expected to vary as a function of which message one reads. On the other hand, since the study messages specifically highlight two distinct types of outcomes that can be achieved by exercising, outcome expectations should be differentially influenced depending on whether an individual reads the facts and information message or the emotion and meaning message.

Accordingly, those who read facts and information message should report higher levels of exercise expectations related to physical health outcomes than those reading the emotion and meaning message because the facts and information message highlights mainly the physiological outcomes of exercise. Those who read emotion and meaning message should, on the contrary, report higher levels of exercise expectations related to emotion- and meaning-based outcomes. Since these emotional outcomes, which may
enhance meaning and feelings, better match the goals of older adults than physical health outcomes, which merely provide information, *(socioemotional selectivity theory; Carstensen, Isaacowitz, & Charles, 1999)*, they should weigh more heavily on one’s decision to exercise and have more of a direct impact on behavior than the outcome expectancies related to physical health.

*Study Hypotheses*

Based on the literature reviewed in the areas of general health communication, socioemotional selectivity theory, and social cognitive theory, several study hypotheses have been formulated. Compared to those receiving the message with facts and information about the physiological benefits of home exercise, it is expected that those receiving the emotion and meaning message will:

A. Report higher adherence to their home exercise program the two weeks immediately following discharge from physical therapy.

B. Report more additional exercise outside of their home exercise program during the two weeks immediately following discharge from physical therapy.

C. Report higher levels of emotion- and meaning-based outcome expectations for exercise immediately following message exposure.

D. Report lower levels of physical health related outcome expectations for exercise immediately follow message exposure.

In addition, the effect of the emotion and meaning message on exercise behavior is hypothesized to be mediated by increased levels of reported emotion- and meaning-based outcome expectations.
CHAPTER II

Method

Design

The current project was a multi-site (4 clinic) prospective intervention study. The study employed a basic between-subject design to compare the effectiveness of two forms of an exercise message on corresponding levels of self-reported adherence to a home exercise program. A simple intervention was preferred over a more complex intervention in this study in order to accommodate the unique needs of the older adult population being sampled (i.e. age-related declines in cognitive abilities [Stuck, et al., 1999] that impact participants’ ability and/or desire to take part in a demanding cognitive task). Additionally, boundaries within the clinical setting impacted the study design in such a way that time with participants was restricted and contact outside of the care setting was limited.

The two independent study groups were formed through a unique method of stratified random assignment – the permuted blocking stratification method (Conlon & Anderson, 1990). Stratified random assignment is superior to simple random assignment in that it takes into account the likely imbalance of important covariates (i.e., gender) within each assigned group in a small sample. Further, the permuted blocking technique
(Zelen, 1974) helps to ensure that there is an equal number of condition assignments within each strata. This method of assignment works by creating a separate randomization list for every combination of strata level. In the current study, participants were stratified by both gender presenting diagnosis. The permuted blocking technique was applied to each class of diagnosis separately for both males and females (see Figure 1). The randomization lists were created by arbitrarily assigning each message condition (emotion and meaning message or facts and information message) in fixed length blocks of four. The three classes of diagnoses used to assign conditions were 1) diagnoses of the low back; 2) diagnoses involving the hip; and 3) diagnoses involving the knee. Within each class of diagnoses, there was expected to be a great deal of similarity in the types, number, and intensity of home exercises prescribed. While home exercises may differ slightly between each class of diagnoses, this particular cluster of diagnoses as a whole represents the three classes with the most similar home exercise programs across the larger myriad of diagnoses.

The different messages represented the two manipulated levels of the independent variable – the benefits of home exercise described as either physiologically-based (facts and information message) or emotion- and meaning-based (emotion and meaning message). Because of the gender and diagnosis stratification method employed, each message group was expected to have a similar number of male and female participants, as well as a similar number of participants with a diagnosis involving the low back, the hip, and the knee.

Participants
<table>
<thead>
<tr>
<th>Gender</th>
<th>Hip</th>
<th>Back</th>
<th>Knee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>F</td>
<td>E</td>
<td>E</td>
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<td>E</td>
<td>F</td>
<td>F</td>
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<td></td>
<td>F</td>
<td>F</td>
<td>E</td>
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<tr>
<td></td>
<td>F</td>
<td>E</td>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Females</th>
<th>Hip</th>
<th>Back</th>
<th>Knee</th>
</tr>
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<td>F</td>
<td>F</td>
<td>E</td>
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<td>E</td>
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<td>E</td>
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<tr>
<td></td>
<td>E</td>
<td>F</td>
<td>F</td>
</tr>
</tbody>
</table>

*Figure 1.* Randomization chart used to assign participants to either receive the emotion and meaning message (E) or the facts and information message (F). Participants were stratified according to gender and presenting diagnosis and assigned using the permuted blocking technique (Conlon & Anderson, 1990).
Older adults between the ages of 60 and 90 were eligible to participate in the current study if they had a verifiable medical diagnosis of the low back, hip, or knee and for which they had been physician-referred to be treated in a program of physical therapy (PT). All participants were enrolled in the Summa Health System PT program at one of four Summa-affiliated outpatient therapy locations – University Park YMCA in Akron, Ohio; the Tallmadge Recreation Center in Tallmadge, Ohio; the Summa Wellness Institute at Western Reserve in Hudson, Ohio; or the Robinson Health Center at Aurora in Aurora, Ohio. Potential participants were screened by their treating therapist prior to being invited to participate in the study based on the inclusion criteria outlined below (also see the therapist screening document in Appendix C).

First, participants were required to have a care plan lasting at least 4 weeks in an effort to homogenize participant characteristics with regards to familiarity with the exercise program, experience in the clinic, and length of therapy prescription. Second, participants had to have no history of mental health issues that would interfere with their ability to perform home exercise independently (i.e., Alzheimer’s disease) and be able to perform their home exercise program without the assistance of a caregiver, as indicated by the physical therapist. Next, participants could not be the primary caregiver for another person (in any setting). Finally, participants could not have a secondary diagnosis of the spine or a cervical injury as to eliminate the possible extraneous barriers that such injuries add to one’s ability to perform home exercises.

The final sample of participants consisted of 60 older adults who completed both the baseline session at the clinic and returned the follow-up survey that was mailed 2-
weeks after discharge from therapy. All participants who completed the baseline session at the clinic returned their follow-up surveys, thus there are no attrition rates to report. The mean age of participants was 69.3 years ($SD = 6.87$ years), with ages ranging from 60 to 88 years. The sample was predominantly female (71.7%) and identified themselves as White/Caucasian (88.3%). Nearly all participants (98.3%) had some form of health insurance and more than half (53.3%) were married. The most common diagnosis were those involving the knee (43.3%), with those involving the low back (35.0%) and the hip (21.7%) close behind. The mean number of sessions participants reported having missed or cancelled was low ($M = 0.47$, $SD = 0.85$). A small number of participants reported having been in PT for the same reason at least once in the past (30.0%), however these individuals did not differ significantly from the rest of the sample on any of the outcome measures (all $p$’s > .28). Further, there were no significant differences between the message conditions on any of the demographic variables (all $p$’s > .10). Full descriptive statistics of the sample, broken down by message condition, are presented in Table 1.

Materials

The two study messages were tailored from the American Physical Therapy Association’s ‘Physical Fitness for Special Populations’ online publication (http://www.apta.org/uploadedFiles/APTAmg/Practice_and_Patient_Care/Patient_Care/Physical_Fitness/Members_Only/PocketGuide_Falls.pdf#search=%22older adults%22) to use for the specific purpose of this study. The messages were each approximately 140 words in length and had an educational tone in presenting two distinct types of outcomes associated with exercise for older adults (see Appendix A). The structure of each message
Table 1.  
*Descriptive Results by Message Condition.*

<table>
<thead>
<tr>
<th></th>
<th>Emotion and Meaning Message ((N = 28))</th>
<th>Facts and Information Message ((N = 32))</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>69.2 (6.1)</td>
<td>69.4 (7.6)</td>
<td>.91</td>
</tr>
<tr>
<td>Gender - Female</td>
<td>71.4%</td>
<td>71.9%</td>
<td>.97</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>29.3 (7.3)</td>
<td>29.8 (6.4)</td>
<td>.76</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
<td>.63</td>
</tr>
<tr>
<td>Low Back</td>
<td>32.1%</td>
<td>37.5%</td>
<td></td>
</tr>
<tr>
<td>Knee</td>
<td>46.4%</td>
<td>40.6%</td>
<td></td>
</tr>
<tr>
<td>Hip</td>
<td>21.4%</td>
<td>21.9%</td>
<td></td>
</tr>
<tr>
<td>Clinic</td>
<td></td>
<td></td>
<td>.44</td>
</tr>
<tr>
<td>University Park</td>
<td>17.9%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>Tallmadge Rec Center</td>
<td>21.4%</td>
<td>21.9%</td>
<td></td>
</tr>
<tr>
<td>Summa Wellness Institute</td>
<td>25.0%</td>
<td>28.1%</td>
<td></td>
</tr>
<tr>
<td>Robinson Health Center</td>
<td>35.7%</td>
<td>40.6%</td>
<td></td>
</tr>
<tr>
<td>Insurance – Yes</td>
<td>100%</td>
<td>96.9%</td>
<td>.35</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
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<td>.56</td>
</tr>
<tr>
<td>Black/African American</td>
<td>14.3%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>85.7%</td>
<td>90.6%</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
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</tr>
<tr>
<td>High School or Below</td>
<td>25.0%</td>
<td>18.8%</td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>28.6%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>Associates/Bachelors Degree</td>
<td>28.5%</td>
<td>40.7%</td>
<td></td>
</tr>
<tr>
<td>Professional Degree</td>
<td>17.9%</td>
<td>12.5%</td>
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</tr>
<tr>
<td>Employment Status</td>
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<td>.35</td>
</tr>
<tr>
<td>Not Employed</td>
<td>50.0%</td>
<td>34.4%</td>
<td></td>
</tr>
<tr>
<td>Employed Part-Time</td>
<td>28.6%</td>
<td>40.6%</td>
<td></td>
</tr>
<tr>
<td>Employed Full-Time</td>
<td>21.4%</td>
<td>25.0%</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td>.88</td>
</tr>
<tr>
<td>Never Married</td>
<td>7.1%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>57.1%</td>
<td>50.0%</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>17.9%</td>
<td>25.0%</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>17.9%</td>
<td>15.6%</td>
<td></td>
</tr>
<tr>
<td>Co-Morbid Health Conditions</td>
<td>3.00 (2.2)</td>
<td>3.41 (1.7)</td>
<td>.43</td>
</tr>
<tr>
<td>Missed/Cancelled Appts.</td>
<td>0.50 (0.96)</td>
<td>0.44 (0.76)</td>
<td>.78</td>
</tr>
<tr>
<td>In PT for Same Reason - Yes</td>
<td>39.3%</td>
<td>21.9%</td>
<td>.15</td>
</tr>
</tbody>
</table>
was identical and each contained roughly 64% manipulated content and 36% non-manipulated content. The average grade level readability of the messages, combined across manipulated and non-manipulated content, was 6.1 (using the *Flesch-Kincad Grade Level* readability statistic). The non-manipulated content was 51 words in length and was readable at grade level 4.7. Non-manipulated content included the statement “Your home exercise program is essential for maintaining the progress you made in physical therapy!”, as well as 4 tips to help older adults stay motivated in their home exercise program.

The manipulated content of each message was designed to be reflective of the key goal classifications outlined by socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999). The emotion and meaning message captured the emotionally meaningful outcomes that home exercise can afford older adults, such as spending time with loved ones and being there for family. The title of this message was also manipulated, stating “Let exercise take you there!” and contains the key phrases “live”, “laugh”, “love”. At a length of 94 words, the manipulated content of this message was readable at grade level 7. The images in this message also highlighted the emotion- and meaning-based outcomes of home exercise, picturing groups of older adults socializing and sharing positive emotion. Every effort was made to display images of ethnically diverse older adults of both genders in each message.

The facts and information message was reflective of the second class of goals outlined by socioemotional selectivity theory, knowledge-related goals. The benefits of exercise in this message highlighted the physiological outcomes that home exercise can
afford older adults, such as stronger muscles and increased balance. The title of this message, “Let exercise take your body there!”, as well as the key words “strength”, “balance”, “flexibility”, emphasized less of the idea that exercise can have emotionally meaningful outcomes, and more of the facts about what exercise can do for your body, thus representing an information gathering approach. With 88 words, the manipulated portion of this message was readable at grade level 8. The images in this message portrayed ethnically diverse older adults exercising in a variety of contexts.

Message Pre-Testing. The study messages were evaluated by a small sample of older adults (N = 10) who were current patients in a program of physical therapy in the Summa Health System network. No demographic information was collected, however it was expected that the sample would closely mirror that of the actual study sample in terms of age, gender, socioeconomic status, and diagnosis. The messages were randomly assigned such that each message was evaluated by 5 different older adults. As expected, the messages did not differ significantly in ratings concerning ease of reading (“The flyer was easy to follow and I understood what I read”); persuasiveness (“I think the flyer will persuade older adults to do their home exercises”); self-efficacy for exercise (“The flyer made me feel confident in my ability to overcome barriers that might prevent me from doing my home exercises”); or general outcome expectations of exercise (“The flyer made me believe that home exercise can provide me with the benefits and outcomes I read about”) (all p’s > .05). Further, the mean ease of understanding and persuasiveness scores were high (ease – M = 4.70, SD = 0.48; persuasiveness – M = 4.20, SD = 0.63,
both on 5-point Likert scales), indicating the messages were appropriately tailored to the study population.

There was not a statistically significant difference between messages on the items related specifically to the theoretical constructs, however all mean differences were in the expected direction. Participants reading the emotion and meaning message did report that their message highlighted more of the emotional and meaningful rewards of home exercise ($M = 4.20; SD = 0.83$) than it did the facts and information about the health benefits of exercise ($M = 3.40; SD = 1.34; t (4) = 1.37, p = .242$). Participants reading the emotion and meaning message also reported that their message made them think more about the social and relationship benefits of home exercise ($M = 3.60; SD = 1.14$) than it did the physical benefits of home exercise ($M = 2.80; SD = 1.30; t (4) = 1.21, p = .294$).

**Procedures**

**Participant Recruitment.** Participants identified as potentially meeting the study inclusion criteria were invited to participate in the study by their treating therapist when they had less than 2 weeks remaining in their plan of care. At each of the four clinics, there was at least one therapist who was briefed on the study and prepared to answer questions about what involvement in the study would entail from participants. The therapist presented potential participants with a screening form that asked participants to self-report on three important dimensions of the study inclusion criteria (diagnosis, secondary injury to the spine, and ability to exercise independently) before indicating whether they agreed to be contacted about the study if deemed eligible to participate. After completing the screening form, all participants were given written information
about the study to take home that included the name and contact information of the principal investigator. When a participant gave permission to be contacted about the study, the treating therapist verified that the participant met the full eligibility requirements through chart review (as per the therapist screening form). A small number of participants approached their therapist after seeing the study advertisements posted in their clinic. These participants were screened in the same manner that the invited participants were screened. (Note: All recruiting and screening documents can be found in Appendix C.)

*Initial Contact.* Once participant eligibility was verified, the therapist contacted the principal investigator with the participant contact information. To protect the confidentiality of the participant information, this contact was made either over the phone or through a secure ‘sharefile’ provided by Summa. The principal investigator then contacted the eligible participant to explain the study, answer any questions, and invite the participant to take part. If the participant verbally agreed to take part in the study, a meeting date and time was established where the participant would complete the baseline survey. The meeting location was always the therapy site and the date and time were determined by the participant (most often thirty minutes before a scheduled therapy appointment or immediately following an appointment).

*Baseline Session.* Participants arrived at the scheduled therapy appointment in which they had pre-arranged to arrive early or stay late to complete the study session. Participants were asked to complete the informed consent (Appendix D) and were assigned to one of two experimental conditions – either the facts and information
message group or the emotion and meaning message group – following the randomization schedule. They were then given the flyer that corresponded to their assigned message group (see Appendix A) and allowed unlimited time to read the flyer in a private room. Next, participants completed the baseline questionnaire packet that contained the following questionnaires (in order of appearance) – exercise intentions, self-efficacy for exercise, outcome expectations for exercise, and baseline demographics (Appendix B). Participants also provided contact information in the form of a mailing address and telephone number so that they could be contacted to complete the follow-up survey. Upon completion of this session, participants were given a small honorarium (choice of a $5 gift card from Giant Eagle Supermarkets, Wal-Mart, Target, or Subway Restaurants), the flyer they read, and a version of the flyer they read in the form of a refrigerator magnet in appreciation for their time. This session lasted approximately 30 minutes. After the baseline session, the treating therapist marked the participant’s medical chart with a green research sticker and placed a discharge form (Appendix C) inside the chart as a reminder for the therapist to contact the principal investigator when the participant was discharged from therapy. The therapist also copied and stapled each participant’s finalized home exercise program to the discharge form for the principal investigator to collect.

Follow-Up Session. The follow-up session involved participants completing a paper survey (the follow-up home exercise questionnaire, Appendix B) at home and mailing it back to the principal investigator. This session took place two weeks after participants were discharged from therapy. The principal investigator mailed the follow-
up survey as to allow for the survey to arrive on or near the two week post-discharge mark. Three days after mailing, participants were contacted by the principal investigator via telephone to ensure receipt of the survey and to answer any questions the participants had about the survey questions. If the survey was not returned within 7 days of the initial phone call, participants were called as a friendly reminder to complete the survey and given the opportunity to again have any questions about the survey answered. When the follow-up survey was received by the principal investigator, the participants were mailed a small honorarium (choice of a $10 gift card from Giant Eagle Supermarkets, Wal-Mart, Target, or Subway Restaurants) in appreciation for their time.

Baseline Measures

Exercise Intentions. Participants completed 2 items measuring their intent to exercise at home. The first question asked how likely participants were to be adherent to their prescribed home exercise program after discharge on a Likert scale ranging from 1 (extremely unlikely) to 5 (extremely likely). The second question assessed the number of exercise sessions per week (after discharge) that participants intended to perform in addition to or outside of their prescribed home exercise program, with 8 options ranging from “7 times per week” to “I don’t plan to exercise”.

Self-Efficacy for Exercise. Participants completed a measure regarding their beliefs about how capable they thought they were of exercising in the face of a variety of obstacles. The obstacles were framed to represent 9 situations that distinctively affect older adults (Resnick & Jenkins, 2000). Participants ranked how confident they felt in being able to overcome each obstacle on a scale from 1 (not confident) to 5 (very
confident). Examples of obstacles included boredom, pain, lack of enjoyment, and feeling tired (see Appendix B for others). The scale had excellent internal reliability ($\alpha = .902$).

*Outcome Expectations for Exercise.* Participants completed a measure that assessed what they expected to achieve from exercising. This measure contained items that highlighted 13 exercise outcomes specific to the older adult population (Resnick, 2005). Participants indicated the extent to which they agreed with the outcomes, ranging from 1 (strongly disagree) to 5 (strongly agree). Of the 13 total items, 9 assessed expectations about the positive outcomes of exercise, while 4 assessed expectations about the negative outcomes of exercise. The positive items were averaged to create a positive expectations subscale with excellent internal reliability ($\alpha = .903$). The negative items were averaged to create a negative expectations subscale with acceptable internal reliability ($\alpha = .719$).

The positive expectations scale was further broken down according to the type of outcome described in each item. Five items described the physical health outcomes of exercise (item 1 – feel better physically; item 3 – feel less tired; item 4 – makes muscles stronger; item 8 – improves endurance; item 9 – helps strengthen bones) and were combined to yield a physical health outcomes expectations subscale with good internal reliability ($\alpha = .853$). Four items described the mental health outcomes exercise that related to the emotion and meaning exercise can provide (item 2 – improves mood; item 5 – enjoyment; item 6 – sense of personal accomplishment; item 7 – more alert mentally). These items were combined to yield an emotion and meaning outcomes expectations subscale with good internal reliability ($\alpha = .818$). The total outcome expectations scale
(combining all 13 items, with the negative items reverse-scored) also had good internal reliability ($\alpha = .861$).

**Demographics.** A demographic questionnaire was used to gather information about participants in three categories – personal information, health information, and physical therapy information. The personal information section was a standard demographic questionnaire that asked about participants’ age, gender, race/ethnicity, height/weight, level of education, marital status, and work or volunteer commitments. The health information section asked about participants’ insurance status, self-rated physical and mental health, and number of co-morbid health conditions. The physical therapy information section asked about the cost of therapy (co-pays and percent of therapy covered by insurance), the amount of time each home exercise session typically took, how difficult and painful participants’ perceived their home exercise program to be, physical therapy experience in the past, and the number of missed/cancelled therapy appointments.

Unrelated to the current project, a miscellaneous section asked participants whether they had a computer in their home, if they had access to internet in their home, and if they had a web camera. These items were added by the sponsoring organization (Summa Health System) and are not reported in the current study.

**Follow-Up Measures**

The follow-up measures were completed by participants two weeks post-discharge from therapy. A 5-part questionnaire measured participants’ self-reported adherence to their home exercise program, self-reported exercise behavior outside of their
home exercise program, and information on their current health status that might affect
their ability to exercise. A total of 20 items were adopted and modified from Forkan and

*Home Exercise Program.* The main section asked specifically about participants’
adherence to their home exercise program. Participants were first asked to indicate if they
had received a home exercise program, and if so, to answer a number of questions
regarding that program. Participants were asked how many exercises they had been given
by their therapist as part of their home exercise program and how many times per week
they had been told to perform their home exercises.

Participants then listed the names (or descriptions) of the exercises they did each
time they performed their home exercise program. This list was cross-checked with the
home exercise program on file for the participant and an ‘adherence score’ calculated.
The adherence score was calculated by dividing the number of exercises listed by the
participant that matched the prescribed home exercise program by the total number of
exercises in the prescribed home exercise program (i.e., a participant who listed 5
exercises of 10 prescribed received a score of 50%). An experienced and trained physical
therapist assisted in the cross-checking process to ensure accuracy of the interpretation of
participant responses. The number of exercises listed by participants that were not in the
prescribed home exercise program were recorded as ‘extra exercises’.

Finally, a ‘total exercise’ score was created from this measure by combining the
extra exercises with the adherence score. The total exercise score was calculated in a
similar manner to the adherence score. The number of extra exercises listed by the
participant was added to both the numerator (the number of exercises listed by the participant that matched the prescribed home exercise program) and the denominator (the total number of exercise in the prescribed home exercise program) of the adherence score ratio and a percentage calculated. Thus, a participant who listed 5 exercises of 10 prescribed and 5 extra exercises would have a total exercise score of 67% (calculated from the ratio of 10/15).

Next in this section, participants were asked to indicate the number of times per week they performed the exercises they listed, how they would classify those exercises (strengthening, balance, flexibility, and/or aerobic), the time it took to complete those exercises each session, and what percentage of their fully prescribed home exercise program they felt they completed by performing these exercises. Also in this section, participants were given the opportunity to provide an open-ended response to the question of what they felt motivated them to do their home exercises and any reasons they may not have done their home exercise program as prescribed.

Additional Exercises. The second section asked about participants’ involvement in exercises outside of their home exercise program. Participants indicated the number of times per week they participated in activities that a) increased muscle strength; b) improved flexibility; and c) were aerobic in nature. These items did not create a reliable scale ($\alpha = .452$), and thus were not combined for analyses.

Characteristics of Exercise Sessions. The third section asked participants about where and with whom they typically completed their exercises (both their home exercise program and additional exercises). One question asked how often participants used a
community center or exercise facility to exercise and one question asked whether participants normally exercised alone, with a partner, or in a group setting.

**Health Information.** The fourth section asked about participants’ current health status. Participants were asked how many prescription medications they took each day and if they had been diagnosed with any new medical conditions since being discharged from therapy. Participants were also asked if they had been experienced “little interest or pleasure” and “feeling down, depressed, or hopeless” in the past two weeks.

**Other Information.** The final section asked about the use of the exercise magnet provided to the participants at the baseline session. Participants were asked whether they had hung up the magnet they received, and if so, if they found that it helped remind or motivate them to exercise.

**Analytic Strategy**

All data were analyzed using SPSS version 17.0.1 (SPSS, 2008). Before testing the study hypotheses, all data were cleaned, descriptive statistics (i.e., means, standard deviations, ranges) were conducted for all baseline and follow-up measures, and tests of major statistical assumptions (i.e., normality, homogeneity of variances) were performed for the proposed analyses. When any assumptions were not met, appropriate statistical steps were taken. For instance, the non-parametric Mann-Whitney U test was used in place of the independent samples t-test when the assumption of normality of the dependent variable was not met (Fay & Proschan, 2010).

Next, preliminary analyses were conducted to determine if any of the sociodemographic variables would be included as covariates in the proposed analyses.
When the potential covariates were continuous, bivariate correlations were conducted with the dependent variables. When the potential covariates were categorical, t-tests and one-way analyses of variance were conducted. The potential covariates included age, gender, race/ethnicity, education level, marital status, body mass index, health insurance status, number of co-morbid health conditions, diagnosis for physical therapy, clinic where receiving physical therapy, history in physical therapy, number of missed or cancelled physical therapy sessions, and reported feelings of depression since discharge from physical therapy.

For the study hypotheses testing, when any dependent variables were found to be significantly correlated with a single or multiple potential covariates, an analysis of covariance was conducted to assess differences between the two experimental groups (emotion and meaning message versus facts and information message). This was the case for the adherence score variable, the total exercise score variable, the emotion- and meaning-based outcome expectations for exercise subscale variable, and the physical health related outcome expectations for exercise subscale variable (Hypotheses A, C, and D). Hypothesis B, which assessed differences in the number of extra exercises listed by participants, was analyzed using the Mann-Whitney U test as no potential covariates were found to be highly correlated.

Mediational analyses were performed to determine if any differences in exercise behavior (i.e., adherence score, extra exercises, or total exercise score) between the message groups could be explained by differential levels of emotion- and meaning-based outcome expectations for exercise. As the theoretical purpose of mediation is to aid in the
explanation of observed differences in a particular variable, these analyses were only
performed in instances where a meaningful difference in exercise behavior was present.

Analyses for testing mediation were conducted using the product of coefficients
approach. This approach was chosen over the causal steps approach (i.e., Baron & Kenny,
1986) for several reasons. The first reason was because the causal steps approach has
been criticized for having low power (MacKinnon, Lockwood, Hoffman, West, and
Sheets, 2002) on the account that all three regression paths between the model variables
must be significant to test for mediation. Thus, mediation may go undetected using the
causal steps approach if, for example, the relationships between the independent variable
and the mediator variable (path a) and the mediator variable and the dependent variable
(path b) only approach significance due to a small sample size (as in the present study).
The product of coefficient approach requires only that the independent variable and the
dependent variable (path c) be significantly related – a more feasible undertaking in a
small sample.

The second reason the product of coefficients approach was chosen over the
causal steps approach was because the causal steps approach has been criticized for its
inability to handle violations of normality (Preacher & Hayes, 2004). As described in the
next section, data in the present study were not normally distributed across groups of the
independent variable. Therefore, the product of the coefficients method was deemed
appropriate for the proposed mediational analyses.

The Preacher and Hayes (2008) “INDIRECT SPSS” macro was used to compute
parameter estimates and confidence intervals for the proposed mediational model. This
macro provided an estimate of the indirect effect (the product of coefficients from paths a and b, termed “ab”) using a bootstrapped method. A z-statistic was then computed by dividing the given bootstrapped indirect effect (ab) by the given standard error of the bootstrapped indirect effect. The presence or absence of a significant z-statistic ($z > 1.96$ or $z < -1.96$) was used to determine whether mediation had occurred in the model. In addition, bootstrapped confidence intervals and the Sobel test (assuming normality) were used in conjunction with the z-statistic to corroborate the inference. Bootstrapped confidence intervals not including zero and a significant Sobel test was used as the criteria to suggest mediation.
CHAPTER III

Results

Descriptive Statistics

Baseline measures. Most participants reported a high likelihood that they would be adherent to their home exercise program after discharge from therapy ($M = 4.45; SD = 0.57; \text{range } 3 – 5$). Further, participants intended to perform additional exercises outside of their home exercise program about 4 days per week after discharge ($M = 4.15; SD = 1.84; \text{range } 0 – 7$).

In regards to efficacy scores, the mean self-efficacy score across all participants was 4.00 ($SD = 0.74; \text{range } 1.89 – 5.00$), while the mean total outcome expectations score (combing all 13 items, with negative items reversed score) was 4.41 ($SD = 0.51; \text{range } 2.92 – 5.00$). The 9-item positive subscale had a mean of 4.39 ($SD = 0.62; \text{range } 2.44– 5.00$), with the physical health outcome items combining to yield a mean of 4.50 ($SD = 0.59; \text{range } 2.40 – 5.00$) and the emotion and meaning outcome items combining to yield a mean of 4.25 ($SD = 0.74; \text{range } 2.24 – 5.00$). The 4-item negative subscale (reverse scored) had a mean of 4.44 ($SD = 0.64; \text{range } 2.75 – 5.00$).

Follow-Up Measures. All participants indicated having received a home exercise program, with the majority receiving 1-5 exercises (43.3%) or 6-10 exercises (46.7%)
and asked to perform those exercises 7 days per week (51.7%). Regarding adherence to home exercise programs, participants averaged an adherence score of 57.5% ($SD = 34.0\%$) with a full range from 0% to 100%. Participants listed performing an average of 1.80 extra exercises outside of their home exercise program ($SD = 2.20\%$; range = 0 – 9). In combining both participant adherence to their prescribed home exercise program and the number of extra exercises listed, participants averaged a total exercise score of 65.0% ($SD = 28.9\%$) with a range from 0% to 100%. The majority of participants reported performing their home exercises 3-4 times per week (48.3%) and that it took them between 15 and 30 minutes each session (60.0%). Most felt that they completed at least seventy-five percent of their prescribed home exercise program each time they exercised (83.3%).

In terms of the types of additional exercises participants performed outside of their home exercise program, the majority of participants did not perform any additional strength (51.7%) or aerobic (45.0%) activities, but performed 2-3 additional flexibility activities (41.7%) per week. Most participants exercised alone (88.3%) and never used a community center or exercise facility (48.3%).

More than half of the participants took 0-3 medications per day (53.3%) and only 10.0% reported having received a new medical diagnosis since leaving physical therapy. Further, only 15.0% reported experiencing little interest or pleasure in doing things and only 13.3% reported feeling down, depressed, or hopeless since being discharged from physical therapy.
Sixty-five percent of the participants reported hanging the study magnet in their home and half (53.8%) reported that it helped remind or motivate them to exercise. In comparing those that did and did not report hanging up the study magnet, there were no significant differences on any of the dependent variables (all $p$’s > .255). There was also no significant difference in magnet usage between the message conditions ($p = .523$).

Within the subgroup that hung the magnets, however, there was a significant difference ($t(37) = 2.35, p = .024$) in adherence scores between those that did ($M = 69.0\%; SD = 24.9\%$) and did not ($M = 46.5\%; SD = 34.7\%$) report that the magnet helped to remind or motivate them to exercise. There was a similar trend in total exercise scores ($t(37) = 2.02, p = .051$) within this particular subgroup (magnet did remind/motivate – $M = 73.8\%, SD = 21.9\%$; magnet did not remind/ motivate – $M = 56.9\%, SD = 30.2\%$).

**Statistical Assumptions**

*Normality of the dependent variables and outliers.* Results of the Shapiro-Wilks test for normality (Shapiro, 1965) suggested that the distribution of scores for each of the dependent variables (i.e., adherence scores, total exercise scores, extra exercises, efficacy scores) across the groups of the independent variable (message condition) were not normal (all $p$’s < .05). Though skewness and kurtosis values were fairly normal (i.e., skew $\leq 2$ and kurtosis $< 7$), the Q-Q plots for each dependent variable appeared consistent with the results of the Shapiro-Wilks test. Thus, a non-parametric test, the Mann-Whitney U test, was used to test the hypotheses when feasible (i.e., when no covariates were included in the analysis). Few scores were greater than 3 standard
deviations for any of the continuous variables and findings did not differ significantly when outliers were removed. As such, no outliers were removed prior to analyses.

*Homogeneity of variances.* Results of the Levene’s test for equality of variances suggested that the within group variance was equal between the groups of independent variable (all $p$’s > .05). Thus, in all analyses, statistics are reported assuming equal variances.

**Hypotheses A and B**

To determine whether those participants who received the emotion and meaning message were more adherent to their home exercise program than those participants who received the facts and information message (Hypothesis A), the mean difference in the adherence score variable was analyzed between the groups. Based on preliminary analyses, gender, feelings of depression, and number of missed appointments were included as covariates because each was related to the adherence score variable (see Tables 2a and 2b). Thus, because of the inclusion of the three covariates, an analysis of covariance was conducted. Results indicated that, contrary to the hypothesis, those who received the emotion and meaning message were not significantly more adherent to their home exercise program and those who received the facts and information message ($F(1,55) = 1.40, p = .242, \eta^2_p = .025$). Participants reading the emotion and meaning message had an average adherence score of 60.0% ($SD = 34.4\%$), while participants reading the facts and information message had an average adherence score of 55.3% ($SD = 34.0\%$).
Table 2a.

*Bi*variate Correlations – Potential Covariates and Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>Home Exercise Adherence</th>
<th>Extra Exercises</th>
<th>Total Exercises</th>
<th>Outcome Expectations (Physical)</th>
<th>Outcome Expectations (Emotional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.080</td>
<td>-.065</td>
<td>-.112</td>
<td>.028</td>
<td>.108</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>.009</td>
<td>.033</td>
<td>-.064</td>
<td>-.065</td>
<td>-.122</td>
</tr>
<tr>
<td>Missed Sessions</td>
<td>-.276*</td>
<td>-.247</td>
<td>-.410**</td>
<td>.119</td>
<td>.242</td>
</tr>
<tr>
<td>PT History</td>
<td>-.108</td>
<td>-.012</td>
<td>-.135</td>
<td>.120</td>
<td>.132</td>
</tr>
<tr>
<td>Co-Morbidities</td>
<td>-.167</td>
<td>-.219</td>
<td>-.261*</td>
<td>.004</td>
<td>-.044</td>
</tr>
</tbody>
</table>

*p < 0.05

**p < 0.01
Table 2b.

Mean Differences – Potential Covariates

<table>
<thead>
<tr>
<th></th>
<th>Gender $t$ ($df$)</th>
<th>Race $F$ ($df$)</th>
<th>Education $F$ ($df$)</th>
<th>Marital Status $F$ ($df$)</th>
<th>Insurance $t$ ($df$)</th>
<th>Diagnosis $F$ ($df$)</th>
<th>Clinic $F$ ($df$)</th>
<th>Depression $d$ $t$ ($df$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Exercise Ad. $^a$</td>
<td>-2.55(58)$^*$</td>
<td>.088(1,58)</td>
<td>.938(6,53)</td>
<td>1.75(3,56)</td>
<td>-.992(58)</td>
<td>.372(2,57)</td>
<td>.334(3,56)</td>
<td>3.59(58)$^{**}$</td>
</tr>
<tr>
<td>Extra Exercises</td>
<td>.700(58)</td>
<td>2.54(1,58)</td>
<td>.498(6,53)</td>
<td>.363(3,56)</td>
<td>.823(58)</td>
<td>.176(2,57)</td>
<td>1.83(3,56)</td>
<td>-.446(58)</td>
</tr>
<tr>
<td>Total Exercise</td>
<td>-2.66(58)$^*$</td>
<td>.029(1,58)</td>
<td>1.48(6,53)</td>
<td>1.73(3,56)</td>
<td>-.902(58)</td>
<td>.146(2,57)</td>
<td>.226(3,56)</td>
<td>2.83(58)$^{**}$</td>
</tr>
<tr>
<td>Outcome Exp. (Phy.)$^b$</td>
<td>-.561(58)</td>
<td>1.67(1.58)</td>
<td>1.06(6,53)</td>
<td>.593(3,56)</td>
<td>1.21(58)</td>
<td>1.77(2,57)</td>
<td>.565(3,56)</td>
<td>2.44(58)$^*$</td>
</tr>
<tr>
<td>Outcome Exp. (Em.)$^c$</td>
<td>.872(58)</td>
<td>.460(1,58)</td>
<td>.406(6,53)</td>
<td>.778(3,56)</td>
<td>1.38(58)</td>
<td>.751(2,57)</td>
<td>.330(3,56)</td>
<td>2.26(58)$^*$</td>
</tr>
</tbody>
</table>

$^a$For ease of presentation, "Home Exercise Adherence" was abbreviated.
$^b$For ease of presentation, "Outcome Expectations (Physical)" was abbreviated.
$^c$For ease of presentation, "Outcome Expectations (Emotional)" was abbreviated.
$^d$Participant report of feeling "down, depressed, or hopeless" since being discharged from physical therapy.
While adherence scores were not influenced by the time point at which participants completed the baseline measures and received the study message (either the last day of therapy or while still in therapy), there was a significant interaction between message condition and time of baseline session \((F(1,53) = 4.62, p = .036, \eta^2_p = .080)\). Participants who received the emotion and meaning message while still in therapy (i.e., 3 to 4 weeks between baseline and follow-up) reported somewhat higher rates of adherence to home exercise \((M = 63.6\%; SD = 34.3\%)\) than participants who received the facts and information message \((M = 50.8\%; SD = 39.0\%)\) while still in therapy \((F(1,34) = 3.42, p = .073, \eta^2_p = .091)\). However, adherence scores were similar for participants who received either the emotion and meaning message \((M = 60.5\%; SD = 27.7\%)\) or the facts and information message \((M = 46.8\%; SD = 34.7\%)\) on the last day of therapy (i.e., 2 weeks between baseline and follow-up; \([F(1,16) = 1.44, p = .247, \eta^2_p = .083]\)).

To determine whether those participants who received the emotion and meaning message performed more additional exercises outside of their home exercise programs than those participants who received the facts and information message (Hypothesis B), the mean difference in the extra exercises variable was analyzed between the groups. As none of the potential covariates were significantly related to the extra exercises variable, a Mann-Whitney U test (with no covariates) was conducted. The results of the test were in the expected direction and approaching statistical significance, \(U(58) = 327.5, z = -1.86, p = .062, r = .24\). Participants reading the facts and information message had an average mean rank of 26.7 and reported an average of 1.28 extra exercises \((SD = 1.78)\),
while participants reading the emotion and meaning message had an average mean rank of 34.8 and reported an average of 2.39 extra exercises \((SD = 2.50)\). This difference was most pronounced in the group of participants with a diagnosis of the low back \((U(19) = 8.5, z = -3.31, p = .001, r = .72)\), where participants receiving the emotion and meaning message listed an average of 3.56 \((SD = 2.24)\) extra exercises and participants receiving the facts and information message listed an average of .83 \((SD = 1.03)\) extra exercises. There was not, however, a moderating effect of diagnosis \((p = .079)\), nor was there a moderating effect of the time at which the baseline session was completed \((p = .115)\).

Finally, an analysis of covariance was conducted to determine whether the two message groups differed when taking into account both adherence to the home exercise program and the number of extra exercises listed by participants. Gender, feelings of depression, number of missed appointments, and number of co-morbid health conditions were included as covariates with the total exercise score variable as the dependent variable. Consistent with the prior analyses, there was not a significant difference between those who received the emotion and meaning message and those who received the facts and information message \((F(1,54) = 1.50, p = .226, \eta^2_p = .027)\). Participants reading the emotion and meaning message had an average total exercise score of 67.8\% \((SD = 28.7\%)\), while participants reading the facts and information message had an average total exercise score of 62.6\% \((SD = 29.3\%)\).

Consistent with the adherence score results, there was a significant interaction between message condition and time of baseline session \((F(1,52) = 11.82, p = .001, \eta^2_p = .185)\). Participants who received the emotion and meaning message while still
therapy had significantly higher rates of adherence to home exercise \((M = 72.1\%; SD = 26.2\%)\) than participants who received the facts and information message \((M = 57.4\%; SD = 34.1\%)\) while still in therapy \((F (1,33) = 7.73, p = .009, \eta^2_p = .190)\). Adherence scores were similar for participants who received either the emotion and meaning message \((M = 52.0\%; SD = 34.1\%)\) or the facts and information message \((M = 68.4\%; SD = 22.5\%)\) on the last day of therapy \((F (1,15) = 1.90, p = .189, \eta^2_p = .112)\).

**Hypotheses C and D**

To determine whether those participants who received the emotion and meaning message reported higher levels of emotion- and meaning-based outcome expectations for exercise than those participants who received the facts and information message (Hypothesis C), the mean difference in the emotion and meaning outcomes subscale of the outcome expectation for exercise scale was analyzed between the groups. An analysis of covariance was conducted with feelings of depression included as the covariate. There was, indeed, a significant difference between message groups in mean levels of emotion- and meaning-based outcome expectations for exercise \((F (1,57) = 4.32, p = .042, \eta^2_p = .070)\). As predicted, those participants reading the emotion and meaning message reported higher levels of emotion- and meaning-based outcome expectations for exercise \((M = 4.42; SD = 0.61)\) than those participants reading the facts and information message \((M = 4.10; SD = 0.82)\).

To determine whether those participants who received the emotion and meaning message reported lower levels of physical health related outcome expectations for
exercise than those participants who received the facts and information message (Hypothesis D), the mean difference in the physical health outcomes subscale of the outcome expectation for exercise scale was analyzed between the groups. Again, an analysis of covariance was conducted with feelings of depression included as the covariate. There was not a significant difference between message groups in mean levels of physical health related outcome expectations for exercise ($F(1,57) = 0.396, p = .531, \eta^2_p = .007$). Contrary to predictions, those participants reading the emotion and meaning message reported slightly higher levels of physical health related outcome expectations for exercise ($M = 4.53; SD = 0.55$) than those participants reading the facts and information message ($M = 4.48; SD = 0.63$).

In examining the difference between message groups on the other subscales of the outcome expectations for exercise measure (i.e., positive subscale, negative subscale, total outcome expectations), results largely replicated those of the physical health outcome expectations reported above (all $p$’s > .158). Levels of self-efficacy for exercise did, however, differ between the emotion and meaning message group and the facts and information message group ($U(58) = 274.0, z = -2.58, p = .010$). Participants reading the emotion and meaning message had an average mean rank of 36.7 and a mean level of self-efficacy of 4.23 ($SD = 0.58$), while participants reading the facts and information message had an average mean rank of 25.1 and a mean level of self-efficacy of 3.78 ($SD = 0.81$).

Proposed Meditational Analyses
To examine whether increased levels of emotion- and meaning-based outcome expectations for exercise could explain the difference in exercise behavior between the message groups, mediational analyses were proposed. Of the three measures of exercise behavior used in the present study (adherence score, extra exercises, and total exercise), the only between-group difference was found in the number of extra exercises reported by participants ($p < .07$). As there were no significant differences between the emotion and meaning message group and the facts and information message group in adherence scores or total exercise ($p$’s $> .23$), explanatory analyses (i.e., mediation) would not add any meaningful beyond the analyses previously reported. Thus, only one mediational analysis was performed in which the extra exercises variable was included as the outcome.

In this mediational model, message group was entered as the independent variable and emotion- and meaning-based outcome expectations for exercise was entered as the mediator. As feelings of depression was correlated with both extra exercises and emotion- and meaning-based outcome expectations, and also included as covariates in previous analyses involving these dependent variables, depression was entered as a covariate in this mediational model. As shown in Figure 2, those participants reading the emotion and meaning message reported significantly higher levels of emotion- and meaning-based outcome expectations for exercise than those participants reading the facts and information message (path a; $\beta = .26$; $t (59) = 2.08, p = .042$). However, higher levels of emotion- and meaning-based outcome expectations for exercise was not
significantly related to the number of extra exercises reported by participants (path b; $\beta = -.14; t (59) = -1.02, \ p = .316$).

When combined, these two paths did not contribute to a significant indirect effect of the emotion and meaning message on number of extra exercises through outcome expectations (path a*b; $\beta = -.035; z = -.763, p > .05$). Further, both the bootstrap test results, as evidenced by the 95% bias corrected and accelerated bootstrap confidence interval ($CI = -.67, .09; p > .05$), and the normal theory test results, as evidenced by the Sobel test ($z = -.90; p = .370$), indicated that there was not a significant indirect effect present in the mediational model. After accounting for the indirect effect of outcome expectations, the direct effect of the emotion and meaning message on the number of extra exercises was stronger and more significant (path c`; $\beta = .28; t (59) = 2.18, p = .033$), suggesting the presence of statistical suppression. Finally, the proposed mediator, emotion- and meaning-based outcome expectations for exercise, explained only 5.0% of the relationship between the emotion and meaning message and the number of extra exercises reported by participants.
Figure 2. Mediational model examining the proposed mediating effect of emotion- and meaning-based outcome expectations for exercise on the relationship between the emotion and meaning message and the number of extra exercises reported by participants.

† p < .06  
* p < .05
CHAPTER IV

Discussion

The American Physical Therapy Association (2001) dictates that a program of physical therapy should aim to “restore, maintain, and promote not only optimal physical function but optimal wellness and fitness and optimal quality of life as it relates to movement and health” (p. 21). The restoration and maintenance of optimal quality of life, in particular, is of paramount importance to the older adult population as declines in movement and overall physical functioning are natural components of the aging process (Brown, Miller, & Eason, 2006). When performed as prescribed, older adults do benefit significantly from participation in supervised exercise programs, such as those typical of physical therapy (Chang et al., 2004). Unfortunately, when it comes to physical therapy, it is more often the case that exercise programs are not performed as prescribed as adherence to the home exercise portion of physical therapy is considerably low in the older adult population (Hardage et al., 2007).

Thus, the primary goal of the present study was to examine the impact of a theoretically-grounded message-based intervention on adherence to home exercise in older adults. Importantly, the present study was the first to propose and empirically test an adherence-enhancing intervention targeting post-physical therapy home exercise programs. The present study was also the first to integrate the goal-specific tenets of
socioemotional selectivity (Carstensen, Isaacowitz, & Charles, 1999) into a persuasive health message and investigate its effectiveness in a real-world setting. Moreover, the novel focus on theoretically tailored message content in response to a documented lack of “definitive recommendations for optimal message content” (p. 12; Latimer, Brawley, & Bassett, 2010) for the promotion of exercise makes the present study an important addition to the field of health communication.

**Home Exercise Adherence and Extra Exercises**

Contrary to the study hypotheses, there was not a significant difference in participants’ adherence to their home exercise program between the message groups (as measured by the adherence score variable). While the adherence score of those participants who received the emotion and meaning message was higher than those who received the facts and information message, the difference was not statistically significant and therefore definitive claims about the impact of the emotion and meaning message cannot be made for adherence specifically. There was, however, a much more reliable difference between the message groups in the number of extra exercises reported by participants that were not part of their prescribed home exercise program. When asked to list the specific exercises they did each time they exercised, participants who received the emotion and meaning message listed more exercises outside of their prescribed home exercise program than participants who received the facts and information message. So while all participants may have been completing similar proportions of their prescribed home exercise programs, those who received the emotion and meaning message were more active in exercises that complemented their home exercise program exercises.
On the contrary, it is possible that these extra exercises may have been used by participants as substitutions for the some of their prescribed exercises that were perhaps perceived as too difficult or too painful. The negative of a scenario such as this is that these extra exercises may not serve the same purpose as the prescribed exercises, and thus may not aid in the maintenance of the progress made in physical therapy. In this case, an increased number of extra exercises may not actually be beneficial.

A potential positive of these older adults performing more exercises outside of their home exercise program is that it perhaps highlights an adaptive strategy spurred on by an increased desire and motivation of participants in the emotion and meaning message group to exercise. If participants in the emotion and meaning group were, in fact, more motivated to maintain the gains they made in physical therapy, it is likely that they adapted their prescribed home exercise program to best suit and accommodate their specific needs instead of giving up on exercising entirely when faced with challenges. Future research should examine the extent to which older adults may utilize such a strategy in the context of home exercise adherence and the health costs and benefits associated with the utilization of this adaptive approach.

This explanation for the higher number of extra exercises reported by participants in the emotion and meaning message group is consistent with the framework of the selection, optimization, and compensation model of aging (SOC theory; Baltes & Baltes, 1990). According to this model, older adults use three strategies to maximize positive experiences and minimize negative experiences as they age – 1) select fewer and more meaningful goals to pursue; 2) optimize existing abilities through available means and
resources; and 3) compensate for the loss of abilities through adaptation techniques. While all three components are applicable to the present study, the compensation aspect of this model is particularly relevant to the results concerning the number of extra exercise reported by the emotion and meaning message group. Participants in this group read a message that was designed to match the emotionally meaningful goals valued by older adults. In turn, these participants reported strongly believing that their home exercise program could help them achieve these goals (i.e., higher levels of emotion- and meaning-based outcome expectations) and listed more extra exercises when asked to report the exercises they did each time they performed their home exercise program. Overall, this account fits nicely within the framework of SOC theory. Participants in the emotion and meaning message group selected to exercise because they believed it could help them reach an emotionally meaningful goal, they optimized their existing abilities by attempting to be adherent to their home exercise program, and they compensated for their inability to be adherent with the fully prescribed home exercise program by replacing exercises they were not able to perform with other exercise they had learned. Thus, the extra exercises are reflective of a healthy compensation strategy used by these participants to reach their desired goals.

Interestingly, there was not a significant difference between the message groups in reports of participants’ perception of the percentage of their full home exercise program they completed each time they exercised – almost all of the participants felt they performed 75% or more of their full home exercise program. There was also no significant difference between the message groups in reports of how often participants
performed exercises outside of their prescribed home exercise program – most reported not performing any extra strength or aerobic activities, but a modest amount of flexibility activities. The extra exercises variable used in the present analyses was not derived directly from participant self-report, but rather computed as the number of exercises participants listed that were not documented in their medical chart by their physical therapist. Taken together, it is possible that participants had a difficult time distinguishing between the exercises that were listed in their home exercise program specifically and the exercises they performed in the clinic that they continued at home without the direction of the physical therapist.

The time point at which participants completed the baseline session also appeared to play an important role in the present findings. In both cases where there was lacking support for the effect of the emotion and meaning message on behavior (the adherence score and total exercise score), there was a significant moderating effect of time. Indeed, participants receiving the emotion and meaning message were more adherent to their home exercise program than participants receiving the facts and information message only when they received the message while still in therapy. Participants who received the study message on the last day of therapy (i.e., the day of discharge) were equally adherent between message conditions. While these analyses and conclusions based on these findings are certainly restricted by sample size issues, they do bring up some important questions for future intervention research to consider. For instance, at what point in therapy are older adults most receptive to information about home exercise? Is there a point in therapy when older adults are more receptive to physiological health information
than emotion- and meaning-based information? Does the content of the ‘message’ (physiological health versus emotion and meaning) need to be consistent throughout therapy? The answers to these questions would aid in the implementation of socioemotional selectivity theory-based health promotion practices into the geriatric healthcare setting.

Despite the fact that limited support was found for the specific study hypotheses related to home exercise adherence, this intervention was successful when considering the story in a larger scope. Across the entire sample, and in regards to the most conservative measure of adherence to home exercise (the match between participants’ list of exercises and therapists’ documented list of exercises), the average adherence score was nearly 60%. Considering the limited body of research that estimates a 44% rate of adherence to prescribed home exercise programs (Hardage et al., 2007), and the fact that the greatest drop in home exercise adherence is the day patients are discharged from therapy (Sluijis & Knibbe, 1991), the two-week post-discharge adherence rate found in the present study is promising. Certainly, the results here speak to the value of future interventions to promote adherence to home exercise, even if the present study failed to provide robust support for one type of message over another. As a final note here, the self-reported nature of the main outcome measures should be acknowledged as a limiting factor in the overall validity and generalizability of these findings.

Outcome Expectations and Self-Efficacy

Another exciting finding from the present study is the finding that the study messages had a differential impact on participants’ outcome expectations for exercise and
self-efficacy for exercise. Specifically, participants who received the emotion and meaning message reported significantly higher levels of outcome expectations related to the emotion- and meaning-based outcomes of exercise, as well as higher levels of self-efficacy for exercise, than did participants who received the facts and information message. As the efficacy measures were taken immediately after participants read their randomly assigned study message, it is notable that this single exposure might have so profoundly influenced participants’ beliefs.

It is important to recognize, however, the potential confounding effect of demand characteristics in the baseline measures, such as the efficacy beliefs highlighted here. Participants completed the baseline measures at their physical therapy clinic – an environment infused with positive attitudes towards exercise and supportive of the challenges faced by older adults in an exercise program. In such a setting, participants may have inadvertently felt compelled to overestimate their ability to overcome barriers to exercise (i.e., their self-efficacy) and their true beliefs in the outcomes associated with exercise (i.e., their outcome expectations). It is likely that there would have been more variance across the expectancies measures had they been completed outside the clinic.

The present results are, however, consistent with idea that efficacy expectations are malleable (Bandura, 1997). Unfortunately, since measures of efficacy were only recorded after message exposure, an authoritative claim of change cannot be made. Nonetheless, participants were assigned to the message groups following a randomization schedule, so some level of change should theoretically be attributed to the content of the study messages. In addition, participants in the emotion and meaning message group,
who read specifically about the outcomes of exercise that were emotion- and meaning-based, reported significantly higher levels of outcome expectations related to that corresponding class of outcome expectations, but not significantly higher levels for any other class of outcome expectations. These findings suggest that participants’ thoughts and beliefs about the outcomes of exercise were indeed influenced by the study message.

In the case of self-efficacy, specifically, exactly how the emotion and meaning message acted as an agent of change is not clear. The two study messages did not differ along the dimension of self-efficacy, and in fact the content of the messages was not designed to speak to one’s belief in his or her ability to perform a home exercise program. Despite that, participants who received the emotion and meaning message reported significantly higher levels of self-efficacy than participants who received the facts and information message. One potential explanation for this difference has to do with the way in which the information in the emotion and meaning message may have made participants feel. Bandura (1997) cited four sources from which we obtain information that helps to shape our efficacy beliefs. The proposal in the present study was that the emotion and meaning message would use the technique of verbal persuasion to incite a change in efficacy beliefs. While at least one previous study (Maddux et al., 1982) was successful at experimentally manipulating efficacy beliefs using a message-based approach (a form of verbal persuasion), it is possible that the success of the emotion and meaning message in the present study could be attributed to other, possibly more powerful, sources of information.
For instance, participants reading the emotion and meaning message may have had differential affective experiences than participants reading the facts and information message. Psychological responses, such as emotional reactions, play an integral role in self-efficacy (Bandura, 1997). On the premise of socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999), the emotion and meaning message was purposely designed to stimulate positive emotions and feelings of love and meaning associated with family and close social relationships. The experience of these emotions and feelings may have driven the increased level of self-efficacy reported by the emotion and meaning message group, as compared to the facts and information message group. Although not hypothesized to be particularly impactful in the present study, there is some evidence to suggest that self-efficacy is the strongest predictor of exercise in older adults (Burton, Shapiro, & German, 1999; Conn, 1998; Resnik, 2001; but see Jette, et al., 1998; Resnick, 1998; Schuster, Petosa, & Petosa, 1995). So even though self-efficacy was not significantly related to exercise behavior here, the present study hints at a simple way in which health messages can be used to influence self-efficacy for exercise in older adults, and potentially impact exercise behavior.

Another advantage the emotion and meaning message may have had over the facts and information message in regards to influencing efficacy beliefs was the combined additive effect of the positive appeal of the gain-framed approach on top of the positive emotions and feelings brought forth by the emotion-infused message content. As described earlier, both gain-framed study messages should have, theoretically, elicited positive thoughts and mood states and been perceived as relatively agreeable, valid, and
accurate (Ditto & Lopez, 1992; Liberman & Chaiken, 1992; Millar & Millar, 2000). The emotion and meaning message, however, contained content that may have further enhanced its affective appeal – a noteworthy difference in the messages when considering efficacy beliefs. Thus, while the gain-framed component of the messages was perhaps partly responsible for the ceiling levels of self-efficacy and outcome expectations observed across the entire sample, the differential message content may have brought about the few significant differences in efficacy. This explanation makes sense when considering that the emotion and meaning message group reported higher levels of outcome expectations than the facts and information message group in all the subscales of the outcome expectations measure – positive expectations, negative expectations (reverse scored), physical health expectations, emotion- and meaning-based expectations, and total expectations.

A surprising finding was that the levels of physical health outcome expectations reported by participants in the message groups were in the opposite direction than predicted. Participants in the emotion and meaning message group did not report lower levels of outcome expectations related to physical health than participants in the facts and information group. What makes this finding so surprising is that despite reading about the outcomes of exercise related to physical health specifically, participants in the facts and information message group reported lower levels of outcome expectations related to physical health than participants in the emotion and meaning message group. However, this finding is still consistent with the explanation that the emotion and meaning message
was able to harness the additive power of positive emotions from being both gain-framed and tailored to unique motivations of older adults.

Outcome expectations and self-efficacy beliefs may not have impacted exercise behavior in the present study because of the time at which beliefs were assessed. Efficacy beliefs were only measured immediately following message exposure, therefore participants’ level of self-efficacy and outcome expectations were unknown during the two weeks where adherence was reported. It is likely that the emotion and meaning message provided only a short-term boost in both self-efficacy and outcome expectations, after which the levels may have evened out with those in the facts and information message group. As there was a variable period of time between when efficacy beliefs were assessed and the follow-up measure completed, any number of factors could have caused a change efficacy beliefs (i.e., experiences in the final sessions of therapy). Thus, the short-term boost in efficacy beliefs seen in the emotion and meaning message group may not have been a useful predictor of actual exercise behavior two weeks after discharge from physical therapy.

**Limitations**

The seemingly short-term effect of the study messages on efficacy beliefs is but one area that limits the present study. Though the design of the present study, which entailed the participants receiving a refrigerator magnet containing the manipulated message content, was purposefully crafted to combat the waning effects of the single message exposure, reported use of the magnet as intended was somewhat low. After completing the baseline session, participants were given the magnet and the researcher
verbally suggested that they use it to hang their home exercise program. Unfortunately, nearly one third of participants reported not hanging their magnets, and only half of those who did hang their magnets thought it helped remind or motivate them to exercise. This is certainly a major limitation as based on participant reports, a potential maximum of only one third of participants received the full benefit of repeated message exposure.

Given that declines in cognitive function, such as memory, are well-documented as being a normal part of the aging process (i.e., Stuck et al., 1999), it is likely that the single message exposure most participants received was not enough to power any significant observed differences in behavior. Indeed, significant differences in adherence were found when analyses were performed within the subgroup of participants who reported using their magnets as suggested. Older adults who hung the magnet and thought it helped remind or motivate them to exercise had significantly higher rates of adhere to their prescribed home exercise program, averaging a 69.0% rate of adherence, than those who hung the magnet but did not think it was helpful in motivating or reminding them to exercise, averaging only a 46.5% rate of adherence. Further, participants who hung their magnets and found them helpful had a significantly higher rate of adherence than all other participants combined (i.e., those who did not hang the magnet and those who hung the magnet but did not think the magnet was useful; averaging only a 51.4% rate of adherence). What this finding suggests is that a message-based intervention can be successful at improving adherence to home exercise in older adults, but more work needs to be done to establish a framework that ensures the messages are being used as intended and reaching participants appropriately.
The findings surrounding magnet usage in this study highlight an important point to consider for future interventions in this area and more broadly – that is, there are two types of ‘reach’ messages need to achieve successfully. As discussed above, the first ‘reach’ is in a physical manner (i.e., message needs to be consistently accessible, such as on a magnet hung on a refrigerator). The second ‘reach’ is in more of a psychological manner. Half of the older adults who reported hanging their magnet did not find it to be motivating, and subsequently were less adherent to their home exercise program. In fact, adherence rates of those participants who did not hang their magnets was actually higher than those who hung their magnets but did not find them to be helpful in motivating or reminding them to exercise (average adherence of 55.5% versus 46.5%, respectively). Thus, while the physical reach may have been successful, the psychological reach was not and adherence seemed to suffer as a result. The content of the messages used in the present study was based soundly in psychological theory, however it is possible that some of the strength of the theoretical constructs got lost in the process of translating the theoretical language into exercise promotion language and the message content was not as far-reaching as intended.

As this study was the first to attempt to translate the theoretical constructs of socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999) into a persuasive message promoting health behavior change of any kind, a small group of older adults evaluated the messages prior to them being implemented in the study. However, differences between the important theoretical dimensions of the messages, though in the right direction, were insignificant. One way to address this limitation in future studies
would be to strengthen the differences between the important theoretical dimensions of the messages. This could be done by modifying the comparison message (the facts and information message) to be better aligned with the traditional message older adults hear from their physical therapists. The facts and information message was designed to reflect the traditional way health professionals communicate with adults (of any age) about the importance of adherence to home exercise, however it was never verified in a clinical setting. To better understand how physical therapists communicate with older adults about exercise, qualitative work needs to be conducted in the clinics. If the facts and information message in the present study was not reflective of the traditional style of communication between therapist and older adult, then it is conceivable that both messages acted as strong intervention pieces. In other words, because both messages were novel, the act of receiving any message was enough to somewhat motivate adherence – an explanation that makes sense considering the overall level of adherence in the present study was far above the average levels of adherence reported in the literature. The inclusion of no-message control group in future studies would eliminate this possibility and allow for a more direct examination of the effect of theoretically-based message content.

Further, the message content itself should be acknowledged as a potential limitation in the present study. Again, as this study was the first to attempt to translate the constructs of socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999) into a persuasive health message, there is little precedent upon which to gauge how successful the messages were at capturing the essence of the theory. The results of the
message pre-testing suggested that older adults viewed the emotion and meaning message as being reflective of the emotion- and meaning-based outcomes of home exercise, however these results should be interrupted with caution for lack of statistical power. An important starting point for future studies in this area would be to more directly assess the design and content of the messages in light of socioemotional selectivity theory.

Another methodological limitation was the lack of multiple measures of the efficacy beliefs examined in the present study – outcome expectations and self-efficacy. While not a central aim, the findings of the present study are unable to speak to whether the study messages caused a change in levels of efficacy as there was no baseline measure of outcome expectations or self-efficacy administered before participants received the study message. As discussed earlier, the findings certainly suggest that there was at least a short-term boost in outcome expectations and self-efficacy for those who read the emotion and meaning message versus those who read the facts and information message, however future studies should examine this idea more directly.

Future studies would also benefit from the inclusion of additional measures of home exercise adherence (i.e., exercise diaries), and in particular one that could provide a more objective measure of adherence rather than relying exclusively on participant self-report. Most participants in the present study thought they were being reasonably adherent to their prescribed home exercise program – the vast majority reporting that they completed 75% or more of their fully prescribed program – whereas their calculated adherence scores were far lower. There was clearly some disconnect between what participants thought they were supposed to be doing and what therapists prescribed for
them to do. This disconnect may be outside of the scope of the present study, but nonetheless an important issue to consider when designing future studies. Future studies might consider contacting participants immediately after they have been discharged from therapy to have them provide an account of their home exercise program that can be verified with their therapist.

One problem with trying to objectively assess home exercise adherence in the present study was that participants each had unique programs that were specifically designed for them. A number of factors determined the exercises that made up each participants’ home exercise program and played a role in the uniqueness of each program. For instance, participants were in therapy for diagnoses involving different body parts (low back, hip, or knee) and were seen in four different clinics by a number of different therapists who have their own unique styles of treating and preferred exercises. The only published study that has attempted to quantify home exercise adherence in older adults (Forkan et al., 2006) used patients who had been discharged from one of two standardized, hospital-based, balance-training programs – “Strong and Steady” at the University of Washington Medical Center and “Safety and Gait Enhancement” at the Northwest Hospital in Seattle. Patients who had successfully completed these programs and had been discharged were mailed survey questionnaires similar to the follow-up survey used in the present study. Because the home exercise program was standard for all participants, however, Forkan and colleagues (2006) were able to more accurately examine adherence on a number of different levels. While the comparison between the documented home exercise program in participants’ medical charts and participants’
reports of the exercises they performed was an adequate approximation of adherence, an “apples-to-apples” evaluation between participants was not possible in the present study.

**Practical Implications**

As the first study of its kind to propose and examine the effects of an intervention to enhance adherence to home exercise in older adults, the findings of the present study have important implications for practice. It has been long recognized that adherence to home exercise after physical therapy is low (Hardage et al., 2007), but until now there has not been a viable attempt to establish a framework for addressing these low levels of adherence. Likewise, though theoretical variables have been examined as predictors of exercise in older adults (i.e., King et al., 2002; Resnik & Spellbring, 2000), the application of theory into tangible practice in this area has thus far been sparse. The theoretical tenets of socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999) are directly relevant to the older adult population, and the findings of this study reveal some new avenues for the integration of socioemotional selectivity theory into real-world applications.

For instance, the American Physical Therapy Association’s Section on Geriatrics makes available for download a large section of patient exercise brochures. Physical therapists are encouraged to use these brochures in their clinics as patient education material. An examination of a small sampling of these brochures (from [http://www.geriatricspt.org/patients/resources.cfm](http://www.geriatricspt.org/patients/resources.cfm)) reveals somewhat of a trend – all the brochures seem to resemble the style of the facts and information message used in the present study. Each brochure is similar in that there is a section describing the benefits of
exercise as it relates to physiological health (as highlighted in Figure 3). These physiological health benefits include increased muscle and bone strength and improved balance and flexibility, among others. Indeed, these common health benefits mirror the “strength, balance, flexibility” theme of the facts and information message. The findings from the present study, despite being preliminary, can be used to better inform the design of educational materials, such as the exercise brochures highlighted here, that therapists provide to their patients.

While it should not be forgotten that the materials therapists provide to their patients are meant to be educational in tone, the principle behind socioemotional selectivity theory is that older adults may respond better to education that has an emotional pitch. Instead of simply describing the many health benefits of exercise to older adults, as the facts and information approach does, it may be better to couple each health benefit with an associated outcome that provides emotion or meaning.

For example, as opposed to just saying “Exercise improves your balance”, a message could say “Exercise improves your balance, providing you with the mobility you need to stay active with your grandchildren”. Physical therapists may also want to incorporate this style of communication into their interactions with older adult patients. Taking the time understand the unique motivations that older adults may have for wanting to be healthy and integrating those emotionally-salient goals into the patients’ plan of care may help improve adherence rates in a ‘bottom-up’ type manner. In other words, if patients are motivated to be in therapy for the right reasons from the beginning, attendance rates in the clinic might improve, spurring increased adherence to home
Figure 3. Sampling of patient exercise brochures from the American Physical Therapy Association’s Section on Geriatrics with exercise benefits highlighted (these brochures and other samples available for download from http://www.geriatricspt.org/patients/resources.cfm).
exercise while in therapy, and potentially spilling over into adherence to home exercise once therapy has been completed.

While these ideas certainly need to be examined empirically, based solely on theoretical propositions and data that should be cautiously interpreted, they do help to address the quandary of the “15 year lag between theory and practice” (p. 1; Bartlett, 1987). The applied value of socioemotional selectivity theory should continue to be investigated in the realm of health behavior change, particularly when it comes to message tailoring. This study only reveals the ‘tip of the ice berg’ – the findings are just a small indication of the larger possibilities that this research can add to our understanding of how to best motivate older adults to live healthy lives and make healthy choices.
References


APPENDIX A

Home Exercise Messages

(Note: Actual study messages were full page, colored prints)
Let exercise take your body there!

The benefits of home exercise include...
• Muscles that are stronger and better able to support your body as you move about.
• An increased ability to control your balance and reduced risk of injuries from falls.
• Being more flexible and better able to move around with less stiffness and tension.
• An overall healthier body that is less prone to illness, injury, disease, and chronic pain.

Your home exercise program is essential for maintaining the progress you made in physical therapy!

**Tips for staying motivated**
1. Write it down! Make a plan and stick to it.
2. Be inspired! Remember why you exercise.
3. Get support! Have a buddy join you.
4. Exercise safely! Use your common sense.

Doing your home exercises regularly means your body will be stronger, steadier, and more flexible!

(Facts and Information Message)
Let exercise take you there!

**The benefits of home exercise include...**

- Being better able to take care of yourself as you rely less on other people.
- Spending more time with loved ones as you increase your ability to be mobile and active.
- Feeling better about yourself knowing you can be there for your family.
- Having more energy to go the places you want to go and be with the people that matter.

**Your home exercise program is essential for maintaining the progress you made in physical therapy!**

**Tips for staying motivated**

1. Write it down! Make a plan and stick to it.
2. Be inspired! Remember why you exercise.
3. Get support! Have a buddy join you.
4. Exercise safely! Use your common sense.

Doing your home exercises regularly means doing more of the things you love with the people that you love!

(Emotion and Meaning Message)
APPENDIX B

Measures
Exercise Intentions

1. Once you complete physical therapy, how likely is it that you will exercise at home according to the home exercise program your therapist has built for you? Please circle your answer on the scale below.

1 2 3 4 5
Extremely Fairly Neutral/ Fairly Extremely
Unlikely Unlikely I’m not sure Likely Likely

2. Once you complete physical therapy, how many times per week do you plan to exercise IN ADDITION TO or OUTSIDE OF your home exercise program? (please check only ONE)

_____ 7 times per week
_____ 6 times per week
_____ 5 times per week
_____ 4 times per week
_____ 3 times per week
_____ 2 times per week
_____ 1 time per week
_____ I don’t plan to exercise
Self-Efficacy for Exercise Scale

Below are some common situations that might affect your ability to participate in your home exercise program once you finish physical therapy. Use the scale provided to indicate how confident you are that you could successfully follow your home exercise program in each of these situations. Please respond by circling your answer on the scale below each question.

1. If the weather was bothering you.

1 2 3 4 5
Not At All Neutral Very Confident
Confident

2. If you were bored by the program.

1 2 3 4 5
Not At All Neutral Very Confident
Confident

3. If you felt pain while exercising.

1 2 3 4 5
Not At All Neutral Very Confident
Confident

4. If you had to exercise alone.

1 2 3 4 5
Not At All Neutral Very Confident
Confident

5. If you did not enjoy it.

1 2 3 4 5
Not At All Neutral Very Confident
Confident
6. If you were too busy with other activities.

1  2  3  4  5
Not At All Neutral Very Confident
Confident

7. If you felt tired.

1  2  3  4  5
Not At All Neutral Very Confident
Confident

8. If you felt stressed.

1  2  3  4  5
Not At All Neutral Very Confident
Confident

9. If you felt depressed.

1  2  3  4  5
Not At All Neutral Very Confident
Confident
### Outcome Expectations for Exercise Scale

Below are some common descriptions of **how exercise can make people feel**. Use the scale provided to indicate how much you agree or disagree with each statement in regards to doing your home exercises.

1. **Exercise makes me feel better physically.**

<table>
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2. **Exercise makes my mood better in general.**

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3. **Exercise helps me feel less tired.**

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4. **Exercise makes my muscles stronger.**

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5. **Exercise is an activity I enjoy doing.**

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6. **Exercise gives me a sense of personal accomplishment.**

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7. Exercise makes me more alert mentally.

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8. Exercise improves my endurance in performing my daily activities.

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9. Exercise helps to strengthen my bones.

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10. Exercise is something I avoid because it causes me to be short of breath.

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11. Exercise is something I avoid because it may cause me to have pain.

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12. Exercise makes me fearful that I will fall or get hurt.

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13. Exercise places too much stress on my heart so I avoid it.

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Baseline Demographics

We would like to know a little bit about you personally, including some medical history and your experiences in physical therapy. Please complete the following sections to the best of your ability.

Remember, ALL of this information is confidential and your name will not be associated with any of your answers.

A. PERSONAL SECTION

1. What is your age? __________

2. What is your gender?
   
   _____ Male
   
   _____ Female

3. What is your height? __________

4. What is your weight? __________

5. What is the highest level of education you have completed?
   
   _____ Less than high school
   
   _____ Some high school
   
   _____ High school graduate or equivalent (G.E.D.)
   
   _____ Some college
   
   _____ Associates Degree
   
   _____ Bachelor’s Degree
   
   _____ Master’s Degree
   
   _____ Professional or Doctorate Degree
6. What is your **marital status**?
   _____ Never married
   _____ Married
   _____ Married, but separated
   _____ Divorced
   _____ Widowed

7. Do you currently **work or volunteer** outside your home?
   _____ No, I do not work or volunteer outside my home
   _____ Yes, I work or volunteer part-time (20 hours a week or less)
   _____ Yes, I work or volunteer full-time (more than 20 hours a week)
   _____ Other commitments (please specify): __________________________

8. What is your primary **racial/ethnic** background?
   _____ American Indian/Alaskan Native
   _____ Asian
   _____ Native Hawaiian or Other Pacific Islander
   _____ Black or African American
   _____ White or Caucasian
   _____ Other (please specify): __________________________
B. HEALTH SECTION

9. Do you currently have **health insurance** (including Medicare or Medicaid)?

   _____ Yes
   _____ No
   _____ I don’t know

10. How would you rate your overall **physical** health?

   _____ Excellent
   _____ Good
   _____ Fair
   _____ Poor

11. How would you rate your overall **mental** health?

   _____ Excellent
   _____ Good
   _____ Fair
   _____ Poor

12. What **other health conditions** have you had or been diagnosed with? *(check all that apply)*

   _____ Anxiety
   _____ Arthritis
   _____ Asthma
   _____ Chronic Obstructive Pulmonary Disease (COPD)
   _____ Depression
C. PHYSICAL THERAPY SECTION

13. How much time does your current home exercise program typically take you to complete?

_____ More than 60 minutes
_____ Between 45 and 60 minutes
_____ Between 30 and 45 minutes
_____ Between 15 and 30 minutes
_____ Less than 15 minutes
_____ I don’t know
_____ I don’t currently have a home exercise program
14. How **difficult** would you say your current home exercise program is for you?

_____ Very difficult  
_____ Fairly difficult  
_____ Neither difficult nor easy  
_____ Fairly easy  
_____ Very easy  

15. How **painful** would you say your current home exercise program is for you?

_____ Extremely painful  
_____ Very painful  
_____ Somewhat painful  
_____ A little painful  
_____ Not at all painful  

16. How much money do you **pay upfront** at each therapy session (i.e., your co-pay)?

_____ $0  
_____ $1 - $10  
_____ $11 - $25  
_____ $26 - $50  
_____ $50 or more
17. How much of your **TOTAL** therapy costs does your insurance (or insurances) cover?

- My insurance covers 100% of the total cost of physical therapy
- My insurance covers 80% - 99% of the total cost of physical therapy
- My insurance covers 60% - 79% of the total cost of physical therapy
- My insurance covers less than 60% of the cost of physical therapy
- I don’t know how much my insurance covers

18. What is the reason you are currently in physical therapy?

________________________________________________________________________

19. How many times have you been in a physical therapy program **BEFORE** this one? (this can be for any reason) ____

20. Have you ever been to physical therapy for the **SAME** reason you are currently?

- Yes
- No
- I don’t know

21. How many sessions of physical therapy have you missed or cancelled since you started your **current** program? _______

**D. MISCELLANEOUS SECTION**

22. Do you have a **computer** in your **home**?

- Yes
- No
23. Do you have access to the internet in your home?

_____ I don’t have a computer

_____ Yes

_____ No

24. Do you have a web camera? (Note - a web camera is a video camera that runs through your computer and allows you to see and talk to other people over the internet.)

_____ I don’t have a computer OR I don’t have internet access

_____ Yes

_____ No

_____ I don’t know
Follow-Up Home Exercise Questionnaire

Thank you for taking the time to participate in this survey. We are interested in your experiences since being discharged from physical therapy.

SECTION 1: Home Exercise Program

The following questions are to gather information about your prescribed physical therapy home exercise program. A home exercise program is a list of exercises given to you by your physical therapist to do at home.

1) When you were discharged from your physical therapy program, did your physical therapist give you a home exercise program? *(Please check one)*

☐ Yes  ☐ No  ☐ Don’t remember

*If you responded No or Don’t remember please skip to SECTION 2.

2) How many different exercises did your physical therapist give you to do as part of your home exercise program? *(Please check one)*

☐ 1 – 5 exercises

☐ 6 – 10 exercises

☐ 11 or more exercises

3) How often did your physical therapist tell you to perform your home exercises? *(Please check one)*

☐ 1 – 2 times per week

☐ 3 – 4 times per week

☐ 5 – 6 times per week

☐ Everyday (7 times per week)
4) To the best of your ability, please **list the exercises you do** each time your perform your home exercise program. Names are **not** important – you can simply *describe* the exercise. **ONLY LIST THE EXERCISES YOU DO!**

*(This information will NOT be shared with your therapist, please be honest.)*

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________
5) In the past two weeks, about **how many times per week** did you do your home exercise program? *(Please check one)*

- [ ] Never
- [ ] 1-2 times per week
- [ ] 3-4 times per week
- [ ] 5-6 times per week
- [ ] Everyday (7 times per week)

*If you responded *Never* please skip to question 10.*

6) In the past two weeks, when you did your home exercise program, **what types of exercises** did you do? *(Please check all that apply)*

- [ ] Strengthening exercises
- [ ] Balance exercises
- [ ] Flexibility exercises
- [ ] Aerobic conditioning exercises (i.e., walking or biking)

7) In the past two weeks, **each time** you did your home exercise program, about **how long** did it take you? *(Please check one)*

- [ ] Less than 15 minutes
- [ ] 15-30 minutes
- [ ] 45 minutes
- [ ] 60 minutes or more
8) In the past two weeks, **each time** you did your home exercise program, about **what percent of the fully prescribed program** did you do? (Please check one)

- □ 25% or less of my prescribed program
- □ About half (50%) of my prescribed program
- □ Most (75%) of my prescribed program
- □ All (100%) of my prescribed program

9) What would you say has most **motivated** you to do your home exercises?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

10) In the past two weeks, if you **did not** do your home exercise program, **why not**? (Please check all that apply)

- □ It’s too hard
- □ It’s too long
- □ It’s uncomfortable
- □ Don’t have equipment needed
- □ Change in health status
- □ N/A
- □ Don’t know how to do it
- □ Other (please specify):

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
SECTION 2: Additional Exercises

Not including your home exercise program, in the past two weeks, please identify how many times per week you participated in the following types of exercises:

11) Activities to increase muscle strength, such as lifting weights? (Please check one)
   - [ ] Less than 1
   - [ ] 1
   - [ ] 2-3
   - [ ] 4-5
   - [ ] more than 5

12) Activities to improve flexibility, such as stretching or yoga? (Please check one)
   - [ ] Less than 1
   - [ ] 1
   - [ ] 2-3
   - [ ] 4-5
   - [ ] more than 5

13) Aerobic exercises for 30 minutes or more, such as dancing, gardening, swimming, or sports? (Please check one)
   - [ ] Less than 1
   - [ ] 1
   - [ ] 2-3
   - [ ] 4-5
   - [ ] more than 5

SECTION 3: Home Exercise Program AND Additional Exercises

This section asks about ALL the physical activity you have been involved in the past two weeks. Physical activity includes your home exercise program AND any additional exercises you are involved in.

*If you have not done any physical activity in the past two weeks please skip to SECTION 4.

14) Of all the physical activity you have done, did you do it mostly… (Please check)
   - [ ] Alone
   - [ ] With a partner
   - [ ] In a group
15) When you have done physical activity, how much of the time did you do it at a **community center** or **exercise facility**? *(Please check one)*

- □ Never
- □ Rarely
- □ Some of the time
- □ Most of the time
- □ All of the time

**SECTION 4: Health Information**

Health status can impact willingness to exercise. The following questions ask about your **current health status**.

16) How many **prescription medications** do you take per day? *(Please check one)*

- □ 0-3
- □ 4-6
- □ 7-10
- □ More than 10

17) During the past two weeks have you been bothered a lot by **little interest or pleasure** in doing things?

- □ Yes
- □ No

18) During the past two weeks have you been bothered a lot by feeling **down, depressed** or **hopeless**?

- □ Yes
- □ No

19) Since your discharge from physical therapy have you been diagnosed with any **new medical problems**?

- □ Yes
- □ No

If yes, please describe:

________________________________________________________________________

________________________________________________________________________
SECTION 5: Other Information

20) Did you hang up the exercise magnet you received at the time you filled out the first survey somewhere in your house?

☐ Yes ☐ No

20a) If YES, did you find that it helped remind or motivate you to exercise?

☐ Yes ☐ No
APPENDIX C

Recruitment and Screening Documents
WANTED: Your Input!

We’re looking for older adults to give us their thoughts about physical therapy and home exercise!

The study involves evaluating a flyer we are developing for older adults about home exercise and completing two short surveys.

You may be eligible if you are:
- 60-90 years old
- Currently in physical therapy
- Have a diagnosis involving your lower body or balance
- Able to do exercises at home independently

Summa Health System and Kent State University are conducting a study of older adults in physical therapy.

Ask your physical therapist for details!

Volunteers will receive compensation for participation!
*Investigating the Older Adult Experience in Physical Therapy*

Please answer the questions below so we can determine if you qualify to participate in this study.

If you qualify, we will contact you to find out a good time for you to complete a short survey. This can be done before or after your scheduled therapy appointment. We will also ask you to complete a short survey over the phone or in the mail after you are finished with therapy.

You can receive $15 in gift cards for completing this study!

NAME: _____________________________________

PHONE NUMBER: ________________________

1. Are you in physical therapy to work on issues involving your hip, knee, or pain in your lower back?
   _____ Yes
   _____ No

2. Do you have an injury to your neck or spine?
   _____ Yes
   _____ No

3. Are you able to exercise at home without help?
   _____ Yes
   _____ No

4. Do you give us permission to contact you about this study?
   _____ Yes
   _____ No
Study Information:

*Investigating the Older Adult Experience in Physical Therapy*

Thank you for your interest in being part of this study!

This study is being conducted by Summa Health System and Kent State University.

Based on the responses you provided on the screening form and a more thorough review by the study staff, we will determine if you qualify to participate.

If you qualify we will:

- Contact you with the phone number you provided on the screening form
- Set up a time either before or after one of your scheduled therapy appointments
- Ask you to meet with us during that time to complete a short survey and evaluate a flyer we are developing for older adults about the importance of exercise
- Give you a gift card after you complete the survey and evaluate the flyer

We will also ask you to complete a short survey over the phone or in the mail (your choice) about 2 weeks after you finish your program of physical therapy. We will mail you a gift card for doing this.

If you have any questions or decide that you do not want to be contacted, please call the number below (NOT the clinic).

Thank you again!

Kristel Gallagher, M.A.
Doctoral Candidate
Department of Psychology
Kent State University
(330) 983-9845
“The Older Adult Experience in PT”: Therapist Screening Form

Patient Name: ______________________________________________

Date of Review: ______________________________________________

Review Performed by: __________________________________________

### Eligibility Check List

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<th>Criteria</th>
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<td>Patient is between the ages of <strong>60 and 90</strong>.</td>
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<td>Patient has <strong>physician referral</strong> for PT.</td>
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<td>Patient has care plan of <strong>at least 4 weeks</strong>.</td>
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<td>Patient has <strong>no history of mental issues</strong> that would interfere with ability to perform home exercises <strong>independently</strong> (i.e., Alzheimer’s).</td>
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<td>Patient can perform home exercises <strong>without assistance</strong> of a caregiver.</td>
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<td>Patient has a <strong>main diagnosis</strong> of involving the <strong>hip, knee or low back pain</strong>.</td>
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<td>Patient <strong>does not</strong> have a secondary diagnosis of <strong>spine or cervical injury</strong>.</td>
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<tr>
<td>Patient is <strong>not the primary caregiver</strong> for a spouse or other dependent.</td>
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**IS PATIENT ELIGIBLE? (circle)**  

YES   NO
DISCHARGE FORM

“Investigating the Older Adult Experience in PT” Study

Note to therapist:

Please provide the following information about this patient once he or she has been discharged from therapy.

Once complete, please place this form in the “Sustaining PT Gains” folder on Deb’s desk (University Park) or Ellen’s desk (Tallmadge).

Patient name:

__________________________________________

Date of discharge:

__________________________________________

Copy of home exercise program attached:

_____________________
(therapist initials here)

Thank you! 😊
APPENDIX D

Consent Form
Summa Health System  
Consent to Take Part in a Research Study  
Investigating The Older Adult Experience in Physical Therapy

You are being asked to be in a research study about your experiences in physical therapy (PT). We ask you to read this form which describes the study, the risks and the possible benefits. Please ask any questions that you may have before agreeing to be in the research study. Your involvement in this study is completely voluntary and you can stop anytime without penalty.

Support  
The Applied Psychology Center at Kent State University provides funds for this study.

Sites of the Study  
The study will be done in the Summa Health System Rehab Department in University Park YMCA and the Tallmadge Recreation Center.

Purpose of the Study  
The purpose of this study is to learn about your time in PT and help you and others improve sticking to a home exercise program.

Procedures  
We will ask you to complete a packet of questionnaires at two times. The first time will be today and it will take about 1 hour. The second time will be about 2-weeks after you are done with PT.

Visit 1: We will ask you to do some questionnaires about:
- an exercise flyer
- physical therapy and home exercise
- your health
- your contact information

Visit 2 (Follow-Up Visit): About 2-weeks after you are done with PT we will contact you with the phone number you gave us. We will ask you if you would like to answer some questionnaires over the phone or have them mailed. The questionnaires will ask about:
- your experiences in physical therapy and exercising at home
- your current health status

If for some reason you could not do these things, you would not be able to be in the study.

Data Privacy  
The data collected from this study will only be viewed by research team members and you. You will be assigned a number which will be used to identify you during the study. This assigned number will not be based on identifiable information.
**Removal from Study**

It is possible that you could be removed from the study. You may be removed for not coming to physical therapy and/or not completing your full program of physical therapy. You would also be removed if you have a medical condition that arises during the study or if your primary physician does not want you to take part.

**Risks**

We do not know of any risks of this study beyond those that you would normally have by being in physical therapy. Some people may find that answering questions about their health, thoughts or feelings is stressful. If it becomes clear that during the study you are badly depressed or a risk to yourself, your doctor will be notified.

**Benefits**

This research will help us to understand the experiences of older adults in physical therapy. It will also help us to improve the way we communicate with older adults about the importance of home exercise. We hope that the results of this study can be used to make physical therapy a better experience for older adults.

**Costs**

There is no extra cost to participate in this study.

**Compensation**

The compensation for this study will be $15 in the form of gift cards (you can chose from Giant Eagle, Wal-Mart, Target, or Subway). We will give you one $5 card after you evaluate the flyer and complete an initial survey. We will also give you a complimentary physical therapy fridge magnet. We will mail you a $10 gift card after you complete the follow-up survey.

**Alternative to Participation**

You may chose whether or not to participate in this study. The alternative to participating in this study is to chose not to participate.

**Consent for Use and Disclosure of Identifiable Health Information for Research Purposes**

The following information is provided to you as part of the Health Insurance Portability and Accountability Act (HIPAA.) This requires additional safeguards be put into place to protect the privacy and security of an individual’s health information. This includes people enrolled as research subjects.

- **What individually identifiable health information will be collected about you as part of this research study?**

The health information we will ask you to provide includes your gender, race, age, insurance status, prior history in physical therapy, and number of prescribed
medications you take daily. We will also ask you to provide your name, address, and telephone number in order that we may contact you for the follow-up session.

For the purposes of this research study, we will not collect health information in a way that could identify you to anyone besides the research team. The information that we collect from you will be labeled with a code. The log that links your name to your responses is kept in a locked cabinet, and the computer is password protected. This is only accessible to the research team.

- **Who will provide or collect this information?**
  All information will be collected by the research team.

- **With whom will the research team share this information?**
  If you sign this form, the researchers may use or release your health information during the conduct of the research with:
  - Each other and with other researchers involved in the study
  - Law enforcement or other agencies, when required by law
  - Summa Health System’s Institutional Review Board (a group of people who protect the rights of research subjects)
  - The sponsor (funding organization) of this research

  All reasonable efforts will be made to protect the confidentiality of the information collected during this study. You will be assigned a number during the study. This is to ensure confidentiality. All sensible efforts will be used to protect the privacy of the participant’s information that may be shared with others as described above.

- **How long will we keep your information?**
  We will keep the information for eight years. It will be kept in a secure and private place. After that time it will be destroyed.

- **What are your rights after signing this form?**
  You have the right to cancel this consent any time. If you do this, we won’t try to collect other information about you. However, we may use the information that was already collected, because you had given consent at a previous time.

- **What will happen if you decide not to sign this form?**
  Refusing to sign this form will not affect your status at this hospital. It will not cause penalty or loss of benefits to which you are otherwise allowed. If you decide not to sign this form, you will not be able to take part in this study.

*Note: Before we can let you take part in this study, this form must be signed and given to us. If you have any questions, please ask us.*
Your participation in this study is voluntary. You may withdraw at any time. If you to withdraw from this study, you will not be penalized. All of your personal information is confidential.

If you have any questions or concerns during the research process, you should contact a member of the research team. Below is the contact information for some members of the research team:

Deb Canuto, PT, Principal Investigator  
Office Phone: 330-375-7356

Kristel Gallagher, M.A., Co-Investigator  
Office Phone: 330-983-9845 *available 24 hours/day

Ellen Walker, PT, Co-Investigator  
Office Phone: 330-630-2715

Renee Brinker, PT, Co-Investigator  
Office Phone: 330-379-5337

Ann Wargo, Co-Investigator  
Office Phone: 330-375-3449

John Updegraff, Ph.D., Co-Investigator  
Office Phone: 330-672-4731

If you have any questions about your rights as a research subject you can contact Summa’s Institutional Review Board (IRB) at 330-375-4045. The IRB is a group of people that reviews research projects to protect the rights and welfare of research participants.

VOLUNTARY CONSENT

All of the above has been explained to me. All of my current questions have been answered. I was encouraged to ask questions about the study. If I have any questions now or later the research team will do their best to answer them.

By signing this form, I do not give up any of my legal rights. I agree to take part in this study. A signed copy of this form will be given to me.

Participant Name - PRINT  
Participant Signature  
Date

Person Obtaining Consent - PRINT  
SIGN  
Date