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Self -efficacy decisional balance and the stages of change for exercise behavior: Examination of the transtheoretical model in a sample of individuals with mobility impairments

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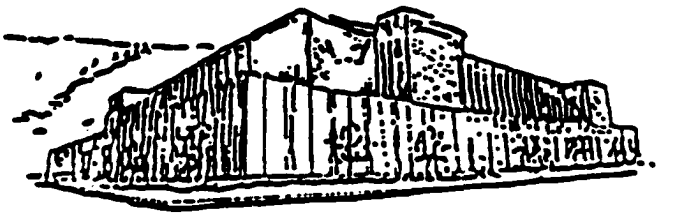

Self-Efficacy, Decisional Balance, and the Stages of Change for Exercise Behavior: Examination of the Transtheoretical Model in a Sample of Individuals with Mobility Impairments

by

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Abstract

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Self-Efficacy, Decisional Balance, and the Stages of Change for Exercise Behavior: Examination of the Transtheoretical Model in a Sample of Individuals with Mobility Impairments

Director: D. Balfour Jeffrey, Ph.D.

Empirical studies have demonstrated that the transtheoretical model's constructs of self-efficacy, decisional balance, and the stages of change are useful for explaining the adoption of exercise behavior in the general population, but they have not yet been examined in a disabled population. Furthermore, self-efficacy for exercise has typically been conceptualized as unidimensional, but more recently researchers have suggested that it be conceptualized as multidimensional. Additionally, motivational interviewing techniques have been identified as being potentially effective for recruiting disabled individuals into exercise programs, but have not yet been empirically examined. The purpose of Study 1 was to replicate the measurement models of two new instruments for multidimensional self-efficacy and decisional balance for exercise within a sample of Medicaid beneficiaries with longstanding mobility impairments, but the results only partially confirmed the measurement models. The purpose of Study 2 was to examine the relationships between self-efficacy, decisional balance, perceived potential barriers to exercise, and the stages of change for exercise within the same sample, but the results did not support the majority of the hypotheses. The purpose of Study 3 was to examine whether different recruitment strategies (i.e., proactive recruitment strategy utilizing motivational interviewing or reactive recruitment strategy utilizing direct mailings of newsletters) moderate the effects of self-efficacy and decisional balance for exercise in predicting exercise program recruitment outcomes within the same sample, but the results did not support these hypotheses. However, decisional balance was a significant predictor of recruitment outcomes and there was a trend in the expected direction for recruitment strategies to predict recruitment outcomes. Future research should: 1) develop better instruments for measuring multidimensional self-efficacy and decisional balance for exercise within disabled populations, 2) be more systematic in measuring the stages of change for exercise, by at least using specific criteria to operationalize "regular exercise" on any such questionnaire with any population, and 3) examine if proactive recruitment strategies utilizing motivational interviewing techniques might be more effective in recruiting disabled individuals into exercise programs when the amount of time spent engaging in these techniques is increased.

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Self-Efficacy, Decisional Balance, and the Stages of Change for Exercise Behavior: Examination of the Transtheoretical Model in a Sample of Individuals with Mobility Impairments

Chapter 1

Introduction

Overview of Chapter 1

This chapter will present a comprehensive review and developmental progression of the literature regarding physical activity and exercise. First, a broad overview of the conceptualization of physical activity and exercise, the healthy effects associated with an active lifestyle, and the prevalence of the various activity levels in the population will be presented. Secondly, several theories and models of physical activity and exercise behavior will be presented, followed by a review of the empirical literature and some recent considerations examining these constructs and models with respect to physical activity and exercise behavior. Thirdly, physical activity and exercise will be discussed in terms of their special significance for those individuals with physical disabilities. Lastly, a brief overview of a study that has been funded by a grant of the U.S. Center for Disease Control and Prevention (USCDCP) and is currently underway will be presented in order to clearly explicate this dissertation research project. The rationale, purpose, and specific hypotheses of this project will be presented at the end of this first chapter, with the methods, results, and discussion following in Chapters 2, 3, and 4.

Overview of Physical Activity and Exercise

Participation in regular physical activity or exercise provides numerous benefits for both physical and mental health in children, adolescents, adults, and the elderly. Many studies have demonstrated that regular physical activity is associated with

protection against premature mortality, coronary heart disease, hypertension, diabetes mellitus Type II, osteoporosis, colon cancer, depression, and anxiety (Bouchard, Shepard, & Stephens, 1994; see Marcus, Bock, Pinto, & Clark, 1996 for a review; Marcus, Forsyth, Stone, Dubbert, McKenzie, Dunn, & Blair, 2000; U.S. Department of Health and Human Services [USDHHS], 1996, 2000). However, despite these apparent benefits of regular physical activity, most of the population of the United States is either sedentary or underactive (USCDCP, 1993). Many who do participate in physical activity or exercise do not do so regularly, reflecting the difficulty of maintaining regular physical activity over the long-term (Dishman, 1988; Marcus, King, Bock, Borrelli, & Clark, 1998). Attempts to increase levels of physical activity and exercise in the general population through media-based interventions seem to result in an increased awareness of and interest in exercise, but not an increase in regular exercise behavior per se (Iverson, Fielding, Crow, & Christenson, 1985; Marcus, Nigg, Riebe, & Forsyth, 2000; Marcus, Owen, Forsyth, Cavill, & Fridinger, 1998). Furthermore, roughly 50% of individuals who join a supervised exercise program will discontinue within the first 3 to 6 months, and this finding has been replicated in a number of different populations (Carmody, Senner, Manilow, & Mattarazzo, 1980; Dishman, 1988; Dishman & Buckworth, 1997). This pattern of exercise relapse is similar to the negatively accelerated relapse curve seen in the study of substance addictions, which suggests that the two might be treated with similar interventions, such as motivational interviewing techniques (Carmody et al., 1980; Hunt, Barnett, & Branch, 1971; Miller & Rollnick, 1991).

Numerous research trials have demonstrated success in promoting short-term exercise adoption in community, worksite, and clinical populations, but little success has

been shown in improving the long-term maintenance or adherence of exercise behavior (Dishman, 1988; Marcus, Forsyth et al., 2000). Only fairly recently has the maintenance of regular physical activity and exercise as opposed to the adoption of regular physical activity and exercise been of primary interest in the research literature. Research concerning the maintenance of regular exercise over the long-term is important because such sustained physical activity levels appear to be necessary in order to receive the full health benefits of exercise. Guidelines specifying the frequency, amount, and intensity of physical activity necessary to receive health benefits have been published by a collaborative workshop between the USCDCP and the American College of Sports Medicine (ACSM, 1990; Pate, Pratt, Blair, Haskell, Macera, Bouchard, Buchner, Ettinger, Heath, King, Kriska, Leon, Marcus, Morris, Paffenberger, Patrick, Pollock, Rippe, Sallis, & Wilmore, 1995). These new guidelines stipulate that individuals should accumulate at least 30 minutes of moderate physical activity (e.g., brisk walking, gardening) on most, preferably all, days of the week, or alternatively at least 20 minutes of vigorous physical activity (e.g., jogging, cycling) at least 3 days a week, which had been the past ACSM (1990) guidelines. Moderate to vigorous physical activity is typically measured as 60-90% of maximum heart rate or 50-85% of maximal aerobic power (maximum oxygen consumption) (Pate et al., 1995). The Surgeon General has since endorsed the USCDCP and ACSM guidelines as well (USDHHS, 1996).

Within these guidelines, a distinction between "physical activity" and "exercise" was delineated, as physical activity represents any bodily movement produced by muscles that expends energy, while exercise represents a subset of physical activity as any planned, structured, programmed, and repetitive bodily movement done for the

purpose of improving or maintaining levels of physical fitness (Pate et al., 1995). However, for the most part, researchers have used these terms somewhat interchangeably and studied these overlapping constructs in parallel. Henceforth, the review of the empirical literature pertaining to this dissertation project will utilize the terms of physical activity and exercise specifically as defined by the USCDCP and ACSM guidelines and refer to them both when relevant.

Epidemiological studies estimate that approximately 60-85% of the adult population in the U.S. does not meet these guidelines, and that approximately 15-25% of the adult population are not active at all (USCDCP, 1993; USDHHS, 1996, 2000; Marcus, Forsyth et al., 2000; Pate et al., 1995). Sedentary behavior or decreased activity levels are more prevalent for women, older adults, ethnic minorities, the less educated, the poor, the disabled, and the chronically ill (USCDCP, 1994a, 1994b; USDHHS, 1996, 2000; Marcus et al., 2000). The USDHHS (2000) has identified physical activity as 1 of 10 Leading Health Indicators and as 1 of 28 Focus Areas for the next decade in their Healthy People 2010 initiative, and hopes to make progress towards several objectives towards increasing the proportion of adolescents and adults who engage in regular physical activity. In summary, getting individuals to become active and participate in regular physical activity or exercise and to maintain these behaviors over the long-term has not been effective. However, within the past decade, there have been some productive lines of empirical research regarding health behavior change that have been applied to physical activity and exercise specifically.

Theoretical Models of Physical Activity and Exercise

Several theoretical models of health behavior adoption and maintenance have been put forth and researched over the years, resulting in several models and specific constructs that have proven helpful in investigating the usefulness of specific interventions aimed at exercise adoption and maintenance in individuals. Three such models are those of social cognitive theory, with an emphasis on self-efficacy (Bandura, 1977, 1982), decision-making theory, with an emphasis on decisional balance (Janis & Mann, 1977), and the transtheoretical model, with an emphasis on the stages and processes of change (Prochaska & DiClemente, 1982, 1983). Although these different models and theories emanated from different lines of research, recent empirical research has revealed several similarities and complementary aspects of these constructs that seem to be easily integrated within the transtheoretical model. This research has produced valuable insights regarding the processes of health behavior change and implications for effective interventions. Brief theoretical descriptions of self-efficacy and decisional balance are presented separately below, followed by a more in-depth description of the transtheoretical model. These descriptions are followed by a more comprehensive review of the relevant empirical literature concerning how these constructs relate to one another within the context of physical activity and exercise behavior.

Self-Efficacy

Self-efficacy is the central concept within the social-cognitive theory of Bandura (1977, 1982, 1986). Self-efficacy concerns an individual's degree of confidence in one's ability to successfully perform a specific positive behavior or abstain from engaging in a problem behavior across a broad range of specific situations or circumstances (Bandura,

1977, 1982, 1986; Marcus, Bock et al., 1996; Prochaska & Marcus, 1994). An individual's belief that he or she can carry out the behavior successfully within a specific situation has been strongly related to the individual's actual ability to perform that behavior in similar situations (Bandura, 1977, 1982, 1986). Self-efficacy beliefs have an effect on the type of behaviors that an individual performs, the length of persistence of the individual when he or she faces difficulties, and the amount of effort the individual expends (Bandura, 1986). Self-efficacy seems to be behavior-specific, for example self-efficacy for smoking cessation may be somewhat different from self-efficacy for exercise, even within the same individual, because different underlying situational factors seem to influence the self-efficacy for different health behaviors. Some empirical studies have found that in some circumstances, self-efficacy was a better predictor of a specific behavior than past behavior or other predictors of change (Bandura, 1986; DiClemente, 1986).

Decisional Balance

Another construct that has helped researchers understand health behavior change is the construct of a decisional balance sheet within the decision-making model put forth by Janis and Mann (1977). In their model, decision-making is composed of considering and balancing eight major categories: 1) instrumental benefits to self, 2) instrumental benefits to others, 3) instrumental costs to self, 4) instrumental costs to others, 5) approval from self, 6) approval from others, 7) disapproval from self, and 8) disapproval from others. These eight categories form an individual's decisional balance sheet and the individual's behavior is reflective of the decisional balance sheet. Janis and Mann (1977) based the construct of the decisional balance sheet on expectancy theory, holding that

whether or not an individual changes his or her behavior will depend on the relative strength of his or her perceived gains or benefits and losses or costs associated with taking action and making a change. Decisional balance seems to represent the individual's aggregate perception of the pros and cons of making a particular decision, such as making a decision to make a behavior change to quit smoking or beginning to exercise.

Decisional balance aims to help explain how individuals take into account the relative pros and cons associated with each decision alternative before committing to and carrying out a particular course of action. Decisional balance attempts to explain how individuals thoroughly consider the full range of available alternatives in addition to the positive and negative consequences (i.e., the pros and cons) for each alternative. Janis and Mann (1977) believe that deliberately considering each alternative with its associated pros and cons will help to solve an individual's decisional conflict. In theory, an individual most often makes a behavior change when their perception of the pros of making the behavior change exceed their perception of the cons of making the behavior change on their decisional balance sheet.

The Transtheoretical Model

Generally speaking, the transtheoretical model intends to provide an integrated theory for helping those engaged in health behavior research and interventions to understand the processes of how individuals and various populations progress towards adoption as well as maintenance of behavior changes over an extended period of time (Prochaska, Johnson, & Lee, 1998). The general framework of the transtheoretical model emerged from a comparative analysis of many major theoretical orientations and

interventions for a number of health behavior changes, including behavioral, cognitive, existential, experiential, gestalt, humanistic, interpersonal, psychodynamic, and radical therapies, hence leading to the name "transtheoretical" (Prochaska et al., 1998; Prochaska & Marcus, 1994). The transtheoretical model has typically concentrated on 5 stages of change and 10 processes of change as its core constructs, in addition to integrating the constructs of Bandura's (1977, 1982) self-efficacy and Janis and Mann's (1977) decisional balance within its comprehensive model of health behavior change. These core constructs of the transtheoretical model were first empirically examined in relation to smoking cessation, but they have since been examined empirically within numerous studies spanning across a wide range of health behaviors, such as quitting cocaine, weight control, sun protection, and condom use, as well as within a number of different populations, for example community and clinical populations (DiClemente & Prochaska, 1982; DiClemente, Prochaska, & Gibertini, 1985; DiClemente, Prochaska, Velicer, Fairhurst, Rossi, & Velasquez, 1991; Nigg, Burbank, Padula, Dufresne, Rossi, Velicer, Laforge, & Prochaska, 1999; Prochaska & DiClemente, 1982, 1983, Prochaska, DiClemente, & Norcross, 1992; Prochaska et al., 1998; Prochaska, Velicer, DiClemente, & Fava, 1988; Prochaska, Velicer, DiClemente, Guadagnoli, & Rossi, 1991; Prochaska, Velicer, Rossi, Goldstein, Marcus, Rakowski, Fiore, Harlow, Redding, Rosenbloom, & Rossi, 1994; Velicer, DiClemente, Prochaska, & Brandenburg, 1985). Despite the transtheoretical model's emergence from research concerning the extinction of a negative behavior such as smoking, there is reason to believe and much empirical literature suggesting that the transtheoretical model is applicable to the acquisition of and initiation of positive behaviors, such as exercise.

Stages of Change

According to the transtheoretical model of behavior change, individuals move across a series of stages of change with respect to their levels of motivational readiness for making behavior changes (Prochaska & DiClemente, 1982, 1983). The conceptualization of stages within this theory is important for understanding behavioral change because it reflects a temporal dimension in which behavioral change occurs (Prochaska et al., 1998; Prochaska & Marcus, 1994). In a sense, the transtheoretical model unifies the various constructs and possible mediators involved in initiating health behavior change, like beginning to exercise, by embedding them within a temporal dimension consisting of stages. The stages represent a mid-level of abstraction between states and traits, as they are hypothesized to be both stable and dynamic in nature, meaning that stages can last for some time and yet be flexible enough to be open to change (Prochaska & Marcus, 1994). Furthermore, movement through the stages is thought to be cyclical in nature as opposed to linear, as many individuals do not maintain their behavioral changes and so return to earlier stages at various times across the entire lifespan (Marcus, Bock et al., 1996; Prochaska & DiClemente, 1982; Prochaska, DiClemente, & Norcross, 1992). The transtheoretical model has traditionally posited five stages of change that have received the most empirical support: precontemplation, contemplation, preparation, action, and maintenance (DiClemente et al., 1991; Prochaska, DiClemente, & Norcross, 1992; Prochaska & Marcus, 1994). These five stages will be presented both as they apply to health behavior change in general as well as to exercise behavior specifically.

Precontemplation is the first stage during which an individual has no intention of changing his or her specific behavior in the foreseeable future, usually measured as being in the next 6 months. With respect to exercise, individuals in precontemplation do not exercise and do not intend to start exercise within the next 6 months. Individuals may be in this stage because they are uninformed or under-informed about the possible long-term consequences of not exercising, might be demoralized about their ability to exercise and do not want to think about or consider trying to exercise, or they are defensive or resistant to social pressures encouraging them to exercise, often resulting in their being labeled as "unmotivated" or "not ready" (Prochaska & Marcus, 1994).

For those in contemplation, they are considering making a behavior change or intending to make a behavior change in the next 6 months, but they have not made a commitment to take action to bring about any change. With respect to exercise, people in contemplation are not currently exercising, but they do seriously intend to start exercising within the next 6 months. Individuals in contemplation seem to be aware of both the pros and cons of regular exercise, and seem to see these pros and cons as being about equal. This often results in extreme ambivalence, thus keeping such individuals stuck in the contemplation stage for extended periods of time, which has subsequently been characterized as "chronic contemplation" or "behavioral procrastination."

Those in preparation either intend to make a significant behavior change in the near future, typically measured as within the next month, or they have been making small changes that approximate the goal behavior but don't meet the specified criteria for the goal behavior. These individuals have usually formulated a plan of action for making a behavioral change. With respect to exercise, individuals in preparation may plan to begin

exercising in the next month or so, or be currently exercising somewhat, but not regularly, such as defined by ACSM and USCDCP guidelines (ACSM, 1990; Pate et al., 1995). Examples of such approximate actions would be talking to a therapist or physician about exercise, joining a health club, buying a self-help book, or just exercising 1 day a week. However, these individuals have not begun to follow through with a plan of action that meets the specified criteria for the goal behavior.

The action stage is the stage in which overt behavioral changes have taken place and currently meet the specified criteria for the goal behavior, and usually have occurred within the past 6 months. Regarding exercise behavior, individuals in the action stage are currently exercising regularly, such as defined by ACSM and USCDCP guidelines, but have been doing so for less than 6 months. This stage is hypothesized to be the least stable, as it is associated with the highest risk for relapse or return to an earlier stage, for example returning to a less active or even sedentary lifestyle. Most intervention programs aimed at helping people make behavior changes, such as those aiming to increase levels of physical activity and exercise in individuals, seem to be designed for people in the action stage. However, the majority of the population may not fall within the action stage with respect to motivational readiness for physical activity and exercise, and thus the interventions may not be effective for those individuals.

Individuals within the maintenance stage are exercising regularly, such as defined by ACSM and USCDCP guidelines, and have done so for at least 6 months (Marcus, Rossi, Selby, Niaura, & Abrams, 1992). This is a stage of continued change in which individuals work towards preventing relapse. Getting individuals to progress to the maintenance stage and then remain there while trying to minimize the risk for relapse is a

difficult task for the majority of the health behavior promotion programs, such as those intended to increase levels of physical activity and exercise. As hypothesized by the transtheoretical model, regarding many health behaviors, it seems as if most individuals relapse and return to an earlier stage, such as contemplation or preparation, before moving into action and maintenance if again at all.

Prochaska and colleagues have proposed a sixth stage of change within the transtheoretical model, using a time criterion of 5 years of continuous maintenance of the new health behavior as a requirement for reaching the termination stage (Prochaska et al., 1998; Prochaska & Marcus, 1994). Within the termination stage, it is now hypothesized that there is zero temptation to engage in the old unhealthy behavior, in addition to their having 100% self-efficacy in previously tempting situations (Prochaska et al., 1998; Prochaska & Marcus, 1994). However, this stage has only been studied with regards to smoking and alcohol abuse, and so it remains an empirical question as to whether termination can be achieved with respect to other health behaviors, such as whether formerly sedentary individuals can maintain regular exercise or whether they remain at risk for relapse (Prochaska & Marcus, 1994). Prochaska and colleagues suggest that the termination stage may not be a realistic goal for a behavior such as exercise for the majority of people, and that a more realistic goal may be a lifetime of maintenance (Prochaska et al., 1998).

Processes of Change

While the stages of change suggest when people change, the processes of change describe how people change (Prochaska et al., 1988). The processes of change represent the activities that individuals use to move through the stages in order to change their

behaviors. Ten processes of change have been identified and studied extensively in the research literature regarding the transtheoretical model: 1) consciousness-raising, 2) dramatic relief, 3) self-reevaluation, 4), environmental reevaluation 5) social liberation, 6), self-liberation, 7) helping relationships (also called relationship fostering), 8) counterconditioning, 9) contingency management, and 10) stimulus control (Prochaska et al., 1988). Marcus, Banspach, Lefebvre, Rossi, Carleton, and Abrams (1992, p. 425) and Marcus, Rossi, Selby, Niaura, and Abrams (1992, p. 387) provide definitions for each of these processes. Consciousness raising represents efforts by the individual to seek new information and to gain understanding and feedback about the problem behavior. Dramatic relief represents affective aspects of change, often involving intense emotional experiences related to the problem behavior, such as catharsis. Self-reevaluation represents emotional and cognitive reappraisal of values by the individual with respect to the problem behavior. Environmental reevaluation represents consideration and assessment by the individual how the problem affects the physical and social environment. Social liberation represents awareness, availability, and acceptance by the individual of alternative, problem-free lifestyles in society, for example becoming more aware of the non-smoking sections in restaurants. Self-liberation represents the individual's choice and commitment to change the problem behavior, including the belief that one can change. Helping relationships represent trusting, accepting, and utilizing the support of caring others during attempts to change the problem behavior. Counterconditioning represents substitution of alternative behaviors for the problem behavior. Reinforcement management represents changing the contingencies that control or maintain the problem behavior. Stimulus control represents control of situations and

other causes which trigger the problem behavior. These 10 processes have been organized under the headings of two higher-order factors: 1) cognitive or experiential processes of change, and 2) behavioral processes of change (Prochaska et al., 1988; Prochaska & Marcus, 1994). The cognitive or experiential processes are composed of the first five processes of change listed above, and the behavioral processes are composed of the second five processes of change listed above.

Numerous retrospective, cross-sectional, longitudinal, and intervention studies have suggested that some change processes are used more than others at the different stages of change (DiClemente & Prochaska, 1982; DiClemente et al., 1991; Prochaska & DiClemente, 1983, 1984; Prochaska, DiClemente, Velicer, Ginpil, & Norcross, 1985; Prochaska & Marcus, 1994; Prochaska et al., 1991). With regards to smoking cessation, the cognitive or experiential processes of change seem to be utilized most often while moving through the precontemplation, contemplation, and preparation stages, while the behavioral processes seem to become more important while moving from preparation to action and onward into the maintenance stage of change (DiClemente et al., 1991; Prochaska & DiClemente, 1983; Prochaska & Marcus, 1994; Prochaska et al., 1988). The transtheoretical model seems to be helpful for interventionists by suggesting which processes to emphasize in order to facilitate a particular individual's progress to the next stage of change (Prochaska & Marcus, 1994).

Self-efficacy and Decisional Balance Within the Transtheoretical Model

Numerous cross-sectional and longitudinal studies have examined the relationship between the stages and processes of change of the transtheoretical model and the borrowed constructs of Bandura's (1977, 1982, 1986) self-efficacy and Janis and Mann's

(1977) decisional balance across a number of different health behaviors (DiClemente et al., 1985; DiClemente et al., 1991; Prochaska, Norcross, Fowler, Follick, & Abrams, 1992; Prochaska et al., 1991; Prochaska, Velicer et al., 1994; Velicer et al., 1985). Across the stages of change, self-efficacy scores increase linearly, with precontemplators having the lowest scores and those in maintenance having the highest scores.

Research with the transtheoretical model and its relationship to decisional balance has typically conceptualized and empirically examined decisional balance in terms of two scale scores for the pros and cons for making a behavior change, as well as looking at a separate scale score formed by subtracting the cons from the pros, rather than in terms of the eight separate categories put forth by Janis and Mann (1977) in their decision-making model (Velicer et al., 1985). This conceptualization of decisional balance has been helpful for understanding and predicting movement between the precontemplation, contemplation, and preparation stages of change of the transtheoretical model (DiClemente et al., 1991; Prochaska et al., 1985; Prochaska & Marcus, 1994; Velicer et al., 1985). A fairly consistent pattern of the pros and cons across the stages of change has occurred across 12 problem behaviors, as cons of making a behavior change always exceed the pros during the precontemplation stage, while the pros always exceed the cons within the action and maintenance stages (Prochaska, Velicer, et al., 1994). Therefore, the crossover of this decisional balance usually occurs in either the contemplation or preparation stages, depending upon the specific behavior being studied. Furthermore, across these 12 studies there seems to be a mathematical relationship between the pros and cons for behavioral change as individuals advance towards action and maintenance (Prochaska et al., 1998). More specifically, it seems that in order to move from

precontemplation to action, there needs to be an increase of approximately one standard deviation in the pros for changing behavior, which has become known as the Strong Principle of Change, and a decrease of approximately one-half of a standard deviation in the cons for changing behavior, which has become known as the Weak Principle of Change (Prochaska et al., 1998). These empirical findings regarding self-efficacy and decisional balance indicate that these constructs can be usefully integrated with the stages and processes of change of the transtheoretical model.

The Transtheoretical Model and Exercise: A Historical Review of the Empirical Literature

As stated above, the transtheoretical model has provided an integrated framework for conducting empirical research regarding health behavior change and in specifying helpful implications for interventions. Thorough reviews of the transtheoretical model and its relation to physical activity and exercise behavior are provided in Prochaska and Marcus (1994), Marcus, Bock, Pinto, and Clark (1996), Marcus, Bock, and Pinto (1997), Marcus, King, Bock, Borrelli, and Clark (1998), and Prochaska, Johnson, and Lee (1998). Several research studies have examined the construct of self-efficacy and its relation to physical activity and exercise apart from the stages of change, decisional balance, and the processes of change of the transtheoretical model, and found that increasing levels of self-efficacy for particular behaviors are associated with and predictive of increasing levels of physical activity and exercise (e.g., McAuley, Courneya, Rudolph, & Cox, 1994; Reynolds, Killen, Bryson, Maron, Taylor, Maccoby, & Farquhar, 1990; Rodgers & Brawley, 1993; Sallis, Haskel, Fortmann, Vranizan, Taylor, & Solomon, 1986; Sallis & Hovell, 1990; Sallis, Hovell, & Hofstetter, 1992; Sallis, Pinski, Grossman, Patterson, &

Nader, 1988). However, no comparable studies strictly examining the association between decisional balance and physical activity and exercise independent of the transtheoretical model were identified.

Several of the most prolific and most renowned researchers regarding the study of the transtheoretical model and its relationship with physical activity and exercise are B. H. Marcus, Ph.D. and her colleagues. Marcus, Selby, Niaura, and Rossi (1992) conducted the first comprehensive study that examined the process of exercise adoption and maintenance using both self-efficacy and its relationship to the stages of change of the transtheoretical model in a three-part cross-sectional study. For the first part of the study, the authors developed a stages of change instrument and a self-efficacy instrument for exercise based on similar measures constructed for smoking cessation (DiClemente et al., 1985; Prochaska & DiClemente, 1983). These two measures were developed from a worksite sample of 1063 employees, of whom 77% were male, the average age was 41.1 years, the average number of years of education was 13.6 years, and the majority of the employees were in blue-collar occupations. The preliminary stages of change questionnaire was composed of five items rated on a 5-point Likert scale measuring precontemplation, contemplation, action, and maintenance. The preliminary self-efficacy for exercise measure consisted of five items rated on an 11-point Likert scale hypothesized to measure a unidimensional construct of self-efficacy for exercise. The content of the five items was related to negative affect, resisting relapse, and making time for exercise. Results from the first part of the study showed that 8.0% of employees fell into the precontemplation stage, 21.1% were in contemplation, 36.9% were in action, and 34.0 % were in maintenance. There were no significant relationships between

demographic variables and the stages of change for exercise or self-efficacy for exercise. Furthermore, total scores of the self-efficacy measure differentiated employees at different stages and increased linearly with advancing stages of change, in accordance with the study concerning self-efficacy and advancing stages of change as related to smoking cessation (DiClemente et al., 1985). These results suggest that individuals who had not yet begun to exercise (precontemplation or contemplation) had significantly less confidence in their ability to exercise than those individuals who were exercising regularly (action or maintenance).

However, upon closer examination of these results, the authors concluded that it might be helpful to subdivide the action stage and create the preparation stage of change between contemplation and action, which had recently been done with smoking cessation (DiClemente et al., 1991). Therefore, the second part of the study was to refine the newly developed instruments using a new sample of 429 employees, in which 15% were male, the average age was 40.5 years, the average number of years of education was 13.8 years, and less than half of the employees were involved in blue-collar occupations. A new stages of change instrument was constructed measuring the five stages of change of precontemplation, contemplation, preparation, action, and maintenance. Furthermore, the scale ranges for each of the items on the self-efficacy for exercise instrument were changed from 11-point Likert scales to 7-point Likert scales. Using these new measures, 7.3% of employees fell into the precontemplation stage, 23.1% were in contemplation, 30.4% were in preparation, 16.6% were in action, and 22.6% were in maintenance. Cronbach's alpha for the 5-item self-efficacy measure was .76. The results of this part of the study replicated the first part of the study. No demographic variables were

significantly associated with outcome variables. Total scores on the new self-efficacy measure increased linearly with advancing stages of change and significantly differentiated employees at different stages of change. Self-efficacy scores of those in precontemplation were significantly lower than all other stages, and all other comparisons were significant except between contemplation and preparation. The third part of the study examined the reliability of these newly developed measures using 20 participants from the second part of the study. Results indicated that the test-retest reliability for the self-efficacy for exercise scale over a 2-week period was .90, and the Kappa index of reliability for the stages of change measure over a 2-week time period was .78.

These results provided preliminary evidence suggesting that the transtheoretical model could be applied successfully to the study of exercise behavior. The authors of this study interpreted the results as showing a consistent picture of exercise behavior within the two samples. In the first sample, 34.0% reported exercising at a level that met the ACSM and USCDCP criteria and thus were classified as being in the maintenance stage, and 39.2% of the second sample met these criteria and were in either action or maintenance. The authors speculated that employees might benefit from different interventions that focused on enhancing different self-efficacy expectations at different stages of change in order to facilitate progression through the stages, such as utilizing informational and motivational experiences in precontemplation and contemplation.

Marcus and Owen (1992) conducted the first study examining the relationship between the stages of change, self-efficacy, and decisional balance for exercise in a cross-sectional and cross-cultural design using a United States worksite sample (n = 1093) and an Australian worksite sample (n = 801). In the U.S. sample, 52% were

female, the average age was 41.0 years, and 94% had at least a high school education. In the Australian sample, 12% were female, the average age was 42.0 years, and 72% had at least a high school education. The stages of change instrument for exercise measuring precontemplation, contemplation, preparation, action, and maintenance in Marcus, Selby et al. (1992) was modified slightly to use an 11-point Likert scale, while the self-efficacy measure remained the same. The authors constructed and tested a decisional balance measure for exercise based on a similar measure constructed for smoking cessation, which based its item content on the eight categories of Janis and Mann's (1977) decisional balance sheet (Velicer et al., 1985). However, the decisional balance measure for smoking in the Velicer et al. (1985) study produced a two-factor solution when subjected to exploratory and confirmatory principal components analyses, resulting in two scales classified as "pros" and "cons," as opposed to the eight categories espoused by Janis and Mann's (1977) original decisional balance sheet. The decisional balance measure for exercise consisted of six items rated on a 5-point Likert scale, with three items each forming the pro and con scales. In the U.S. sample, Cronbach's alpha was .70 for the pro scale and .56 for the con scale, while in Australia, Cronbach's alpha was .70 and .43, respectively. Cronbach's alpha for the self-efficacy for exercise scale was .85 in the U.S. sample and .80 in the Australian sample.

Results replicated some of the findings of Marcus, Selby et al. (1992), as scores on the self-efficacy for exercise measure significantly differentiated employees at most stages in both samples, as precontemplators and contemplators had the lowest scores, while those in action and maintenance had the highest scores. Similar differential patterns occurred for the pro scale, the con scale, and the overall decisional balance scale

(pros minus cons) for exercise for both samples, consistent with the applications of these constructs to smoking cessation (Velicer et al., 1985). Specifically, the cons for exercise decreased consistently across the stages of change, while both the pros for exercising and pros minus cons index increased across the stages of change. These results, like those concerning self-efficacy, suggest that potential effective interventions would aim to increase the pros and decrease the cons for exercise differently at different stages of change in order to help individuals progress towards the action and maintenance stages of change for exercise.

In contrast to the earlier study, results from this study yielded some relationships between demographic variables and outcome variables, because in the U.S. sample there was a nonsignificant trend for females to be in the middle stages (contemplation, preparation, and action) and for men to be in the extreme stages (precontemplation and maintenance). Younger employees were significantly more active than older employees, and employees with more education were significantly more active than those with less education. In the Australian sample there was a nonsignificant trend for women to be more active than men, younger employees were significantly more active than older employees, and employees with more education were significantly more active than those with less education.

A later study constructed and tested a longer and more comprehensive decisional balance measure for exercise on a worksite sample of 778 employees (Marcus, Rakowski, & Rossi, 1992). Within the sample, 66% were male, the average age was 41.5 years, the average number of years of education was 13.5 years, 95% were Caucasian, 70% were married, and 70% were employed in white-collar occupations. The same stages of

change measure used in Marcus and Owen (1992) was used in this study. The authors composed a 40-item questionnaire of statements thought to be reflective of Janis and Mann's (1977) eight categories and related to the pros and cons of beginning to exercise. The researchers then conducted principal components analysis, which yielded two factors, one formed by a 10-item pro scale and the other formed by a 6-item con scale. Each of the 16 items was rated on a 5-point Likert scale. Cronbach's alpha for the pro scale was .95 and for the con scale it was .79. The stages of change for exercise were significantly differentiated by scores on the pros, cons, and decisional balance (pros minus cons) scale scores, replicating the findings of Marcus and Owen (1992). Seven of the 10 possible pairwise contrasts between stages of change were significant for the pro scale, 8 of the 10 possible pairwise contrasts were significant for the con scale, and all of the pairwise contrasts were significant for the pros minus cons scale. The crossover or decisional balance point where pros exceeded the cons occurred in the preparation stage, similar to other health behaviors (Prochaska, Velicer, et al., 1994). These results supported the earlier findings that decisional balance indices for exercise changed linearly as individuals progressed across the stages of change, supporting the contention that the transtheoretical model may be successfully applied to exercise behavior (Marcus & Owen, 1992).

Marcus, Rossi, Selby, Niaura, & Abrams (1992) used a cross-sectional design to construct an instrument measuring the processes of change for exercise in a worksite sample of 1172 employees. Researchers randomly split the sample into halves to conduct initial model development and testing and then later conduct confirmatory model testing. Within the sample, 66% were female, the average age was 37.2 years, the average

number of years of education was 12.3 years, 93% were Caucasian, 50% were married, and the majority of them were employed in blue-collar occupations. Results indicated that employees utilized all 10 processes of change with respect to physical activity and exercise behavior, as hypothesized by the transtheoretical model (Prochaska et al., 1988). Furthermore, these ten processes of change were organized into the same higher-order two-factor structure representing cognitive or experiential processes of change and behavioral processes of change, as found by Prochaska et al. (1988).

There were some similarities as well as some differences between the results of this study and those reported for smoking cessation (DiClemente et al., 1991; Prochaska & DiClemente, 1983; Prochaska et al., 1991). For both exercise adoption and smoking cessation, individuals in precontemplation use the processes of change much less frequently than individuals in all other stages of change. Furthermore, concerning both health behaviors, the use of cognitive or experiential processes does not seem to change much between contemplation and preparation, whereas the use of behavioral processes increases from contemplation to preparation and again from preparation to action. As with smoking cessation, the use of behavioral processes of change peaked in the action stage for exercise. However, one of the differences between the utilization of processes of change for exercise and the utilization of processes of change for smoking cessation was that the use of the behavioral processes of change seemed to decline as individuals move from action to maintenance for smoking cessation, but not for exercise. Furthermore, for smoking cessation, use of the cognitive or experiential processes peaked in the preparation stage and then declined through the action and maintenance stages, but for exercise, the use of the cognitive or experiential processes peaked in the action stage

and then decreased in the maintenance stage. The authors speculated that the use of the cognitive or experiential processes of change peaking one stage later for exercise could be due to the fact that for exercise adoption individuals are acquiring a new behavior, while for smoking cessation, individuals are ceasing a behavior. Again, similar to previous studies, the results regarding self-efficacy and decisional balance seem to suggest that potential effective interventions would emphasize differential processes of change during different stages of change in order to help individuals progress towards the action and maintenance stages of change for exercise.

The study conducted by Marcus and Simkin (1993) demonstrated some limited concurrent validity for the stages of change measure, as it was significantly related to the Seven Day Physical Activity Recall (PAR) questionnaire in a worksite sample of 235 employees. Within the sample, 64% were female, the average age was 40.6 years, average number of years of education was 12.6 years, and 60% were employed in white-collar occupations. This study utilized a 5-item true-false questionnaire scored by using an algorithm to classify the participants into one of the five stages of change for exercise behavior. This measure was different than the stages of change for exercise behavior measures used by Marcus, Selby et al. (1992), Marcus and Owen (1992), Marcus, Rakowski, and Rossi (1992), and Marcus, Rossi et al. (1992). The authors reported the same Kappa index of reliability of .78 for a 2-week time period. The PAR questionnaire is a self-report instrument that asks participants to list the types and number of minutes of moderate and vigorous physical activity that they engaged in during the past week. The scores of the PAR questionnaire significantly differentiated those individuals among three groupings of the five stages of change: 1) precontemplation/contemplation, 2)

preparation, and 3) action/maintenance. Within the study, 51% fell into the precontemplation or contemplation stages, while 18% fell into the preparation stage, and 31% fell into the action, or maintenance stages. However, these findings are limited, as it strictly involves self-reported levels of physical activity and exercise, with no objective measures of physical activity levels to verify the self-reports.

The studies presented above provide some preliminary empirical evidence for the utility of using the transtheoretical model, self-efficacy, and decisional balance in examining and explaining exercise behavior adoption, maintenance, and effective interventions. However, each of the four studies has some limitations, some of which are common to all of them. These four studies were all cross-sectional in design, and in order to provide further support for the transtheoretical model, similar results concerning changes in self-efficacy and decisional balance over a progression through the stages of change with respect to exercise behavior need to be demonstrated in longitudinal studies. Secondly, most of the studies utilized self-report measures regarding activity levels and did not collect any objective measures of actual levels of physical activity and exercise behavior to validate and verify these self-reports. Therefore, additional studies utilizing more objective measures of actual physical activity levels and exercise behavior would strengthen these preliminary findings. Thirdly, each of these studies was conducted on relatively middle-aged, Caucasian, worksite samples, limiting the generalizability of the findings. Additional studies conducted with different populations such as community volunteers and/or patient samples would continue to strengthen the external validity of the transtheoretical model and its application to physical activity and exercise behavior adoption and maintenance. Furthermore, experimental designs testing the efficacy of

different physical activity and exercise interventions based on the transtheoretical model and the preliminary findings regarding its relationship to physical activity and exercise would strengthen these findings as well.

More recent studies have addressed some of the criticisms identified above. Marcus, Banspach, Lefebvre, Rossi, Carleton, and Abrams (1992) conducted a prospective study examining the efficacy of an intervention designed to increase physical activity in a sample of 610 community volunteers. The goal of the study was to recruit individuals specifically in the contemplation and preparation stages and to motivate and support progress to advanced stages of change for exercise. The sample was77.0% female, the average age was 41.8 years, and the majority had at least a high school diploma. Participants completed the same stage of change questionnaire used in other studies (Marcus, Selby et al., 1992; Marcus & Owen, 1992; Marcus, Rossi et al., 1992; Marcus, Rakowski, & Rossi, 1992) and those who were identified as being in the precontemplation and maintenance stages were excluded from the remainder of the study. Those who were classified as being in the contemplation, preparation, and action stages were assigned to a 6-week intervention matched for their specific stage of change (stage-matched), based on previous research regarding the differential emphases of the processes of change, self-efficacy, and decisional balance for the different stages of change for exercise (Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992; Marcus, Rossi et al., 1992; Marcus, Selby et al., 1992).

Each intervention included stage-specific self-help written materials concerning the initiation or increase of physical activity and exercise, a resource manual describing various options for activities in the community, and weekly "fun walks" and "activity

nights." A stratified random sample based on stage of change at baseline of 401 participants was selected to participate in post-intervention telephone interviews collecting information on exercise status and activities that they engaged in over the previous 6 weeks. Interviews were completed on 236 participants. Results indicated that 30% of those individuals in the contemplation stage at baseline and 61% of those in preparation at baseline were in the action stage after the 6-week intervention. Furthermore, 30% of those in contemplation at baseline had moved into the preparation stage of change after the 6-week intervention. Although these findings suggest that interventions matched for stage of change are quite effective in promoting exercise adoption and maintenance, the generalizability of these results is limited because a group controlling for the natural effects of time was not used. Furthermore, a truly randomly selected sample was not utilized within this study.

Marcus, Eaton, Rossi, and Harlow (1994) constructed and confirmed an integrated model of physical exercise composed of self-efficacy, decisional balance, stages of change, and levels of self-reported physical activity in two cross-sectional worksite samples, and then tested this model with longitudinal data to see if it would predict levels of self-reported physical activity. The worksite sample of 349 employees used to construct the model was 50.7% male, the average age was 40.84 years, and the average number of years of education was 13.59 years. The worksite sample of 349 employees used to confirm the model was 52.1% male, the average age was 40.52 years, and the average number of years of education was 13.66 years. In the third part of the study, the authors examined the model with longitudinal data, as 433 employees provided data concerning their levels of physical activity 6 months later. In this sample, 47.8%

were male, the average age was 40.77 years, and the average number of years of education was 13.67 years.

Exploratory and confirmatory analyses of the cross-sectional data yielded a model in which employees' self-reported level of physical activity, as measured by the PAR, could be predicted from the pros for exercise (two items), cons for exercise (two items), self-efficacy for exercise (three items), and the stage of change for exercise. Much of the variance for stage of change for exercise was explained by the three measures for pros for exercise, cons for exercise, and self-efficacy for exercise, while much of the variance in the levels of physical activity was explained by the stage of change for exercise. Furthermore, examination of this model with prospective longitudinal data revealed that the data fit the model well and that the model did a good job predicting the level of physical activity 6 months later, supporting the earlier findings of the cross-sectional data. Results suggested that self-efficacy for exercise has a stronger association with one's stage of change in comparison with the decisional balance indices of the pros and cons for exercise. Again, in the longitudinal analysis, the stage of change was a strong predictor of level of exercise 6 months later.

Marcus, Simkin, Rossi, and Pinto (1996) conducted a naturalistic longitudinal study in a worksite sample of 314 employees to examine what kind of change occurs over time without any intervention within the stages of change and the processes of change for exercise behavior. Within the sample, 66% were female, the average age was 41.0 years, the average number of years of education was 12.5 years, 93% were Caucasian, 60% were married, and 40% were employed in blue-collar occupations. The stages of change and processes of change questionnaires used in previous studies were used (Marcus,

Rossi, Selby, Naiura, & Abrams, 1992), and employees completed these questionnaires at baseline and then 6 months later at follow-up. Employees were classified into four separate groups in order to examine stages of change and the use of processes of change: 1) 32% were stable-sedentary, those individuals who remained in precontemplation or contemplation at baseline and follow-up, 2) 27% were stable-active, those individuals who remained in preparation, action, or maintenance at baseline and follow-up, 3) 26% were adopters, those individuals who moved from precontemplation or contemplation to preparation, action, or maintenance, and 4) 15% were relapsers, who moved from preparation, action, or maintenance to precontemplation or contemplation.

As predicted, those individuals classified as stable-sedentary and stable-active did not demonstrate significant changes in their use of processes of change between baseline and follow-up within their respective groups. However, there were significant differences between these two groups concerning the use of behavioral and experiential processes of change, as the stable-active group reported using all processes of change to a greater extent than the stable-sedentary group at both baseline and follow-up. In examining the group of adopters, the use of all of the processes of change except for social liberation increased significantly from baseline to follow-up. Most adopters moved from contemplation to one of the advanced stages, suggesting that having the intention to begin exercising is an important step before engaging in exercise. Concerning the relapsers, all of the behavioral processes and one of the experiential processes, dramatic relief, significantly decreased from baseline to follow-up. A total of 76% of the relapsers regressed from preparation, action, or maintenance back to contemplation, where they still had the intention to exercise again, while only 24%

regressed completely back to precontemplation, where they had no intention to start exercising again. The authors believed that this finding suggested that those relapsers may have continued to intend to exercise, but had difficulty avoiding situations that led to relapse. The results suggest that the behavioral processes of change are critical for maintaining long-term exercise behavior and preventing relapse, and so these processes should be explicitly taught in interventions in order to be effective for maintaining regular physical activity over the long-term. Furthermore, when an individual does relapse, it seems like it is because of the loss of or reduced utilization of behavioral processes or skills rather than cognitive or experiential ones. Again, limitations of this study are that it was a nonrandomized sample, there was no objective data concerning actual levels of physical activity to validate the self-reported levels, and there was no intervention group to which to compare patterns of stage of change and processes of change.

Marcus and her colleagues have carried out additional studies intended to replicate their previous findings as well as broaden the scope of the application of the transtheoretical model to exercise adoption and maintenance in order to examine its relationship with other health behaviors. Using a cross-sectional design of an all-female worksite sample composed of 431 employees, Marcus, Pinto, Simkin, Audrain, and Taylor (1994) obtained results indicating that women in precontemplation scored the lowest and those in maintenance scored the highest on the measures for self-efficacy for exercise, pros for exercise, and pros minus cons, while the trend was reversed for the cons for exercise measure. These results are in line with those found in previous cross-sectional studies (Marcus & Owen, 1992; Marcus, Selby et al., 1992). Other studies have

examined the relationships between stages of change, processes of change, decisional balance, and self-efficacy across multiple behaviors, such as exercise behavior, smoking cessation, and dietary fat intake reduction within the same samples, and the results suggest that these constructs are significantly related to one another and share some similarities across these health behaviors, but still demonstrate some specificity to each particular health behavior as well (Bock, Marcus, King, Borrelli, & Roberts, 1999; Bock, Marcus, Rossi, & Redding, 1998; Emmons, Marcus, Linnan, Rossi, & Abrams, 1994; King, Marcus, Pinto, Emmons, & Abrams, 1996; Marcus, Albrecht, Niaura, Taylor, Simkin, Feder, Abrams, & Thompson, 1995; Marcus, King, Albrecht, Parisi, & Abrams, 1997; Pinto, Borrelli, King, Bock, Clark, Roberts, & Marcus, 1999).

For example, King et al. (1996) obtained results indicating that self-efficacy and decisional balance associated with smoking cessation are significantly related to those same constructs with respect to exercise behavior. Results indicated that smokers who were exercising regularly reported significantly greater self-efficacy for smoking cessation than those smokers who were not exercising regularly. Additionally, those smokers preparing to quit smoking reported less self-efficacy for exercise than those smokers who had already taken action to quit smoking. The pros and cons for smoking cessation were significantly associated with the pros and cons for exercise, respectively. Bock et al. (1998) found that motivational readiness to begin exercise as measured by stage of change was positively related to motivational readiness to reduce dietary fat intake, but was not differentially related to motivational readiness for smoking cessation. These results hint that interventions aimed at encouraging one of these health behaviors may possibly lead to indirectly facilitating other healthy behaviors, and may serve as a

gateway for healthier lifestyles. Furthermore, the addition of an exercise component to smoking cessation interventions may facilitate smoking cessation and prevent relapse, particularly in individuals who are sedentary or those women who smoke in order to control their weight (Bock et al., 1999; Marcus et al., 1995; Marcus, King et al., 1997; Pinto et al., 1999).

Additional studies have also replicated the effectiveness of interventions for increasing exercise based on the transtheoretical model, self-efficacy, and decisional balance with some specific patient populations. For example, as predicted, patients who underwent a 12-week cardiac rehabilitation program designed to increase levels of exercise demonstrated increases in self-reported physical activity levels, self-efficacy, decisional balance, and behavioral processes of change as patients progressed through the stages of change at post-treatment and a 3-month follow-up (Bock, Albrecht, Traficante, Clark, Pinto, Tilkemeier, & Marcus, 1997). Another study carried out a randomized clinical trial comparing the effects of a lifestyle exercise intervention with those of a more structured exercise intervention on outcome measures of the constructs of the transtheoretical model; in addition, the study utilized more objective measures of health and correlates of exercise behavior, such as changes in lipid and lipoprotein-cholesterol concentrations, blood pressure, and percentage body fat composition (Dunn, Marcus, Kampert, Garcia, Kohl, & Blair, 1997). Results from this study indicated that after participating in one of the 6-month interventions, 78% of a lifestyle group and 85% of the structured group were exercising regularly as defined by ACSM and USCDCP guidelines (ACSM, 1990; Pate et al., 1995) and therefore were either in the action or maintenance stages. Both groups also had significant reductions in total cholesterol and lipoprotein-

cholesterol concentrations, diastolic blood pressure, and percentage of body fat, as well as significant increases in self-efficacy and in both cognitive and behavioral processes of change, with no significant between-group differences on these outcomes. These results suggest that lifestyle exercise interventions can be as effective as more structured exercise interventions in increasing exercise adoption and maintenance. Although this was a randomized clinical trial, there was no control group to which to compare the outcomes of these two interventions.

In the first prospective, randomized, controlled study comparing a stage-matched self-help intervention to a standard self-help intervention, participants in the stage-matched intervention were significantly more likely to progress to more advanced stages of change and less likely to remain in their baseline stage of change or regress to an earlier stage of change (Marcus, Emmons, Simkin-Silverman, Linnan, Taylor, Bock, Roberts, Rossi, & Abrams, 1998). This study was conducted on a worksite sample of 1559 employees, of whom 57% were male, the average age was 39.9 years, 69.8% were married, 93.5% were Caucasian, 69.4% had at least a high school diploma, and 62% were in a blue collar job. Furthermore, these changes in the stages of change between baseline and post-intervention demonstrated similar expected changes in self-reported levels of physical activity and exercise as measured by the PAR.

Another study completed a randomized controlled trial comparing the efficacy of a physician-delivered brief physical activity counseling to a control condition of usual care based on self-reported physical activity levels in a patient sample composed of middle-aged and older adults (Goldstein, Pinto, Marcus, Lynn, Jette, McDermott, DePue, Milan, Dube, Tennstedt, & Rakowski, 1999). Patients in the intervention received brief,

stage-matched activity counseling, a patient manual, a follow-up appointment with their physician to discuss activity counseling, and newsletter mailings, while those in the control condition received usual care from their physician, in which physical activity counseling was not given and no follow-up appointment was scheduled. Patients were administered measures of stage of change for exercise and self-reported physical activity levels at baseline, 6 weeks later, and at 8 months. Patients receiving the brief stage-matched activity counseling were more likely to be in the advanced stages of change for exercise than those in the control condition, but this effect was not maintained at the 8-month follow-up. Currently, researchers are conducting an ongoing 5-year randomized clinical trial to evaluate the efficacy of two primary care, practice-based physical activity interventions based on the transtheoretical model compared to a control condition of usual care (Albright, Cohen, Gibbons, Miller, Marcus, Sallis, Ima, Jemick, & Simons-Morton, 2000; King, Sallis, Dunn, Simons-Morton, Albright, Cohen, Rejesle, Marcus, & Coday, 1998). Furthermore, one study obtained results suggesting that advancement through the stages of change for exercise is associated with increases of self-perceived quality of life, as measured by the SF-36 questionnaire (Laforge, Rossi, Prochaska, Velicer, Levesque, & McHorney, 1999).

Additional Replications and Considerations

Additional researchers independent of Marcus and her colleagues have examined the applicability of the transtheoretical model to the adoption and maintenance of physical activity and exercise as well. These studies will be briefly summarized here. These studies have obtained results that for the most part are in accordance with the transtheoretical model and its constructs, even in different populations. Although they

used a different classification system based on "interest in exercise" as opposed to the typical stages of change, Armstrong, Sallis, Hovell, and Hofstetter (1993) examined a sample of "precontemplators" and "contemplators" and found that contemplators had higher self-efficacy scores than precontemplators, and that the stages of change was a significant predictor of adoption of physical activity and exercise in the future, even after controlling for differences in variables like age, gender, and self-efficacy, in a survey of middle-aged Caucasians. Wyse, Mercer, Ashford, Buxton, and Gleeson (1995) found significant differences in levels of self-efficacy and self-reported physical activity and exercise between the precontemplation/contemplation, preparation, and action/maintenance groupings of stages of change in a sample of young British adults, aged between 16 and 21 years. Gorely and Gordon (1995) found that self-efficacy and the pros scale increased and the cons scale decreased as originally hypothesized between precontemplation and maintenance in an elderly Australian population. Hellman (1997) found that barriers and benefits of physical activity and exercise significantly predicted the stage of change for exercise in a sample of elderly U.S. adults with a cardiac condition after they had been discharged from a cardiac rehabilitation inpatient program. Herrick, Stone, and Mettler (1997) found significant differences for decisional balance and self-efficacy scores across the stages of change for exercise, as well as for smoking cessation, sun protection, and dietary fat consumption in a worksite sample of middle-aged Caucasians. Nigg and Courneya (1998) obtained results that self-efficacy, the pros, and the cons for exercise changed as hypothesized across the stages of change for adolescents 13 to 19 years of age from Canada.

Two relatively recent research projects that have several manuscripts prepared for submission (Benisovich, Rossi, Norman, & Nigg, 1998a, 1998b, 1998c; Nigg, Rossi, Norman, & Benisovich, 1998, 2001; Rossi, Benisovich Norman, & Nigg, 2001) have reconsidered the ways in which decisional balance and self-efficacy for exercise have been conceptualized and measured in past studies. Nigg et al. (1998; 2001) constructed a decisional balance questionnaire composed of item content representing the eight categories of Janis and Mann's (1977) decisional balance sheet for exercise behavior to examine if it could then empirically reproduce the eight factors in a principal components analysis. These authors recounted that earlier Marcus studies (e.g., Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992) developed decisional balance measures with item content based on the same eight categories of decisional balance, but then only examined the relation between the two scales of pros and cons to the stages of change for exercise. Therefore, these studies had never explicitly examined the possibility of an eight-factor structure based on the model of decisional balance.

The authors cited other studies that were conducted by researchers not affiliated with Marcus and her colleagues that replicated their results and were consistent with the transtheoretical model, even with different populations (Gorely & Gordon, 1995; Hellman, 1997; Nigg & Courneya, 1998). However, these studies used the decisional balance measure consisting of the two pros and cons scales created by Marcus, Rakowski, and Rossi (1992) in order to examine its relationship to the stages of change for exercise behavior, and therefore were incapable of addressing a potential eight-factor model of decisional balance for exercise. The authors cited that Myers and Roth (1997) did in fact find eight factors in their own model of "barriers" and "benefits" for exercise

in a sample of college students. However, these factors did not correspond to the eight categories of Janis and Mann (1977). One possibility entertained by authors was that the number of factors of decisional balance for exercise might vary for different populations (Myers & Roth, 1997; Nigg & Courneya, 1998; Nigg et al., 2001).

Nigg et al. (1998, 2001) conducted a two-part study to construct a new decisional balance measure for exercise based on the eight categories of Janis and Mann's (1977) model and then to subject the new measure to an exploratory and confirmatory principal components analysis to see if they reproduced the eight factors empirically. The first part of the study was conducted on a sample of 240 undergraduate students, of whom 69% were female, the average age was 19.8 years, the average level of education was 13.5 years, 95% were unmarried, and 89% were Caucasian. The authors generated 69 decisional balance statements representing the eight categories, and participants responded to each of the 69 items by rating the importance of each statement in their decision to exercise or not to exercise in their leisure time on a 5-point Likert scale, ranging from (1) not at all important to (5) extremely important. The responses of the sample were subjected to an exploratory principal components analysis, evaluating the potential number of factors in several ways. A two-factor solution resulted which accounted for 48.08% of the total item variance, with factor one and factor two accounting for 24.65% and 23.43% of the total variance, respectively. The measure was reduced to 49 items for the purpose of confirmation in the second part of the study.

This second part of the study was conducted by a random telephone interview with a new sample of 346 adults aged between 18 and 75, of whom 62% were female, 95% were white, and the median income for the sample was between $30,000 and

$40,000. This sample was randomly split in half to conduct further structural and exploratory analyses on sample 1 and confirmatory analyses on sample 2. Analysis of sample 1 yielded a two-factor solution to the 49 items. The 49-item pool was reduced further and resulted in a 10-item measure composed of the same two factors, with 5 items per factor. These two factors that were extracted accounted for 59.74% of the total variance. Factor one was labeled as the pros scale and accounted for 36.08% of the total variance, and factor two was labeled as the cons scale and accounted for 23.65% of the total variance. A confirmatory factor analysis of the two 5-item scales was conducted with sample 2 and the model fit the data well, thus confirming the hypothesized model. The final 10-item decisional balance measure produced a Cronbach's alpha value of .89 for the pros scale in both samples, and Cronbach's alpha values of .83 and .64 for the cons scales in samples 1 and 2, respectively, suggesting adequate internal consistency for the measure.

These results suggested that Janis and Mann's (1977) eight categories of decisional balance could not be produced statistically with respect to physical activity and exercise. This seems to confirm that the original and simpler conceptualization of decisional balance in terms of the pros and cons is more parsimonious and practical, because it also results in a shorter assessment instrument. Furthermore, results from this study regarding the pattern of pros and cons across the stages of change were consistent with previous studies and the transtheoretical model. The Strong Principle was supported in both samples, while the Weak Principle was supported in the adult population, but was not as pronounced in the undergraduate sample, possibly due to the homogeneity of the sample concerning knowledge about the negative consequences of exercising.

These same researchers also chose to reexamine the conceptualization of self-efficacy as it applied to physical activity and exercise behavior (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001). They reported that self-efficacy had been treated as a single global construct in many of the past studies examining its relationship with exercise (e.g., Armstrong et al., 1993; Gorely & Gordon, 1995; Herrick et al., 1997; Marcus, Selby et al., 1992; McAuley et al., 1994; Reynolds et al., 1990; Rodgers & Brawley, 1993; Sallis et al., 1986), with one exception (Sallis et al., 1988). These researchers argued that such a global factor of self-efficacy did not adequately encompass the fluctuating, dynamic nature of exercise behavior, and argued that a multidimensional approach could be more representative of the construct in addition to being more useful. They believed that examining self-efficacy for exercise in a multidimensional way could facilitate the examination of individual differences by looking at the different situations that were more challenging for individuals as they begin to adopt physical activity and exercise and move towards maintaining such a lifestyle. They argued that such a conceptualization could be useful for developing more appropriate and effective interventions to aid in the movement to get individuals to become more physically active.

Benisovich et al. (1998a, 1998b, 1998c; Rossi et al., 2001) reported that both a "global self-efficacy" and a "multidimensional self-efficacy" based on situational aspects had been examined within a hypothesized hierarchical model examining their relationships to the stages of change for smoking cessation (Velicer, DiClemente, Rossi, & Prochaska, 1990). Within the Velicer et al. (1990) study, the global construct was adequate for explaining self-efficacy in the precontemplation and maintenance stages, as they represented the extremes of the range, being uniformly low in precontemplation and

high in maintenance across several situations. However, in the middle stages of change, individual differences in self-efficacy emerged from numerous challenging situations to create distinctions among these situations. Benisovich et al. (1998a, 1998b, 1998c; Rossi et al., 2001) intended to examine a multidimensional approach to self-efficacy for exercise behavior by constructing a hierarchical measure of global and situational self-efficacy for exercise and comparing them within their study. Their study was conducted on a sample of 228 undergraduates, of whom 69% were female, 95% were unmarried, the average age was 19.8 years, the mean level of education was 13.5 years, and 89% were Caucasian. The researchers generated 32 items describing affects, barriers, and situations in which individuals might find it difficult to exercise. The sample responded to each item by rating their level of confidence that they would exercise in each of the 32 circumstances on a 5-point Likert scale, ranging from (1) not at all confident to (5) completely confident. The five items from the Marcus, Selby et al. (1992) self-efficacy for exercise measure were included in the pool of 32 items.

The data was subjected to an exploratory principal components analysis, which revealed six components, labeled Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather. Item reduction resulted in an 18-item measure consisting of three items for each of the six components. Cronbach's alpha for Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather was .85, .83, .87, .77, .85, and .87, respectively. Cronbach's alpha for the entire 18-item scale was .94. All of these values reflect adequate internal consistency for the scales. The correlations between the six component scales ranged from .51 to .64. The authors then conducted structural equation modeling to examine the

five possible alternative measurement models of the data. A hierarchical structural model composed of six primary self-efficacy factors and a single higher order or secondary factor representing global self-efficacy provided the best measurement model alternative that fit the data.

Concerning validation of the measure through prediction of participants' exercise behavior, the six factors of self-efficacy for exercise together accounted for 23.3% of the total variance in exercise behavior, while in comparison the global factor of self-efficacy accounted for 14.4% the total variance. Additionally, the six factor scores accounted for 25.2% of the total variance in the pros of exercise, and the global factor accounted for 14.4% of the total variance. The global factor of self-efficacy and each of the six factors of self-efficacy for exercise did increase across the stages of change, although several factors did not differ as much between certain stages of change as other factors did. Some differences between the stages of change for each factor were not significant. Across all of the stages of change, the factors of Excuse Making and Inconvenience were consistently the lowest scores of self-efficacy, and the factors of Exercising Alone and Negative Affect were consistently the highest scores of self-efficacy. These results indicate that the six factors behaved differently across the stages of change, and suggest that a multidimensional conceptualization of self-efficacy for exercise may be more informative in explaining unique aspects of self-efficacy for exercise. This would seem to be highly useful for the purposes of intervention. For example, focusing interventions on certain factors that remain lowest relative to the other factors (e.g., Excuse Making and Inconvenience) may lead to quicker advancement through the stages of change and to higher levels of increased activity and exercise. Furthermore, a multidimensional self-

efficacy measure seems to be useful because various factors of self-efficacy for exercise can be examined in the context of individuals and their idiographic perception of self-efficacy across a variety of potentially challenging situations. This allows researcher as well as clinical interventionists to see what situations are the most difficult for them as individuals with respect to their movement through the stages of change. However, replication and extension of these findings and hypotheses are needed to confirm such speculations, and so these remain as empirical questions.

Also as a result of this study, the researchers formulated a Short Form 6-item global self-efficacy for exercise scale, with one item representing each of the six factors. This was done in order to create a brief, useful assessment device that would not be burdensome to respondents in research or clinical situations. Cronbach's alpha for the scale was .82, suggesting adequate internal consistency. More importantly, a one-factor model was imposed on the data with this measure, and the model fit the data very well, supporting the unidimensionality of the Short Form 6-item global self-efficacy for exercise scale. The 6-item scale also demonstrated levels of construct validity comparable to those found with the longer 18-item measure.

Again, limitations of both of these studies regarding decisional balance and self-efficacy were that they relied upon measures of self-report, that the samples were composed of volunteers, and that they were conducted with a cross-sectional design, rather than a longitudinal design. With the decisional balance study, the purpose of the study was evident to the participants, allowing for the possibility of social desirability in their responses. Furthermore, the study with the self-efficacy measure had a relatively homogeneous sample composed of young undergraduates on which to conduct

exploratory analyses, and they did not have another additional sample on which to confirm the model. Therefore, more research is needed to examine and validate the multidimensional 18-item self-efficacy for exercise in additional samples and examine its utility in predicting levels of physical activity and exercise behavior in longitudinal and intervention designs with more objective measures of physical activity and exercise behavior.

Physical Activity and Exercise in Individuals with Disabilities

The studies reviewed above suggest that the transtheoretical model is useful for understanding exercise behavior in worksite, community volunteer, and a few specific patient populations, and that interventions based on its understanding and constructs with these populations are effective and promising. However, the extent to which the transtheoretical model and its stage-matched interventions can be generalized to other patient populations has yet to be determined, as similar comprehensive studies aimed at replicating the results of these preliminary studies need to be conducted with other important patient populations like the physically disabled. While there have been some studies examining the concept of self-efficacy for exercise as it related to exercise behavior in a population of disabled individuals with mobility impairments (e.g., Kinne, Patrick, & Maher, 1999; Maher, Kinne, & Patrick, 1999), these studies have been significantly different from those conducted by Marcus and colleagues, which have been more formal in specifically examining the transtheoretical model in terms of the stages of change, processes of change, self-efficacy, decisional balance, and their relation to levels of physical activity or exercise behavior.

There are an estimated 49-54 million Americans comprising 19-21% of the U.S. adult population who report having a disability that interferes with their life activities, and these estimates are self-admittedly conservative (USCDCP, 1994a; USDHHS, 2000). This population seems to be at increased risk for experiencing additional health complications. People with disabilities are commonly sedentary or underactive, even more so than the rest of the U.S. adult population, as approximately 73% do not engage in regular physical activity as set forth by ACSM and USCDCP guidelines (Marcus, Forsyth, et al., 2000; Pate et al., 1995; USDHHS, 1996, 2000). Such reduced levels of physical activity may contribute to the elevated risk for negative health complications within that population. A push for a national agenda of conducting disability research on the surveillance, prevention, and reduction of the numerous possible secondary conditions associated with having a primary disability has served as the impetus behind such research that has been carried out over the past decade (Cole, 1994; Houk & Thacker, 1989; Marge, 1988; Patrick, Richardson, Starks, & Rose, 1994; Pope, 1992; Ravesloot, Seekins, & Walsh, 1997; Rimmer, 1999; Seekins, White, Ravesloot, Norris, Szalda-Petree, Lopez, Golden, & Young, 1999; Turk, Geremski, Rosenbaum, & Weber, 1997; White, Gutierrez, & Seekins, 1996). A further example of the importance and priority of such research is exemplified by the Healthy People 2010 initiative identifying the examination of secondary conditions in those individuals with disabilities as 1 of their 28 focus areas (USDHHS, 2000).

Secondary conditions have been defined as conditions that are "causally related to a disabling condition (it occurs as a result of the primary disabling condition) and that can be either a pathology, an impairment, a functional limitation, or an additional disability"

(Pope, 1992, p. 347). Examples of secondary conditions associated with having a primary disability like a spinal cord injury, multiple sclerosis, or cerebral palsy are such conditions as pressure sores, urinary tract infections, depression, ulcers, strokes, and arthritis (Marge, 1988; Pope, 1992; Seekins, Smith, McCleary, Clay, & Walsh, 1990). These secondary conditions can exacerbate the already significant functional limitations experienced by the disabled individual resulting in further functional impairments as well as escalating health care costs (Seekins, Clay, & Ravesloot, 1994; Trupin, Rice, & Max, 1995). As an illustrative example, Sugarman (1985) reported that nearly 50% of those individuals with a spinal cord injury develop pressure sores that cost over $30,000 and require up to 6 months hospitalization to treat successfully. Clearly, there is a need to work towards understanding the prevalence of secondary conditions and work towards their prevention and management.

The Montana University Affiliated Rural Institute on Disabilities has conducted numerous research studies in the area of secondary conditions concerning individuals with disabilities in rural parts of the country. Researchers there have developed the Secondary Condition Surveillance Instrument (SCSI; Seekins et al., 1990), a 40-item measure that assesses the number, type, and level of severity experienced regarding various secondary conditions experienced by adults with mobility impairments. Mobility impairments are those that limit or interfere with an individual's performance of basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying objects. Mobility impairments can be caused by a variety of primary conditions, for example spinal cord injuries, multiple sclerosis, or cerebral palsy, in addition to other conditions. A descriptive surveillance study using the SCSI to examine the prevalence and patterns

of such secondary conditions in rural areas of Montana found that most individuals with a mobility impairment reported experiencing at least one secondary condition, and that 11 of the 15 conditions receiving the highest problem index scores calculated from the sample had significant environmental, behavioral, or lifestyle components (Seekins et al., 1994). Examples of these conditions were pain, depression, isolation, fatigue, sleep disturbances, weight control, and physical conditioning problems. The researchers speculated that health promotion strategies utilizing exercise or physical activity components might help prevent and manage some secondary conditions for this population.

Ravesloot, Seekins, and Walsh (1997) obtained results from a constructed path model that suggested that primary disabilities were not predictive of specific clusters of secondary conditions as measured by the SCSI, and that many secondary conditions like depression and pain are experienced by many individuals with different primary disabilities. The researchers suggested that broader interventions for impacting overall health attitudes and health practices such as those espoused by health promotion programs might be effective for preventing and managing secondary conditions, as opposed to interventions specifically designed for groups composed of particular primary disabilities.

These results and speculations led up to the development, implementation, and preliminary evaluation of a health promotion program designed to promote overall health and to prevent and reduce the impact of secondary conditions experienced by adults with primary mobility impairments (Ravesloot, Seekins, Young, 1998; Seekins et al., 1999). This health promotion program, called Living Well with a Disability, has demonstrated

preliminary effectiveness for preventing and managing secondary conditions in those individuals with mobility impairments, in addition to preliminary cost-effectiveness (Ravesloot, Seekins, & Ipsen, 1999; Seekins et al., 1999). The Living Well with a Disability intervention is an 8-week course taught by facilitators to groups of 8-12 adults with mobility impairments (Ravesloot, Seekins et al., 1999). It is delivered to the population at an Independent Living Center (ILC), defined by Ravesloot, Seekins et al. (1999, p. 2) as "a community based, non-profit, consumer-directed, non-residential organization intended to both advocate for and to provide support services to those with disabilities to help them live independently in their communities." These ILCs have been implicated as playing a significant role in carrying out the national agenda to prevent and manage secondary conditions of those with primary disabilities (White et al., 1996). The Living Well with a Disability protocol utilizes a copyrighted text (see Ravesloot, Young, Norris, Szalda-Petree, Seekins, White, Golden, & Lopez, 1996) as an aid to help participants identify how their daily behaviors contribute to the pursuit and attainment of their long-term health goals, and use problem-solving techniques of solution generation, depression prevention, and communication to aid in achieving those health goals.

Researchers examined outcomes of the intervention by comparing a nonrandomized sample of 14 individuals who completed the Living Well with a Disability program, the post-intervention measures, and the follow-up measures 6 months after the post-measure, with 21 individual controls that completed all outcome measures within the same timeframe (Ravesloot, Seekins, & Young, 1998; Seekins et al., 1999). Both samples had comparable age, gender compositions, and incomes, but the intervention group had an average education level of 13 years, while the control had one

of 14 years, in addition to a difference in racial composition. Those individuals in the intervention group reported a 37% decrease in their secondary conditions as measured by the SCSI 6 months after the intervention ended, while the individuals in the control comparison group did not report such a comparable decrease. Major limitations of the results concern the nature of the data as being strictly self-report measures and the lack of a random assignment to treatment. However, further support for this intervention comes from an additional study comparing healthcare costs of 77 participants gathered within a 2-month time period before enrollment in the Living Well with a Disability program with the healthcare costs of the same 77 participants gathered in the 2-month time period immediately after completion of the program ($4098 versus $3704), suggesting that the intervention is cost-effective as a result of reducing the costs associated with reducing the complications from secondary conditions (Ravesloot, Seekins et al., 1999).

Grant-Funded Study

These encouraging results of the Living Well with a Disability health program have led the research group to begin conducting a study funded by a USCDCP grant that will examine the cost-effectiveness of two recruitment strategies for two different treatment strategies involving exercise for the treatment of secondary conditions in a cohort of Medicaid beneficiaries with mobility impairments (Ravesloot, 1999). Several different researchers have suggested that participation in regular physical activity and exercise could be helpful in preventing and managing secondary conditions (Laskin, 2000; Marge, 1988; Ravesloot et al., 1998; Rimmer, 1999). This study also incorporates a few aspects of the transtheoretical model into its design, rationale, and hypotheses. The researchers plan to address the difficulties of maintenance of regular exercise by applying

their behavioral maintenance strategies employed with the Living Well with a Disability program to exercise program development and maintenance. These strategies are intended to help individuals with the long-term generalization and maintenance of health behaviors. Furthermore, the researchers found significant increases in self-reported levels of physical activity by participants 6 months after they completed the Living Well with a Disability intervention (Ravesloot, Murphy-Southwick, Seekins, & White, 1999). This finding occurred despite there not being any specific mechanisms or supports for increasing physical activity in the intervention. The researchers interpreted these findings as preliminary evidence for the case that the Living Well with a Disability health promotion intervention might be useful for generalizing to physical activity and exercise maintenance.

The grant-funded study's main focus involves the comparison of cost-effectiveness for four conditions resulting from combinations of the two levels of the two independent variables concerning recruitment and intervention. Specifically, the grant-funded study will compare 1) a reactive recruitment strategy of direct mailings of newsletters to eligible participants with 2) a proactive recruitment strategy of telephoning eligible participants and initiating techniques based on motivational interviewing (Miller & Rollnick, 1991) to help eligible participants to begin exploration of the pros and cons of beginning an exercise program. Furthermore, the grant-funded study will also compare 1) those participants recruited into an exercise program plus the Living Well with a Disability program with 2) those participants recruited into an exercise program alone.

Proactive recruitment strategies are hypothesized to be more effective with individuals in the precontemplation and contemplation stages of change in order to help them progress towards the advanced stages of change, such as preparation, action, and maintenance (Prochaska & Marcus, 1994). Reactive recruitment strategies, which are typically carried out by placing advertisements or announcements in the media, may be better suited for recruiting those individuals in the action and possibly the preparation stages, because responding to reactive strategies may be too big of a behavioral step for individuals in the precontemplation and contemplation stages. Prochaska and Marcus (1994) reported that by using random digit dialing of 5000 smokers in Rhode Island, proactive recruitment strategies allowed them to recruit 75-80% of eligible smokers to a self-help intervention based on their respective stages of change (stage-matched), a significant improvement over the 4-7% recruitment rates they cited when they used reactive recruitment strategies, even with incentives. Therefore, as there seem to be more individuals in the precontemplation and contemplation stages than those in the later stages, proactive recruitment is likely to be more effective for increasing recruitment rates for health promotion interventions aimed at facilitating behavior changes. However, at this point in time this hypothesis has not been addressed empirically with individuals with physical mobility impairments with respect to recruitment for exercise programs.

Motivational interviewing utilizes five general strategies to promote health behavior change: 1) express empathy, which represents an attempt to understand the individual's feelings and rationale without judgment, criticism, or blame, 2) develop discrepancy, which represents an attempt to create and amplify a discrepancy between an

individual's present behavior and broader future goals, such as through discussion of the consequences of the present behavior, 3) avoid argumentation, which represents an attempt to avoid defensiveness, resistance, and labeling, which is usually counterproductive, 4) roll with resistance, which represents an attempt to switch momentum and invite rather than insist for the individual to shift his or her perceptions, and 5) support self-efficacy, which represents an attempt to increase the individual's belief and confidence in himself or herself that he or she is capable of and responsible for bringing about behavioral change (Miller & Rollnick, 1991). Motivational interviewing has been shown to be effective for recruiting people into positive health behavior change programs, and has been associated with positive treatment outcomes, particularly in the area of substance abuse, which as stated above has a similar relapse rate to that of physical activity and exercise behavior (Carmody et al., 1980; Hunt et al., 1971; Walitzer, Dermen, & Connors, 1999). Participants assigned to the proactive recruitment strategy of motivational interviewing will have a staff member engage in motivational interviewing techniques with them beginning with the first phone contact and continuing through the time they have scheduled a screening and evaluation with the Physical Therapist, with a maximum of three phone contacts and one in-person session.

The exercise programs will take place at an ILC affiliated with the Rural Institute on Disabilities in Missoula for people with disabilities called the New Directions program. New Directions is a 2000 square foot facility that has clinical office rooms, a group room for conducting health promotional education, and a 1000 square foot fitness facility that has Life Fitness brand fitness equipment and specialized training equipment for people who use wheelchairs. The program at New Directions has been operational

since February 1998, and it currently provides services to approximately 50 clients on a regular basis, as well as an additional 50 clients who visit the facility sporadically. Since the inception of New Directions, the clinical and research staff there believe that they have learned a great deal about health promotion and disability in an applied "real world" setting, such as learning about recruiting individuals with disabilities into health promotion programs, as well as the difficulty and amount of cost involved to recruit these individuals and help this population maintain their newly acquired positive health behaviors.

Rationale, Purposes, and Hypotheses

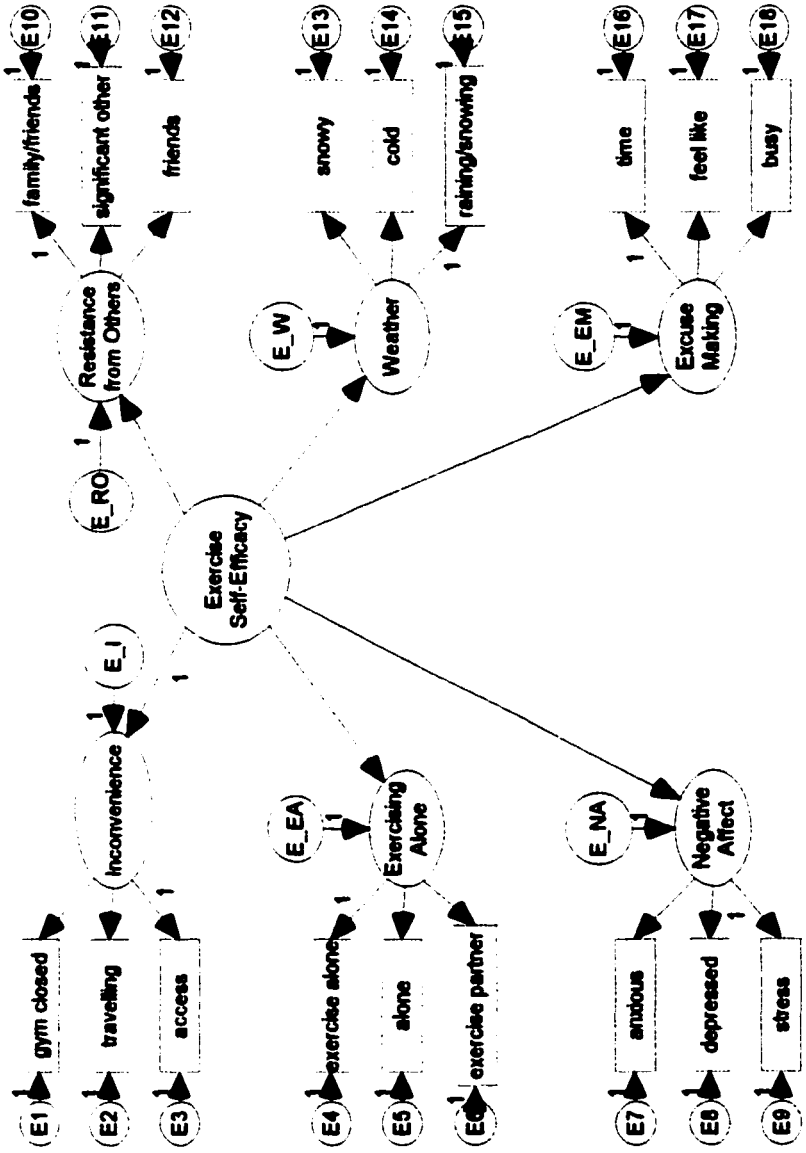
The researchers of the grant-funded study reviewed above are primarily interested in the outcomes of the recruitment strategies and exercise program conditions in terms of cost-effectiveness, and there is a great opportunity to expand upon the grant-funded study to examine the utility, applicability, and generalizability of the transtheoretical model, its constructs, and its measurement instruments with respect to exercise behavior within a population of individuals with longstanding mobility impairments. In order to increase and maintain regular exercise among people with disabilities, health promotion researchers need to extend the transtheoretical model to see if it generalizes to a disabled population or if modifications need to be made (Rimmer, Braddock, Pitetti, 1996). The present dissertation research project has several purposes that will be addressed in a series of three different studies utilizing the sample being utilized for completion of the Montana University Affiliated Rural Institute on Disabilities study entitled "The Cost of Treating Secondary Conditions with Physical Activity in a Cohort of Medicaid Beneficiaries with Mobility Impairments" (Ravesloot, 1999) funded by a USCDCP grant.

Study 1

The two recently developed decisional balance and self-efficacy for exercise instruments (Benisovich et al., 1998a, 1998b, 1998c; Nigg et al., 1998, 2001; Rossi et al., 2001) have not been utilized and/or the results of these studies have not been replicated in additional empirical studies. Therefore, the purposes of Study 1 were to attempt to replicate and confirm the measurement models and original psychometric findings of the Full 18-item multidimensional self-efficacy for exercise instrument, the Short Form 6-item global (unidimensional) self-efficacy for exercise instrument, and the 10-item decisional balance for exercise instrument in order to validate these two new measures using this specified sample of Medicaid beneficiaries with longstanding mobility impairments.

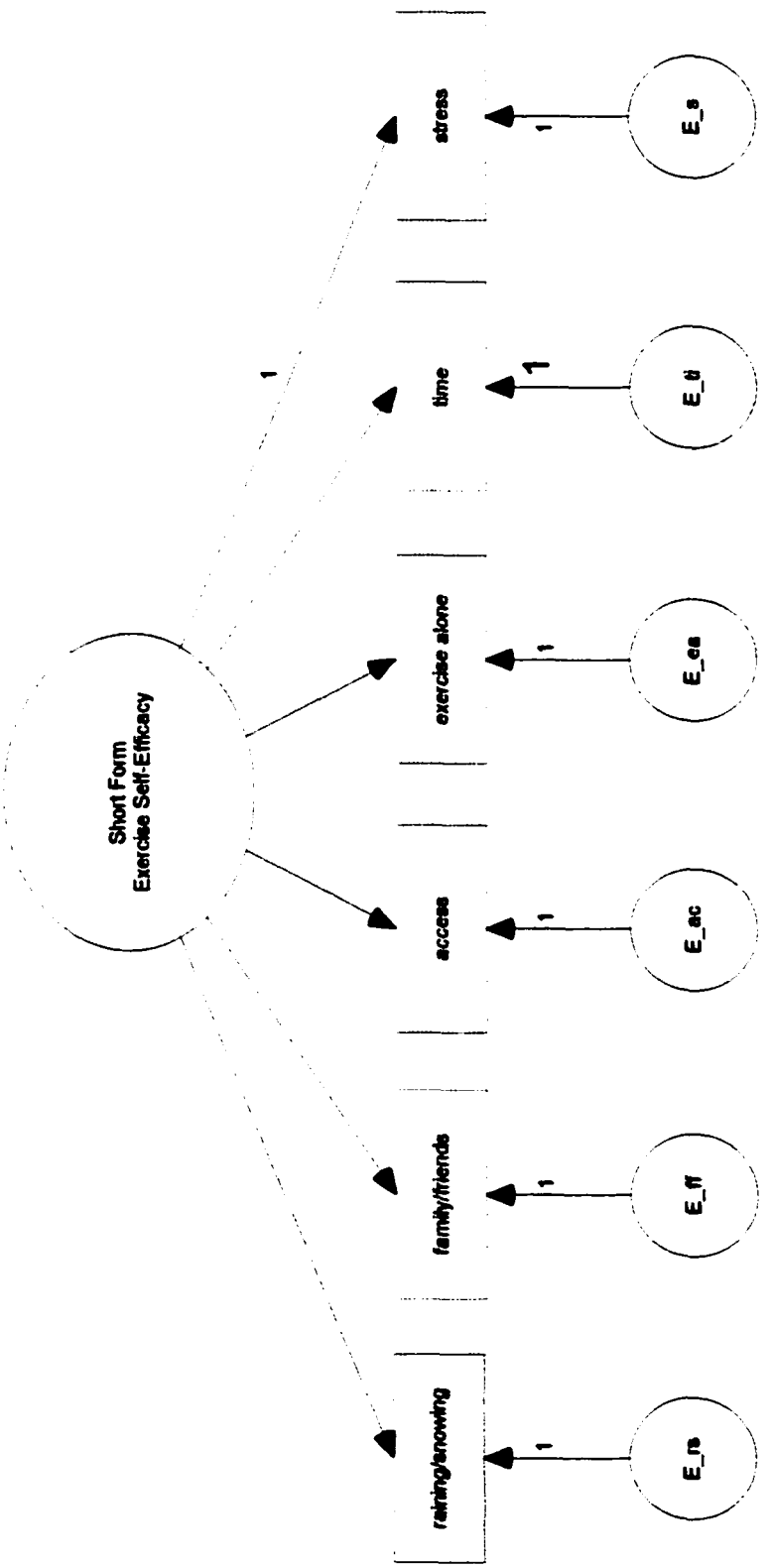
The following were the hypotheses of Study 1: a) analyses on the Full 18-item multidimensional self-efficacy for exercise instrument would produce a well-fitting hierarchical measurement model composed of a single, higher order factor representing global self-efficacy for exercise and six primary factors of Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather that represent situational self-efficacy for exercise (See Figure 1); b) analyses on the Short Form 6-item global (unidimensional) self-efficacy for exercise instrument would produce a well-fitting one-factor measurement model (See Figure 2), and c) analyses on the new decisional balance for exercise instrument would produce a well-fitting measurement model composed of two uncorrelated factors representing the Pros and Cons scales (See Figure 3).

Figure 1
Hypothesized Hierarchical Structural Model of Multidimensional Instrument of Self-efficacy for Exercise



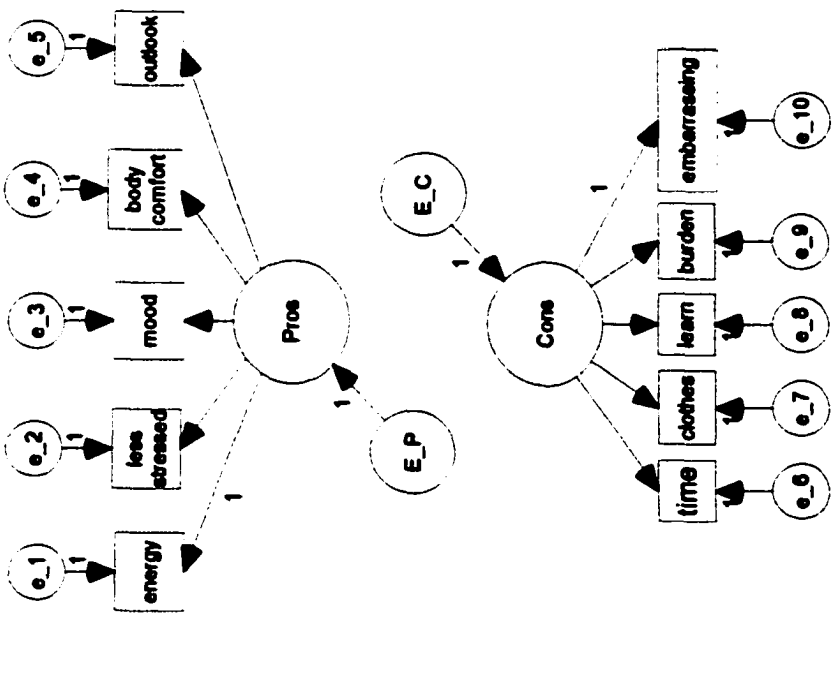
Note: E and E_ denote error variances for manifest and latent variables.

Figure 2
Hypothesized Structural Model of Short Form 6-item Global (Unidimensional) Self-efficacy for Exercise Instrument



Note: E_ denotes error variances for manifest variables.

Figure 3
Hypothesized Structural Model of Decisional Balance for Exercise Instrument



Note: E_ denotes error variances for manifest and latent variables.

Study 2

One purpose of Study 2 was to examine if the various indices and scales of the self-efficacy and decisional balance for exercise instruments would vary across the transtheoretical model's five stages of change for exercise within a sample of Medicaid beneficiaries with longstanding mobility impairments in the same manners that have been found in empirical studies utilizing worksite and college student samples. At the time of the dissertation project research proposal, no empirical studies examining the constructs of the transtheoretical model and their relationship to exercise adoption and maintenance with a disabled population had been identified. An additional purpose of Study 2 was to examine if the subjective perceptions of those individuals with mobility impairments regarding the levels of difficulty with potential problems or barriers interfering with participation in the exercise programs at the New Directions facility, as measured by the Disability and Health Perceived Barriers questionnaire (DHPB; Murphy-Southwick, Ravesloot, & Seekins, 1999), would vary across the five stages of change of the transtheoretical model in the same manner hypothesized for the Cons scale of the decisional balance instrument. These perceived barriers appeared to be similar to the content of the Cons scale, which measures the perceived costs of exercise, and they might be more specific and applicable to this population than the more general decisional balance for exercise instrument.

Following were the hypotheses of Study 2: a) groupings based on the five stages of change with respect to exercise (Precontemplation, Contemplation, Preparation, Action, and Maintenance) would be differentiated by the two global scale scores (Full 18-item and Short Form 6-item) of self-efficacy for exercise; b) these same groupings would

be differentiated by the six 3-item factor scale scores of self-efficacy for exercise (Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather); c) these same groupings would be differentiated by the Pros scale of the decisional balance for exercise instrument; d) these same groupings would be differentiated by the Cons scale of the decisional balance for exercise instrument; e) these same groupings would be differentiated by the Pros Minus Cons scale of the decisional balance for exercise instrument; and f) these same groupings would be differentiated by the scale of the DHPB questionnaire measuring the potential problems or barriers to participation in exercise.

Study 3

The purposes of Study 3 were 1) to examine if recruitment strategies moderate the effects of global self-efficacy for exercise, as measured by the Short Form 6-item scale, in predicting exercise program recruitment outcomes, and 2) to examine if recruitment strategies moderate the effects of decisional balance for exercise, as measured by the Pros Minus Cons scale, in predicting exercise program recruitment outcomes. The literature has indicated that levels of self-efficacy and decisional balance for exercise are predictive of levels of exercise. The literature regarding exercise behavior has also suggested that proactive recruitment strategies should be more effective than reactive recruitment strategies in successfully recruiting potential participants into exercise programs and getting them to increase their levels of exercise. One hypothesized explanation for this finding could be that proactive recruitment strategies for exercise programs utilizing techniques such as motivational interviewing are more appropriate for those individuals who have lower levels of global self-efficacy for exercise and lower ratings of decisional

balance for exercise, as measured by the Pros Minus Cons scale, than reactive recruitment strategies utilizing direct mailings of newsletters are with these same individuals. Such findings would imply that recruitment strategies moderate the relationships between the effects of global self-efficacy and decisional balance for exercise on exercise program recruitment outcomes.

Specifically, a moderator variable is a third variable "which partitions a focal independent variable into subgroups that establish its domains of maximal effectiveness in regard to a given dependent variable" (Baron & Kenny, 1986). Furthermore, Baron and Kenny (1986) state that a moderator variable can be either a qualitative or quantitative variable "that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable." The moderator variable hypothesis is supported if the interaction between the proposed moderator and the predictor variable is significant on the dependent outcome variable. Therefore, if the interactions between 1) recruitment strategy (i.e., proactive through motivational interviewing versus reactive through direct mailings of newsletters) and global self-efficacy for exercise, and 2) recruitment strategy and decisional balance for exercise are significant, then these results would support the contention that the different recruitment strategies moderate the effects of self-efficacy and decisional balance for exercise in predicting exercise program recruitment outcomes.

Following were the hypotheses of Study 3: a) there would be main effects for recruitment strategy (i.e., proactive recruitment strategy utilizing motivational interviewing or reactive recruitment strategy utilizing direct mailings of newsletters), the Short Form 6-item global self-efficacy for exercise scale, and the Pros Minus Cons scale

measuring decisional balance for exercise on predicted exercise program recruitment outcomes, b) there would be a significant interaction between recruitment strategy and the Short Form 6-item global self-efficacy for exercise scale on predicted exercise program recruitment outcomes, and c) there would be a significant interaction between recruitment strategy and the Pros Minus Cons scale measuring decisional balance for exercise on predicted exercise program recruitment outcomes.

Chapter 2

Methods-Study 1

Participants

Study 1 was conducted on a sample of individuals who received disability benefits from the Montana Department of Medicaid, had a longstanding mobility impairment, were between the ages of 18 and 65, did not have a co-morbid psychotic or personality disorder, and did not have a terminal illness or cognitive impairment. The selection of the sample of participants included for analyses in this study was carried out according to the procedures of the grant-funded study, which is presented in chronological detail in the Procedures section for Study 1 down below.

Materials

Demographic Information. Participants indicated their date of birth, sex, years of education, marital status, race, ethnicity, employment status, and health care coverage on the demographic information questionnaire. See Appendices A and B for the demographic information questionnaires.

Self-Efficacy for Exercise. An 18-item instrument developed by Benisovich et al. (1998a, 1998b, 1998c; Rossi et al., 2001) was used to measure self-efficacy for exercise behavior. See Appendix C for the self-efficacy for exercise instrument. This instrument purports to be capable of measuring both global (unidimensional) and multidimensional conceptualizations of self-efficacy for exercise. The authors of this instrument (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001) believe that a multidimensional instrument of self-efficacy for exercise can more comprehensively

address the situational determinants of self-efficacy for a specific individual, while a global instrument may neglect to take into account such situational or individual differences in predicting levels of exercise. Therefore, a multidimensional approach may in fact be more useful for clinical interventions by helping to identify specific situations in which to increase self-efficacy for individuals in order to advance through the stages of change with respect to exercise more quickly.

For each item, participants indicate their perceived level of confidence in their ability to exercise regularly despite situations that might interfere with their plans to exercise using a 5-point Likert scale ranging from not at all confident (1) to completely confident (5). Participants could also indicate that an item does not apply to me (0); a response which had been added to this multidimensional instrument because: 1) such a response had been included in the original self-efficacy for exercise instrument developed by Marcus et al. (1992), and 2) the possibility that some of these items would not be applicable to this specific sample of participants with mobility impairments. The Full 18-item measure comprises six factors labeled Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather, and the values of Cronbach's alpha were reported to be .85, .83, .87, .77, .85, and .87, respectively. Cronbach's alpha for the Full 18-item scale measuring a global conceptualization of self-efficacy for exercise was reported to be .94. The Short Form 6-item scale measuring a unidimensional conceptualization of self-efficacy for exercise was reported to have a Cronbach's alpha value of .82. All of these values reflect acceptable internal consistency for the various scales (George & Mallery, 1999). The correlations between the six

component scales ranged from .51 to .64. No values were reported for stability of the scales.

Decisional Balance for Exercise. A 10-item instrument developed by Nigg et al. (1998, 2001) was used to measure the two scales regarding the decisional balance for exercise behavior. See Appendix D for the decisional balance for exercise instrument. This self-report instrument consists of a 5-item Pros scale that measures the perceived benefits of exercise and a 5-item Cons scale that measures the perceived costs of exercise. For each of the 10 items, participants rate how important each statement is with respect to their decision to exercise or not exercise using a 5-point Likert scale ranging from not important (1) to extremely important (5). Nigg et al. (1998, 2001) reported a value of .89 for Cronbach's alpha for the Pros scale in each of two independent samples, suggesting acceptable internal consistency, and they reported values of .83 and .64 for Cronbach's alpha for the Cons scale in those same two samples, suggesting questionable to acceptable internal consistency (George & Mallery, 1999). No values were reported for stability of the instrument.

Procedure

As stated above in the Introduction section, Study 1 is a part of the larger grant-funded study entitled "The Cost of Treating Secondary Conditions with Physical Activity in a Cohort of Medicaid Beneficiaries with Mobility Impairments" (Ravesloot, 1999) through the Montana University Affiliated Rural Institute on Disabilities. The procedures of the grant-funded study that are relevant to Study 1 will be presented below.

Approval of the grant-funded study by the Institutional Review Board was obtained in January of 2001. Montana Department of Medicaid mailed an enrollment

letter and a postage-paid postcard (See Appendices E and F) to 1535 individuals with a disability receiving Medicaid benefits and living in Missoula County on January 15, 2001. This postcard asked these individuals to indicate their interest and willingness to participate in the research study by returning the postcard or calling the phone number indicated on the postcard, with the incentive for doing so being that they could complete a brief survey and be paid $10 for doing so. Another mailing of the same postcard approximately two weeks later, on January 30, 2001, to remind individuals to return the postcard or call the specified phone number, followed up this first mailing.

A total of 552 individuals from this identified cohort returned the postcard or called the phone number indicating their interest and willingness to participate in the study. These individuals were then sent a packet of forms and questionnaires entitled the Health Survey I packet, which consisted of an informed consent and contact information questionnaire (See Appendix G), a demographic information questionnaire (See Appendix A), and several measures specific to the purposes and hypotheses of the grant-funded study. The Health Survey I packets were sent out on February 15, 2001. Participants were offered $10 for returning a completed Health Survey I packet.

A total of 381 individuals returned the Health Survey I packets and signed the consent form. These individuals were then screened to meet inclusion and exclusion criteria. To be included in the grant-funded study and subsequently Study 1, individuals had to be between the ages of 18 and 65, inclusive, and had to have a long-lasting mobility impairment that limits their performance of basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying objects. Individuals with shorter-term mobility impairments that are likely to resolve over time, such as a broken leg or hip

replacement, were excluded from the study. Furthermore, individuals who met the inclusion criteria but who had a co-morbid psychotic or personality disorder were excluded from participation in the study. Additionally, those individuals who reported a terminal illness such as cancer or a cognitive impairment as their primary impairment were excluded from participation in the study. However, those individuals excluded from the study were invited to participate in and receive health promotion services without the collection of data for the purpose of the grant-funded study. These inclusion and exclusion criteria help to create a more homogeneous sample for the purposes of the study. However, a weakness of the proposed sample is that it will not be representative of the general population of individuals with mobility impairments, as many individuals with mobility impairments do not receive Medicaid benefits. Furthermore, this sample will not be representative of all individuals with mobility impairments who do receive Medicaid benefits.

Using the inclusion and exclusion criteria of the grant-funded study, a total of 291 individuals were identified for future recruitment into the exercise program conditions of the grant-funded study, but an additional 25 individuals were excluded from participating in the grant-funded study because they had already been actively participating in the New Directions program. Therefore, the Health Survey II packet consisting of an informed consent and contact information questionnaire (See Appendix H), a demographic information questionnaire (See Appendix B), the self-efficacy and decisional balance for exercise instruments (See Appendices C and D), and several questionnaires specific to the purposes and hypotheses of the grant-funded study, was mailed to 266 participants on July 16, 2001. In order to increase the Health Survey II packet return/completion rate,

attempts to contact those individuals who had not returned the completed packet by mid-August 2001 were made by telephone to remind them that they would receive $10 for returning a completed Health Survey II packet.

A total of 198 participants returned their Health Survey II packets, and the data from each of these packets was entered into a large data file by a staff member of The Montana University Affiliated Rural Institute on Disabilities in the order they were received. In order to ensure clean, accurate, and reliable data entry for Study 1, five participants from each quartile of the data set (i.e., five from the first 50 participants' packets, five from the second 50 participants' packets, etc.) were randomly selected for the purpose of examining the accuracy of data entry of those questionnaires necessary for the purposes of Study 1. Of the 20 packets examined, only one packet was found to have any data entry errors associated with it, and the total number of errors associated with that specific packet was five out of 40 item responses for that packet, which were corrected. This error rate for data entry was deemed to be low enough to infer that the data set had been entered accurately and that no further examination of the data set was necessary.

The data of 34 participants were excluded because either they omitted items of the questionnaires necessary for the purposes of Study 1 ($n = 29$) or they responded with a 0 (does not apply to me) to all of the 18 items of the self-efficacy for exercise instrument ($n = 5$). Furthermore, a review of the data indicated that a substantial number of participants had responded to several of the 18-items of the self-efficacy for exercise instrument with a 0 (does not apply to me) response, in addition to a substantial number of participants ($n = 140$) who had responded with a 0 (does not apply to me) response to at least one of the 18 items of the self-efficacy for exercise instrument (For example, responding with a 0

(does not apply to me) response to the item "My exercise partner decides not to exercise that day;" See Appendix C). Listwise deletion of incomplete data would have reduced the sample size to such a degree that it would have been insufficient for conducting any confirmatory factor analysis to test the hypotheses of Study 1 (n = 24). Therefore, after consulting with a statistician (John Caruso, personal communication, 2/27/2002), values of 0 (does not apply to me) for the 18 items of the self-efficacy for exercise instrument were later replaced by their respective item mean values, which were calculated from each item's non-zero values. This method of mean replacement is acknowledged to be an imperfect solution because it resulted in a decreased standard deviation for each of the items, but it is one which seemed to minimize the loss of data in order to permit the confirmatory factor analysis necessary for testing the hypotheses of Study 1. Therefore, in summary, the statistical analyses of Study 1 were conducted on the data set obtained from the sample of participants (N = 164) who completed the self-efficacy and decisional balance for exercise instruments entirely and appropriately, in addition to replacing any 0 (does not apply to me) responses on the self-efficacy for exercise instrument with respective item means.

Methods-Study 2

Participants

Participants for Study 2 were a subset of the sample utilized in Study 1. The subset consisted of those participants who were being recruited into the exercise programs of the grant-funded study and who returned a completed Health Survey III packet, which will be presented in the Procedures of Study 2 down below.

Materials

Demographic Information. The same questionnaire that was used in Health Survey II in Study 1 to gather demographic information was used in Study 2. See Appendix B for the demographic information questionnaire.

Self-Efficacy for Exercise. The same instrument that was used in Study 1 to measure self-efficacy for exercise behavior was used in Study 2. See Appendix C for the self-efficacy for exercise instrument. Eight possible scale scores were calculated for comprehensive comparisons and analyses (Full 18-item, Short Form 6-item, Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather factor scales). In order to be consistent with previous studies (e.g., Marcus & Owen, 1992; Marcus, Pinto et al., 1994) and provide a standard measure for comparison across the groupings by stages of change for exercise, each of the self-efficacy for exercise scale scores was converted to a T score (M = 50, SD = 10) for statistical analyses.

Decisional Balance for Exercise. The same instrument that was used in Study 1 to measure decisional balance for exercise behavior was used in Study 2. See Appendix D for the decisional balance for exercise instrument. Higher scores on the Pros scale signify the perception of high benefits from exercise, while higher scores on the Cons scale signify the perception of high costs of exercise. Earlier studies have also examined the Pros Minus Cons scale score (Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992). In order to be consistent with previous studies (e.g., Marcus & Owen, 1992; Marcus, Pinto et al., 1994; Marcus, Rakowski, & Rossi, 1992; Nigg & Courneya, 1998; Nigg et al., 1998, 2001) and provide a standard measure for comparison across the

groupings by stages of change for exercise, the Pros, Cons, and Pros Minus Cons scale scores were converted to T scores (M = 50, SD = 10) for statistical analyses.

Stages of Change for Exercise. The stages of change for exercise behavior questionnaire used by Marcus and Simkin (1993) was used to categorize the participants into each of the five stages of change as posited by the transtheoretical model. This self-report questionnaire is composed of five true-false statements regarding participants' attitudes towards exercise. See Appendix I for the stages of change for exercise questionnaire and Appendix J for the scoring algorithm of this questionnaire. Marcus, Selby, Niaura, and Rossi (1992) reported that the Kappa index of reliability over a 2-week time period was .78 for a similar questionnaire, suggesting adequate reliability. Some support for the validity of the measure has been demonstrated by its relationship to the Seven Day Physical Activity Recall (PAR) questionnaire, as it significantly differentiated self-reported physical activity levels by stage of change (Marcus & Simkin, 1993).

However, a difference between the version of the questionnaire used in Study 2 and those used by the Marcus and Simkin (1993) study was the fact that the version used for Study 2 did not operationalize the term "exercise regularly" with specific criteria within the items assessing the Preparation, Action, and Maintenance stages, such as defining "regular exercise = three or more times per week for 20 minutes or longer" as Marcus and Simkin (1993) had done. This had been done in order to make the questionnaire more readable and less complex for the specific population of individuals with mobility impairments. Therefore, the term "exercise regularly" was not standardized for all the participants, thus allowing some variability of the interpretation

of this term. However, several different questionnaires measuring the stages of change for exercise behavior have been utilized in the empirical literature regarding exercise and the transtheoretical model (See Reed, Velicer, Prochaska, Rossi, & Marcus, 1997 for a review). These different questionnaires and different studies have not produced any salient consistencies concerning the prevalence or proportion of individuals across these five stages of change for exercise behavior, but have produced robust significant findings concerning the relationship between the stages of change and the indices of self-efficacy and decisional balance for exercise.

Barriers. The Disability and Health Perceived Barriers questionnaire (DHPB; Murphy-Southwick, Ravesloot, & Seekins, 1999) was used to measure the degree of difficulty that participants would perceive having with 27 potential problems or barriers for participation in health promotion activities, such as an exercise program. See Appendix K for the Disability and Health Perceived Barriers (DHPB) questionnaire. This self-report questionnaire consists of 27 items on which participants rate their perceived level of difficulty for participation in a health promotion/exercise program at the New Directions facility using a 4-point Likert scale ranging from not a problem (0) to a big problem (3). The grant proposal reported Cronbach's alpha to be .87 based on a sample of 189 health promotion participants before they engaged in the 8-week Living Well with a Disability health promotion intervention, suggesting acceptable internal consistency and reliability (George & Mallery, 1999; Ravesloot, 1999).

Procedure

Another packet of questionnaires entitled the Health Survey III packet was mailed in October of 2001 to the identified sample of 266 participants of Study 1. The Health

Survey III consisted of an informed consent and contact information questionnaire (See Appendix G), a demographic information questionnaire (See Appendix B), the stages of change for exercise questionnaire (See Appendix I), the self-efficacy for exercise instrument (See Appendix C), the decisional balance for exercise instrument (See Appendix D), the DHPB questionnaire (See Appendix K), and several measures specific to the purposes and hypotheses of the grant-funded study. Participants were offered $10 for returning a completed Health Survey III packet. In order to increase the Health Survey III packet return/completion rate, attempts to contact those individuals who had not returned the completed packet by mid-December 2001 were made by telephone to remind them that they would receive $10 for returning a completed Health Survey III packet.

A total of 183 participants returned their Health Survey III packets, and the data from each of these packets was entered into a large data file by a staff member of The Montana University Affiliated Rural Institute on Disabilities in the order they were received. In order or assure clean, accurate, and reliable data entry for Study 2, the same precautions and procedures utilized in Study 1 were carried out. Five participants from each quartile of the data set (i.e., five from the first 50 participants' packets, five from the second 50 participants' packets, etc.) were randomly selected for the purpose of examining the accuracy of data entry of those questionnaires necessary for the purposes of Study 2. Of the 20 packets examined, only two packets were found to have any data entry errors associated with it, and the total number of errors within those specific packets was five out of 72 items per packet. This error rate for data entry was deemed to be low enough to infer that the data set had been entered accurately and that no further

examination of the data set was necessary. Additionally, of these 20 packets examined, six of them had 14 items that had two responses circled for those items, and the average of the circled responses had been entered into the data file (e.g., circled both 2 and 4 for a particular item, and 3 was entered into the data file). All of the 183 Health Survey III packets were then visually inspected by the primary investigator, who found that a total of 13 participants had circled two responses on a total of 45 items. However, the data entry by the research assistant had been consistent and systematic in entering the average of the circled responses for each of these 45 items, and so this did not seem to pose a threat to the integrity of the data.

The data of 12 participants were excluded because they did not complete the stages of change for exercise behavior questionnaire appropriately. Of these 171 participants who completed the stages of change for exercise behavior questionnaire, 141 completed each of the 17 items of the DHPB (potential Barriers) questionnaire, while 166 of the 171 participants completed each of the 10 items of the decisional balance for exercise instrument appropriately. Furthermore, 158 of the 171 completed each of the 18 items of the self-efficacy for exercise instrument. However, 14 of these 158 responded with a 0 (does not apply to me) to all of the 18 items of the instrument and were subsequently excluded, leaving a total of 144 who completed the self-efficacy for exercise instrument appropriately. As discovered in Study 1, a review of the data for Study 2 indicated again that a substantial number of participants had responded to several of the 18-items of the self-efficacy for exercise instrument with a 0 (does not apply to me), in addition to a majority of participants (n = 135) who had responded with a 0 (does not apply to me) to at least one of the 18 items of the self-efficacy for exercise

instrument. As was carried out in Study 1, values of 0 (does not apply to me) for the 18 items of the self-efficacy for exercise instrument in Study 2 were later replaced by their respective mean values for each respective item (variable), which were calculated from each item's non-zero values. Therefore, in summary, the statistical analyses concerning the hypotheses of Study 2 were conducted on the data from the sample of those respondents who fully completed the stages of change and self-efficacy for exercise instrument (n = 144), decisional balance for exercise instrument (n = 166), and the DHPB questionnaire (n = 141)(Appendices C, D, I, K).

Methods-Study 3

Participants

Study 3 was conducted on the same sample identified in Study 1, consisting of 266 individuals with long-standing mobility impairments who met the inclusion and exclusion criteria of the grant-funded study (See Methods-Study 1), returned their Health Survey II packets (See Methods-Study 1), and were being recruited into the exercise programs of the grant-funded study (See Procedure and Figure 4 below).

Materials

Demographic Information. The same questionnaire that was used in Study 1 to gather demographic information was used in Study 3. See Appendix B for the demographic information questionnaire.

Self-Efficacy for Exercise. The same instrument that was used in Study 1 to measure multidimensional self-efficacy for exercise was used in Study 3. See Appendix C for the self-efficacy for exercise instrument. Only the raw score of the Short Form 6-

item global (unidimensional) self-efficacy for exercise scale was calculated for the analyses.

Decisional Balance. The same instrument that was used in Study 1 to measure decisional balance for exercise was used in Study 3. See Appendix D for the decisional balance for exercise questionnaire. Only the raw score of the Pros Minus Cons scale was calculated for the analyses.

Procedure

The 266 participants identified in Study 1 were randomly assigned to one of four conditions, formed by crossing the two recruitment conditions [direct mailings of newsletters (reactive) or motivational interviewing (proactive)] with the two exercise program conditions (exercise alone or exercise plus the Living Well with a Disability program).

Recruitment Strategies

Approximately half of those 266 eligible participants were randomly assigned to receive the reactive recruitment strategy, which involved each participant receiving direct mailings of up to 3 newsletters detailing opportunities for participation in an exercise program at New Directions, the health promotion program of the Montana University Affiliated Rural Institute on Disabilities (See Appendix L for one of the newsletters). Approximately half of those participants who received the newsletters were assigned to the exercise alone condition, and the other half of participants were assigned to the exercise plus the Living Well with a Disability program condition. In order to accommodate the schedule of incoming participants at New Directions, the first newsletter was sent to 72 participants on June 28, 2001. The second and third mailings of

the newsletters occurred in October 2001 and January 2002 for the remainder of those assigned to receive the direct mailings of the newsletters. Participants who received the direct mailings of the newsletters had to contact New Directions in order to begin carrying out the necessary screening procedures (detailed in the section below) before participating in any of the two exercise program conditions.

Approximately half of those eligible participants who returned the Health Survey I packets were randomly assigned to receive the proactive recruitment strategy, which consisted of each participant receiving a telephone call from the one trained staff member who then initiated motivational interviewing techniques aimed at recruiting them into an exercise program condition. This procedure began in August of 2001 and was completed by mid-April of 2002 for the purposes of Study 3. Eligible participants randomly assigned to this recruitment strategy condition could have received up to three phone calls and/or one in-person meeting with the trained staff member conducting the motivational interviewing techniques during the screening procedures (detailed in the section below). The participants randomly assigned to receive the direct mailings of the newsletters did not receive any motivational interviewing phone calls or in-person sessions with the trained staff member during these screening procedures. The procedures of the proactive recruitment strategy utilizing motivational interviewing were staggered because they had to be tailored to each individual participant's schedule, which resulted in a standardized sequential procedure, but one that occurred over various unique timelines specific for each participant.

Screening Procedures for Exercise

All of the 266 eligible participants randomly assigned to the two exercise conditions, either exercise alone or exercise plus the Living Well with a Disability program, were required to undergo a similar sequence of screening procedures before initiating any of the exercise programs. First, each participant had to undergo an intake interview scheduled with a staff member. During this intake interview, participants were asked to sign several informed consent forms, one indicating agreement to participate in an exercise program, one being a release of confidential information to allow the staff at New Directions to send a letter to each participant's primary physician regarding his or her participation in exercise, and one being a release of confidential information to allow the staff at New Directions to collect data regarding each participant's utilization of healthcare services, which was part of the grant-funded study. The letter sent to each participant's primary physician has been used for over 2 years by the New Directions staff (See Appendix M for the letter). This letter required the primary physician's signature endorsing each participant's initiation of exercise and providing any prompts for any necessary precautions.

Second, after the intake interview, the participants were assigned to undergo a physical activity screen conducted by a staff physical therapist who was naïve to both the recruitment strategy and exercise program conditions. The staff physical therapist then reviewed any identified precautions for the participant and then initiated a physical therapy evaluation, if deemed necessary for the participant. The physical therapist then helped each participant formulate an appropriate individualized exercise program. Third, after the physical activity and physical therapy screens, participants then received three

orientation sessions during which participants were familiarized with both the data system recording healthcare utilization as well as the fitness and exercise equipment of New Directions. Fourth, after these orientation sessions, participants then completed a physical fitness evaluation, during which a number of baseline measures of physical fitness (e.g., body fat composition and maximal oxygen capacity) were measured. The following week after this baseline measurement, all participants of both the exercise alone and the exercise plus the 8-week Living Well with a Disability program conditions were then ready to begin weekly exercise on their own initiative. The chapters of the Living Well with a Disability program include information on goal setting, problem solving, attribution retraining, managing depression, communication, information seeking, nutrition, advocacy, and maintenance. As stated above, eligible participants assigned to the proactive recruitment strategy utilizing motivational interviewing had these screening procedures initiated by the trained staff member's phone call, and would have had up to three phone calls and one in-person session, if required, in order to help them complete the screening procedures.

Since Study 3 had the purpose of examining the possibility that two different recruitment strategies moderate the relationships between indices of self-efficacy and decisional balance for exercise on outcomes of exercise program recruitment, it originally proposed to operationally define exercise program recruitment outcomes using two sets of criteria representing two different points during the entire recruitment process of the grant-funded study. The first set of criteria planned to define recruitment outcomes by classifying those participants who actually came to their scheduled intake interview at New Directions as being "recruited," and those participants who did not come to their

scheduled intake interview at New Directions as being "not recruited." Furthermore, the second set of criteria planned to define recruitment by classifying those individuals who came to New Directions to begin their individualized exercise program the week after completing the physical fitness evaluation as being "recruited," while those who failed to begin their individualized exercise program the week after completing the physical fitness evaluation were to be classified as "not recruited." It had been estimated that all of the necessary procedures for operationally defining recruitment outcomes using both sets of criteria would be completed by the end of April 2002, but unfortunately only the procedures for defining recruitment outcomes according to the first set of criteria (i.e., their scheduled intake interview at New Directions) were completed by this time, and so being "recruited" was only defined as those participants who actually came to their scheduled intake interview at New Directions, and the second set of criteria was dropped from Study 3.

As reported in Study 1, 198 participants returned their Health Survey II packets by September 2001, and the data from each of these packets had been entered into a large data file by a staff member of The Montana University Affiliated Rural Institute on Disabilities in the order they were received. Accuracy and reliability of data entry had been checked in Study 1, and so no additional procedures were conducted for Study 3. Of the 198 participants who returned their Health Survey II packets, the data of 33 participants were excluded because either they omitted items of the Short Form 6-item global self-efficacy and 10-item decisional balance for exercise instruments (n = 19,) or they responded with a 0 (does not apply to me) response to all of the 6 items of the Short Form 6-item global self-efficacy for exercise instrument (n = 14). Of these 165

participants, 164 had been assigned to receive one of the two recruitment strategy conditions [direct mailing of newsletters (reactive) or motivational interviewing (proactive)], and the procedures necessary for operationally defining recruitment outcomes according to the first set of criteria had been completed for these 164 participants. Exactly half (n = 82) of these 164 participants had been assigned to receive the reactive recruitment strategy (direct mailings of newsletters), and the other half (n = 82) had been assigned to receive the proactive recruitment strategy (motivational interviewing). Of these 164 participants, 28 came to their scheduled intake interview at New Directions and were classified as being "recruited," while the remaining 136 did not attend their scheduled intake interview and were classified as being "not recruited." Furthermore, as carried out in Study 1, the values of 0 (does not apply to me) for the 6 items of the Short Form 6-item global self-efficacy for exercise instrument were later replaced by their respective item mean values, which were calculated from each item's non-zero values. Therefore, in summary, the logistical regression analyses of Study 3 were conducted on the data set obtained from the sample of participants (N = 164) who completed the Short Form 6-item global self-efficacy and decisional balance for exercise instruments of the Health Survey II packets entirely and appropriately and were being recruited into the exercise programs of the grant-funded study.

Since Study 3 was part of the grant-funded study of the Montana University Affiliated Rural Institute on Disabilities, which was an effectiveness study as opposed to an efficacy study, it emphasized a comparison between the proactive and recruitment strategies as implemented in an applied, real-world setting. Therefore, these studies did not contain rigorous experimental procedural controls to carry out manipulation checks of

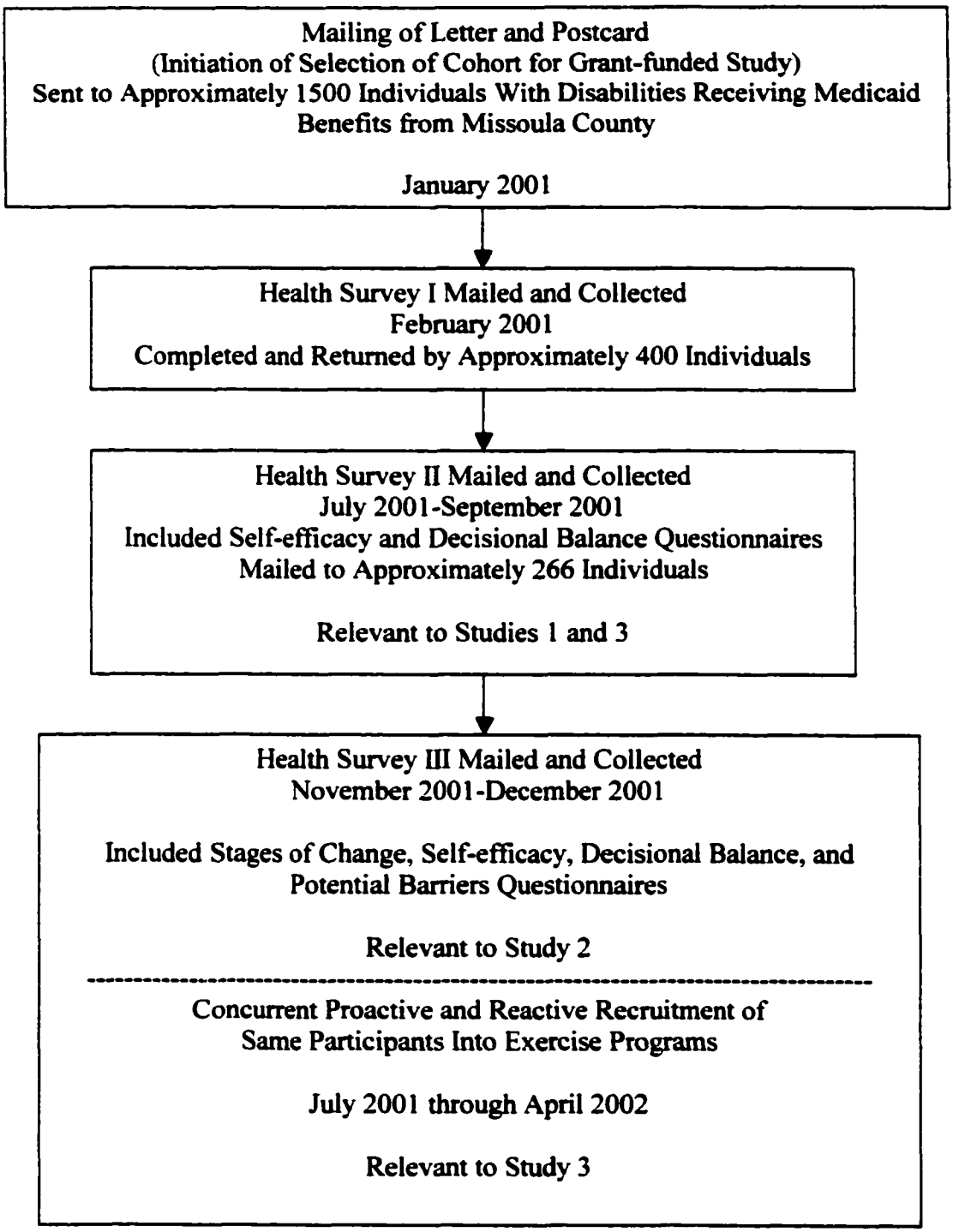
the recruitment strategies, which would typically be done when conducting an efficacy study. Since this was also a longitudinal study, there were several participants who were assigned to the reactive recruitment strategy who did not receive the direct mailings of newsletters because they had moved their primary residence, and similarly, there were several participants who were assigned to the proactive recruitment strategy who were not contacted by telephone by the trained staff member because they had changed their telephone number or moved their primary residence as well. Investigators and research assistants involved in the grant-funded study tried their best to maintain up-to-date contact information for each participant, but it was highly likely that such information was not always available for every participant.

Regarding those 82 participants assigned to receive the proactive recruitment strategy, attempts had been made by the trained staff member to contact each of them by phone at least three separate times, and when unable to speak with the participant directly, messages were left for them, when possible, to return the call at their convenience. Some participants returned the call and chose to engage in the motivational interviewing techniques, while some chose not engage in motivational interviewing, and some others did not return the calls and were not able to be contacted at a later date. To clarify this process, an illustration will be provided regarding those 107 participants who were assigned to receive the proactive recruitment strategy for the grant-funded study (as opposed to the 82 participants of Study 3): 56 had been contacted by phone for five minutes or more, 37 had not been contacted because they had either moved, disconnected their phones, or provided wrong numbers, and an additional 14 had never been reached after at least three attempts by the trained staff member. Similar figures were not

available for those participants who were assigned to receive the reactive recruitment strategy for the grant-funded study and did not receive their newsletters. In summary, the total sample of 164 participants in the preceding paragraph represents those participants who completed the necessary instruments of Study 3 and on whom attempts were made to recruit them into exercise programs by either the proactive or reactive recruitment strategies of the grant-funded study.

Figure 4

Flow Chart for the Dissertation Project



Chapter 3

Results-Study 1

Descriptive Statistics

As stated in the Methods-Study 1 section, a total of 164 participants who were Medicaid beneficiaries with longstanding physical mobility impairments appropriately completed all of the items of the instruments necessary for the purposes of Study 1. Within this sample, 65.2% were female, the average age was 48.1 years, the average number of years of education was 12.9 years, 90.2% were Caucasian, 17.1% were married, and 11.6% were currently employed. This sample is substantially older than the samples from which the two instruments were developed (48.1 years vs. 19.8 years), but not substantially older than the second sample in which the decisional balance for exercise instrument was confirmed (48.1 years vs. 43.0 years), and it appears to be comparable to the other samples on gender, education, ethnicity, and marital status characteristics (Benisovich et al., 1998a, 1998b, 1998c; Nigg et al., 1998, 2001; Rossi et al., 2001).

The means, standard deviations, and values of Cronbach's alpha for the items and various scales of the multidimensional self-efficacy for exercise instrument (Full 18-item Global scale, Short Form 6-item Global scale, Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather factor scales) are presented in Table 1. Additionally, Table 1 contains a column indicating the percentages of the sample (N = 164) responding with a 0 (does not apply to me) response to each of

Table 1

Study 1 - Multidimensional Self-Efficacy for Exercise Instrument: Means, Standard Deviations, and Internal Consistency (Cronbach's Alpha) Coefficients for the Items and Factor Scales (N = 164)

Scale and Items	Mean	SD	Cronbach's Alpha	Percentage of 0 (DNA) Responses
Negative Affect	6.95	3.15	.88	
I am under a lot of stress.[a]	2.46	1.24		13.4%
I am depressed.	2.20	1.18		18.9%
I am anxious.	2.28	1.11		20.7%
Excuse Making	7.08	3.02	.78	
I feel I don't have the time.[a]	2.26	1.14		21.3%
I don't feel like it.	2.38	1.28		13.4%
I am busy.	2.45	1.21		20.7%
Exercising Alone	8.41	3.02	.78	
I am alone.	2.87	1.35		22.6%
I have to exercise alone.[a]	2.96	1.32		25.0%
My exercise partner decides not to exercise that day.	2.58	0.91		61.0%
Inconvenience	7.56	2.73	.75	
I don't have access to exercise equipment.[a]	2.80	1.33		35.4%
I am traveling.	2.24	0.98		54.3%
My gym is closed.	2.52	1.00		65.9%
Resistance from Others	8.22	2.30	.77	
My friends don't want me to exercise.	3.14	0.92		64.6%
My significant other does not want me to exercise.	2.55	0.78		70.1%
I am not spending time with friends or family who do not exercise.[a]	2.53	1.06		43.9%
Weather	7.98	3.37	.92	
It's raining or snowing.[a]	2.67	1.20		31.7%
It's cold outside.	2.75	1.22		29.9%
The roads or sidewalks are snowy.	2.56	1.22		31.1%
Full 18-item Global Self-Efficacy for Exercise Instrument	46.20	13.99	.93	
Short Form 6-item Global Self-Efficacy for Exercise Instrument	15.68	5.40	.83	

Note. [a] Denotes item of Short Form 6-item Global Self-Efficacy for Exercise Instrument.

the 18 items of the self-efficacy for exercise instrument. The percentages for the 18 items ranged between 13.4% and 70.1%. The values in this column also indicate what percentage of the data underwent mean replacement, as reported above, for each of the 18 items in order to complete the additional analyses for the purposes of Study 1. The reader is reminded that the values presented in all subsequent Tables and Figures relevant to the self-efficacy for exercise instrument for Study 1 are those that were calculated after completing mean replacement of all 0 (does not apply to me) responses for each particular item (variable) of this instrument. Although the issue of 0 (does not apply to me) responses had been introduced in the Methods-Study 1 section and is being highlighted here, interpretation of this issue will take place primarily in the Discussion-Study 1 section.

The means and standard deviations of most of the scales of the self-efficacy for exercise instrument reported in Table 1 are lower than those originally reported by the authors of the instrument (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001). The exception is the mean of Excuse Making, which has a larger mean and larger standard deviation than the corresponding values reported by the authors of the original study. The findings of slightly lower means are not surprising, because this specific sample of Medicaid beneficiaries with longstanding mobility impairments might be expected to have a lower degree of self-efficacy to exercise in most of the particular situations or circumstances detailed in the 18 items of the instrument, as well as a lower degree of global self-efficacy for exercise.

Visual inspection of Table 1 also calls attention to the comparatively small standard deviations of those items with the larger percentages of 0 (does not apply to me)

responses, which had been expected as a result of conducting mean replacement of these responses, and resulted in markedly diminished variances for these particular items. The values of Cronbach's alpha reported in Table 1 suggest that all of the scales have acceptable levels of internal consistency, because they are all greater than .70 (George & Mallery, 1999). Furthermore, these values are comparable to those values of Cronbach's alpha for the scales originally reported by the authors of the instrument (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001).

The Pearson product-moment correlation matrix between the 18 items of the multidimensional self-efficacy for exercise instrument is presented in Table 2. All of the intercorrelations are significant at the .05 level, and the majority of them are significant at the .01 level. The pattern and significance of the observed intercorrelations between all of items are in accordance with self-efficacy theory and previous empirical results, as all the items are purported to represent situational aspects of a global or unidimensional concept of self-efficacy for exercise.

The means, standard deviations, and values of Cronbach's alpha for the full 10-item decisional balance for exercise instrument, the 5-item Pros scale of decisional balance for exercise, and the 5-item Cons scale of decisional balance for exercise are presented in Table 3. The authors of this instrument did not provide raw score means and standard deviations for the items and scales of this instrument with their sample, so no direct comparisons could be made (Nigg et al., 1998, 2001). The values of Cronbach's alpha reported in Table 3 suggest acceptable levels of internal consistency for all of the scales of the decisional balance for exercise instrument, as they are all greater than .70 (George & Mallery, 1999). These values of Cronbach's alpha for the scales are

Table 2

Study 1 - Multidimensional Self-Efficacy for Exercise Instrument: Item Intercorrelations (N = 164)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. stress	-																	
2. depressed	.70**	-																
3. anxious	.67**	.74**	-															
4. time	.52**	.53**	.48**	-														
5. feel like	.59**	.61**	.59**	.59**	-													
6. busy	.35**	.44**	.41**	.57**	.47**	-												
7. alone	.55**	.61**	.55**	.32**	.52**	.43**	-											
8. exercise alone	.43**	.52**	.46**	.39**	.47**	.40**	.71**	-										
9. exercise partner	.43**	.38**	.33**	.36**	.38**	.33**	.41**	.49**	-									
10. access	.44**	.45**	.36**	.45**	.51**	.34**	.54**	.55**	.47**	-								
11. travelling	.34**	.27**	.31**	.35**	.42**	.33**	.37**	.28**	.43**	.49**	-							
12. gym closed	.28**	.32**	.29**	.28**	.43**	.36**	.37**	.40**	.47**	.56**	.49**	-						
13. friends	.26**	.24*	.27**	.24*	.24*	.37**	.35**	.41**	.54**	.40**	.39**	.50**	-					
14. significant other	.34**	.29**	.35**	.29**	.26**	.36**	.37**	.38**	.54**	.34**	.33**	.41**	.57**	-				
15. family/friends	.40**	.32**	.34**	.36**	.38**	.43**	.35**	.46**	.50**	.47**	.49**	.48**	.53**	.53**	-			
16. raining/snowing	.33**	.36**	.39**	.39**	.47**	.37**	.47**	.54**	.44**	.58**	.38**	.49**	.44**	.47**	.54**	-		
17. cold	.34**	.35**	.40**	.36**	.40**	.47**	.42**	.48**	.44**	.49**	.34**	.45**	.52**	.47**	.51**	.86**	-	
18. snowy	.33**	.27**	.38**	.33**	.34**	.34**	.38**	.45**	.50**	.47**	.36**	.37**	.40**	.45**	.41**	.74**	.78**	-

Note. ** Denotes $p \leq .01$ level (2-tailed).
* Denotes $p \leq .05$ level (2-tailed).

Table 3

Study 1 - Decisional Balance for Exercise Instrument: Means, Standard Deviations, and Internal Consistency (Cronbach's Alpha) Coefficients for the Items and Factor Scales (N = 164)

Scale and Items	Mean	SD	Cronbach's Alpha
Pros	15.99	6.03	.90
I would have more energy for my family and friends if I exercised regularly.	3.08	1.44	
I would feel less stressed if I exercised regularly.	3.15	1.45	
Exercising puts me in a better mood for the rest of the day.	3.07	1.41	
I would feel more comfortable with my body.	3.21	1.54	
Regular exercise would help me have a more positive outlook on life.	3.48	1.34	
Cons	8.71	4.26	.72
I would feel embarrassed if people saw me exercising.	2.05	1.45	
Exercise prevents me from spending time with my friends.	1.52	1.04	
I feel uncomfortable or embarrassed in exercise clothes.	2.02	1.47	
There is too much I would have to learn to exercise.	1.65	1.14	
Exercise puts an extra burden on my significant other.	1.48	1.03	
Decisional Balance	24.70	8.45	.83

comparable to those values originally reported by the authors of the instrument (Nigg et al., 1998, 2001).

The Pearson product-moment correlation matrix between the 10 items of the decisional balance for exercise instrument is presented in Table 4. The pattern of this observed correlation matrix appears to be slightly different from what would be expected from previous empirical results regarding decisional balance for exercise theory. Those items comprising the Pros scale (Items 1, 3, 5, 7, and 9) correlated with each other strongly and were substantially larger than their correlations with items comprising the Cons scale (Items 2, 4, 6, 8, and 10), which is in accordance with decisional balance for exercise theory and previous empirical results. However, only the "embarrassing," "clothes," and "learn" items of the Cons scale seemed to demonstrate the expected pattern of having larger correlations with each other that were substantially larger than their correlations with items of the Pros scale. In contrast, the "time" and "burden" items of the original Cons scale were not highly correlated to each other, nor were they highly correlated to the other items of the original Cons scale, and these latter correlations were not substantially larger than their correlations with items of the Pros scale.

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was conducted on each of the self-efficacy and decisional balance for exercise instruments by using structural equation modeling with the aid of the statistical software package of Amos 4.0. The sample size of 164 participants was perceived to be adequate for conducting confirmatory factor analyses with these two new instruments, based on the statistical rule-of-thumb that there should

Table 4

Study 1 - Decisional Balance for Exercise Instrument: Item Intercorrelations (N = 164)

Item (Scale)	1	2	3	4	5	6	7	8	9	10
1. energy (Pros)	-									
2. embarrassing (Cons)	.22**	-								
3. less stressed (Pros)	.61**	.31**	-							
4. time (Cons)	.21**	.16*	.22**	-						
5. mood (Pros)	.62**	.11	.67**	.17*	-					
6. clothes (Cons)	.16*	.74**	.29**	.19*	.12	-				
7. body comfort (Pros)	.54**	.28**	.57**	.25**	.62**	.23**	-			
8. learn (Cons)	.12	.43**	.21**	.30**	.12	.46**	.26**	-		
9. outlook (Pros)	.64**	.20**	.65**	.30**	.74**	.26**	.72**	.20**	-	
10. burden (Cons)	.14	.13	.04	.34**	.09	.19*	.03	.36**	.18*	-

Note. ** Denotes $p \leq .01$ level (2-tailed).
* Denotes $p \leq .05$ level (2-tailed).

be approximately 5-10 participants per observed (manifest) variable (Bryant & Yarnold, 1995; John Caruso, personal communication, 8/28/2001, 12/18/2001).

The first hypothesis regarding the measurement model of the new 18-item multidimensional self-efficacy for exercise instrument was tested using structural equation modeling to impose five alternative measurement models on the same observed data presented in Tables 1 and 2 (i.e., data with mean replacement for 0 (does not apply to me) responses. These five alternative measurement models represented the plausible alternative conceptualizations of the collected data. First, the null or independence model representing a zero-factor model hypothesizing that all 18 items of the measure were independent was tested. This model is typically not hypothesized as a serious representation of the observed data, but its indices of model fit serve as a baseline comparison for the indices of fit of the four alternative structural models (Rossi et al., 2001). The second model that was tested was the single factor model hypothesizing that self-efficacy for exercise would be best represented as a single, global or unidimensional construct. The third and fourth models that were tested both hypothesized that self-efficacy for exercise was a multidimensional construct. However, the third model hypothesized that self-efficacy for exercise was best represented by six uncorrelated factors (Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather) that were independent of each other, while the fourth model hypothesized that self-efficacy for exercise was best represented by six correlated factors. Lastly, the fifth model hypothesizing that self-efficacy for exercise was best represented by a hierarchical structural model composed of six primary factors (Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather)

and a single, higher order or secondary factor representing global self-efficacy for exercise was tested. Specifically, this fifth model was the one hypothesized to provide the best-fitting structural model of the 18-item multidimensional self-efficacy for exercise instrument in Study 1.

These five alternative structural models were tested using Amos 4.0, which provided numerous indices indicating how well the five alternative structural models fit the observed data. The indices that were examined were the chi-square statistic (χ^2) along with its respective degrees of freedom (df) and significance level (p), the chi-square with degrees of freedom ratio (χ^2/df; Wheaton, Muthen, Alwin, & Summers, 1977), the goodness of fit index (GFI; Joreskog & Sorbom, 1984), the adjusted goodness of fit index (AGFI; Joreskog & Sorbom, 1984), and the root mean square error of approximation (RMSEA; Browne & Cudeck, 1993). In confirmatory factor analysis through structural equation modeling, non-significance of the chi-square statistic (χ^2) is desired as it means that there is <u>not</u> a significant difference ($p>.05$) between the observed correlation matrix and the expected (estimated) correlation matrix, a finding which suggests that the hypothesized model can be constructed from, or fits, the observed data. The degrees of freedom (df) value is calculated from the total number of observations (N) minus the number of specified parameters of the model (i.e., the number of paths of the structural model that are free to vary). Furthermore, the chi-square with degrees of freedom ratio (χ^2/df) should be within the range of 2:1 or 3:1 to indicate an acceptable fit (Carmines & McIver, 1981). The goodness of fit index (GFI) is based on a ratio of squared discrepancies between the observed and expected matrices to the observed variances (Loehlin, 1992). The adjusted goodness of fit index (AGFI) is based on the same GFI

ratio, but it takes parsimony into account by adjusting the GFI for the number of degrees of freedom (Loehlin, 1992). Each of these values should be greater than .90 to suggest an acceptable model. The root mean square error of approximation (RMSEA) should approach 0 and be no more than .10 to suggest an acceptable model (Browne & Cudeck, 1993).

Additionally, the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and the root mean-square residual (RMR; Steiger, 1990), which represent additional indices of fit provided by Amos 4.0, were examined and reported for a direct comparison to the results obtained and reported by the original authors of the instrument (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001) in their development of the multidimensional self-efficacy for exercise instrument. Both the CFI and the TLI should be greater than .90 to suggest an acceptable model, while the RMR should approach 0 and be no more than .10 to suggest an acceptable model.

The indices of fit for the five alternative structural models of the multidimensional self-efficacy for exercise instrument are reported in Table 5. Furthermore, graphical representations of the single factor, six uncorrelated factors, six correlated factors, and hierarchical factor structural models and their corresponding standardized regression weights (path coefficients) are shown in Figures 5, 6, 7, and 8, respectively. A figure of the null or independence model has not been provided. The indices of fit reported in Table 5 for the five alternative structural models of the full 18-item multidimensional self-efficacy for exercise instrument indicate that none of these models fit the observed data well using the specific criteria for the indices outlined above, although the six

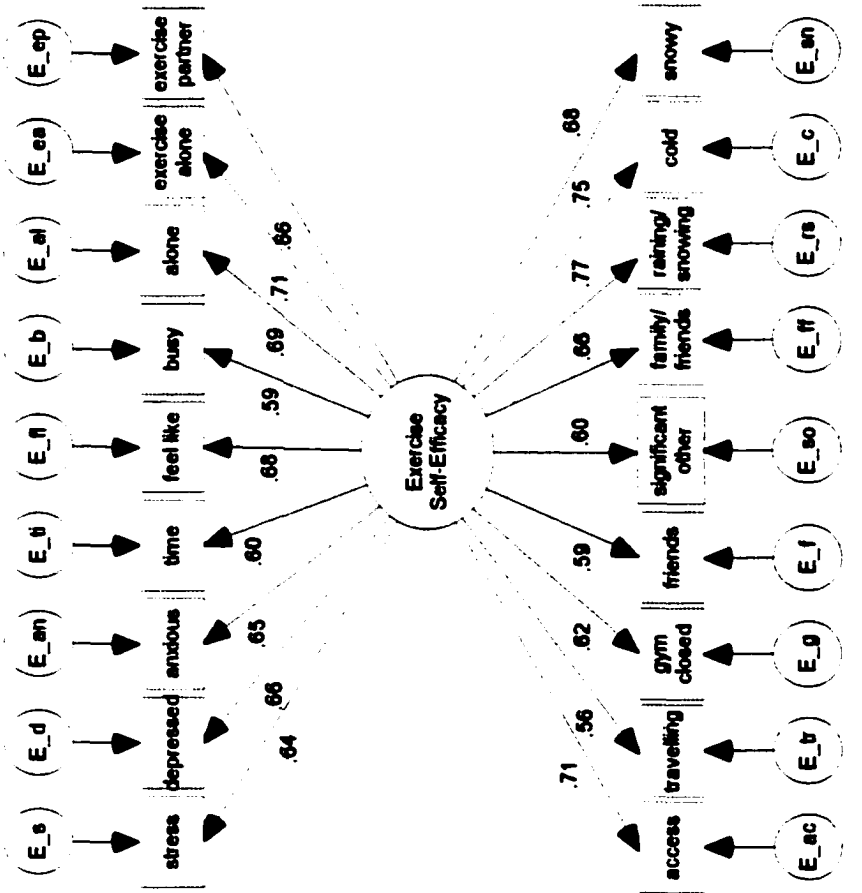
Table 5

Study 1 - Multidimensional Self-Efficacy for Exercise Instrument: Fit Indices of the Alternative Structural Models (N = 164)

Models	χ^2	df	p	χ^2/df	GFI	AGFI	CFI	TLI	RMR	RMSEA
Null (Independence)	1950.30	153	<.01	12.75	.23	.14	.00	.00	.56	.27
Single Factor (18 items)	700.70	135	<.01	5.19	.63	.54	.69	.64	.13	.16
Six Uncorrelated Factors	749.18	135	<.01	5.55	.61	.50	.66	.61	.49	.17
Six Correlated Factors	255.78	120	<.01	2.13	.86	.80	.92	.90	.07	.08
Hierarchical Model	311.68	129	<.01	2.42	.83	.77	.90	.88	.09	.09
Short Form (6 items)	22.15	9	0.02	2.46	.96	.90	.96	.93	.07	.10

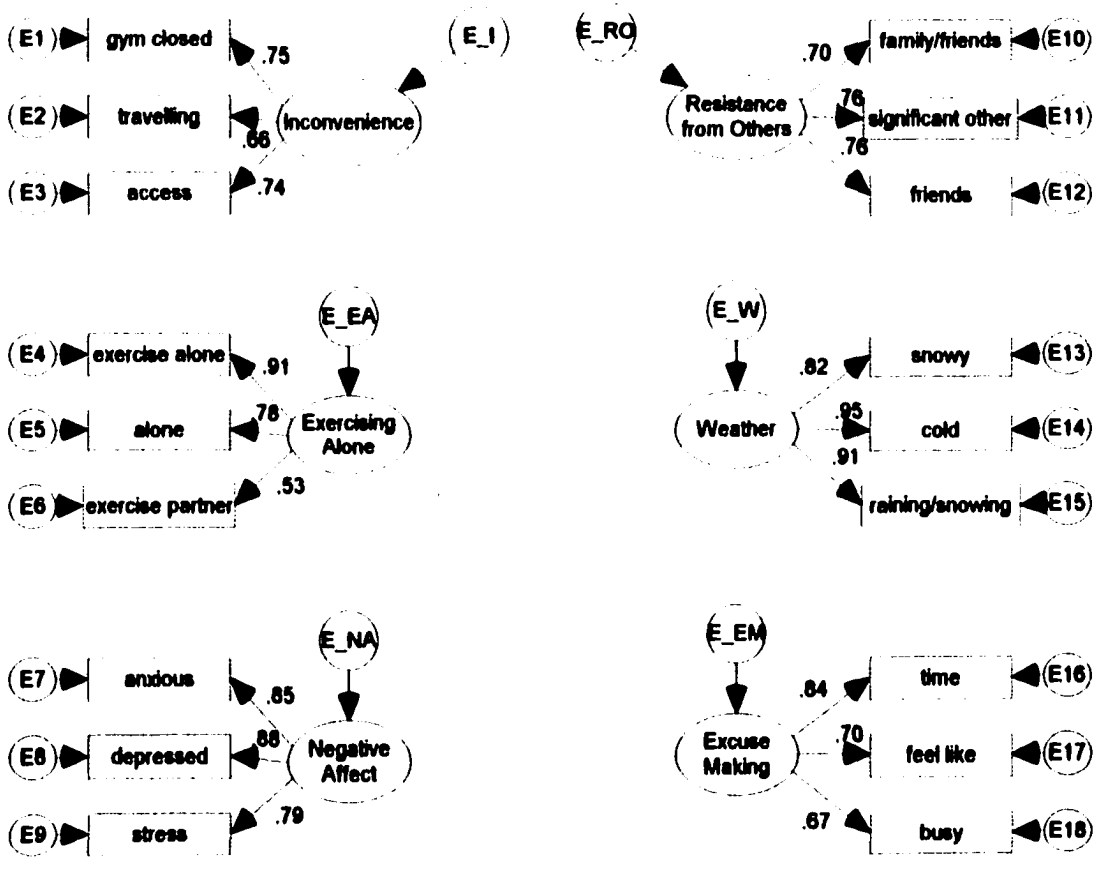
Note. $\chi 2$ = Chi-square, df = degrees of freedom, GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMR = Root Mean-Square Residual, RMSEA = Root Mean Square Error of Approximation.

Figure 5
Alternative Structural Model of Single Factor for Multidimensional Instrument of Self-efficacy for Exercise



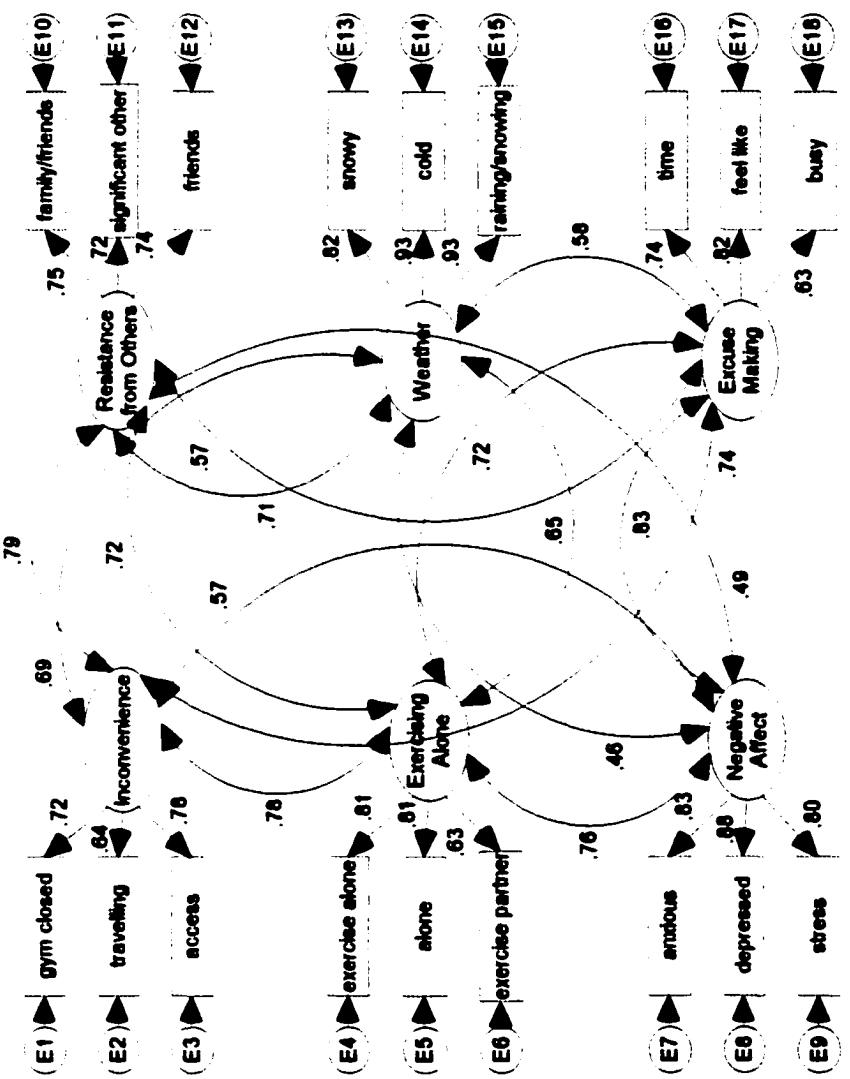
Note: E_ denotes error variances for manifest variables.

Figure 6
Alternative Structural Model of Six Uncorrelated Factors for the Multidimensional Instrument of Self-efficacy for Exercise



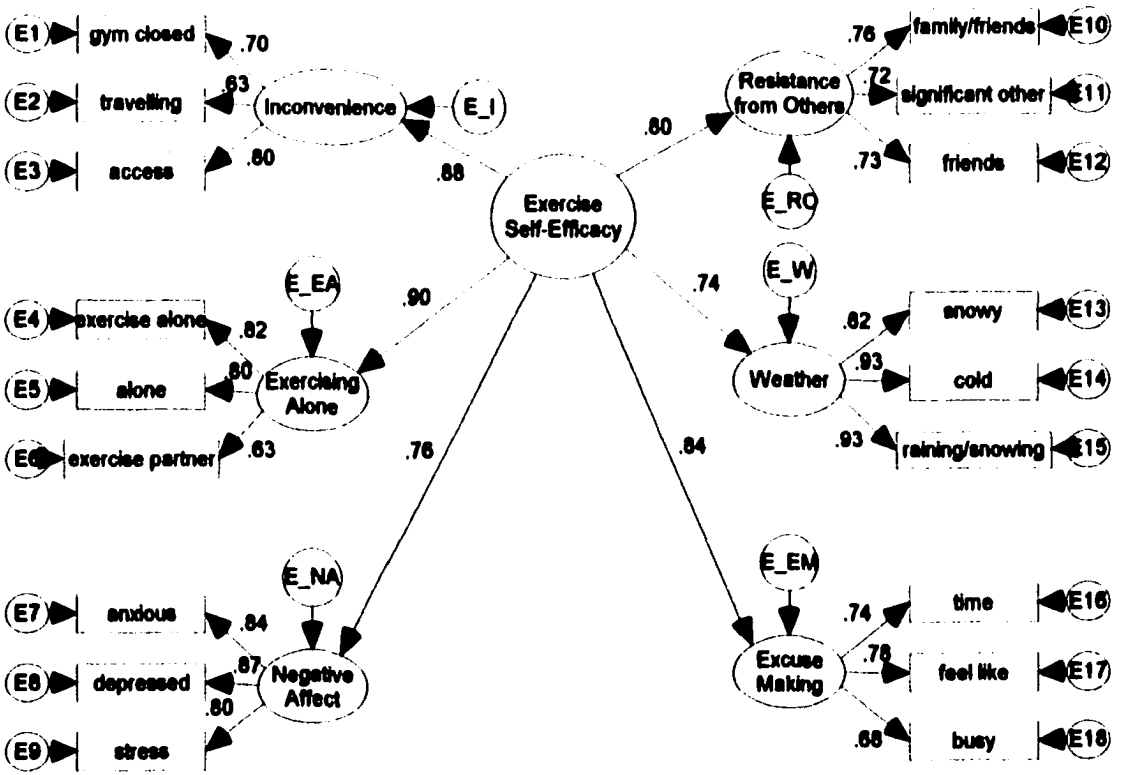
Note: E and E_ denote error variances for manifest and latent variables.

Figure 7
Alternative Structural Model of Six Correlated Factors for Multidimensional Instrument of Self-efficacy for Exercise



Note: E denotes error variances for manifest variables.

Figure 8
Alternative Structural Model of Hierarchical Factor Structure for Multidimensional Instrument of Self-efficacy for Exercise

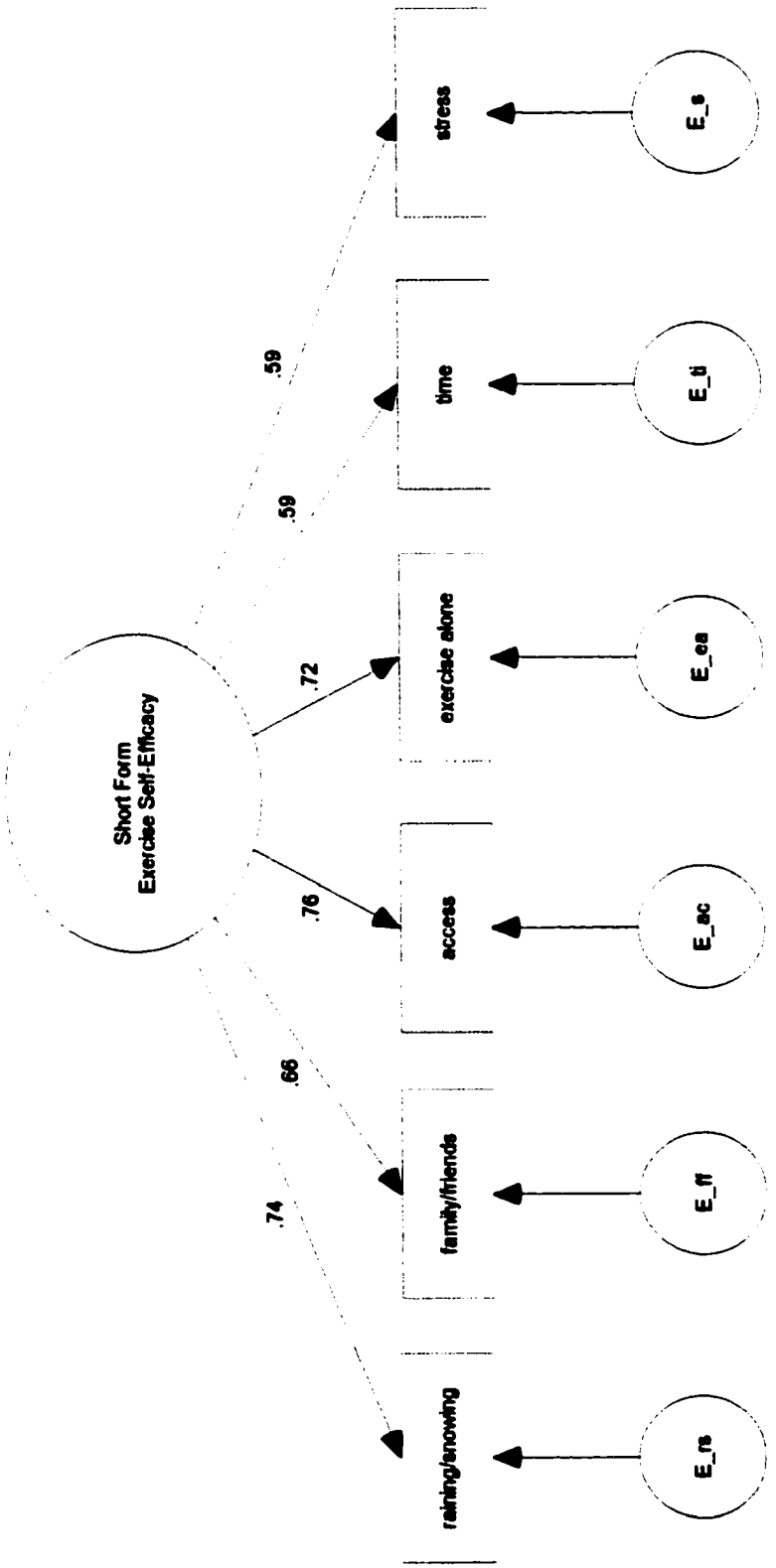


Note: E and E_ denote error variances for manifest and latent variables.

correlated factors model approached an acceptable fit. As an illustrative example for direct comparison with the results obtained by Rossi et al. (2001; Benisovich et al., 1998a, 1998b, 1998c), the CFI, TLI, and RMR values obtained in Study 1 for the hierarchical model, .90, .88, and .09, respectively, were different than those obtained by Rossi et al. (2001; Benisovich et al., 1998a, 1998b, 1998c), .95, .94, and .07, respectively. This hypothesized structural model, as well as all other alternative structural models, did not achieve all of the necessary criteria that would indicate any acceptable, well-fitting models. Therefore, these results did not confirm the hierarchical structural model of the 18-item multidimensional self-efficacy for exercise instrument, as proposed by its authors (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001), in this sample of Medicaid beneficiaries with longstanding mobility impairments, and so the first hypothesis of Study 1 was not supported.

The second hypothesis regarding the measurement model of the new Short Form 6-item global self-efficacy for exercise instrument was tested by imposing a single factor measurement model on the observed data presented in Tables 1 and 2 using Amos 4.0 and examining the indices of fit. These indices are also reported in Table 5, and Figure 9 shows the structural model and its standardized regression weights. The indices of fit indicate that the hypothesized one-factor structural model of the Short Form 6-item instrument did fit the observed data well. Thus, the factor structure of this Short Form 6-item instrument of global self-efficacy for exercise, as proposed by the original authors (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001) was confirmed, and the second hypothesis of Study 1 was supported.

Figure 9
Structural Model of Short Form 6-item Global (Unidimensional) Self-efficacy for Exercise Instrument



E_ denotes error variances for manifest variables.

The third hypothesis regarding the measurement model of the new 10-item decisional balance for exercise instrument was tested by imposing a structural model consisting of two uncorrelated factors representing the Pros and Cons scales/factors on the observed data presented in Tables 3 and 4 using Amos 4.0 and then examining the indices of fit. These indices are reported in Table 6, and Figure 10 shows the structural model and its standardized regression weights (path coefficients). The indices of fit reported in Table 6 indicate that the hypothesized structural model of two uncorrelated factors (i.e., the Pros and Cons) for the decisional balance for exercise instrument did not fit the observed data well. In contrast, Nigg et al.'s (1998, 2001) CFA of the same structural model of the decisional balance instrument had produced a well-fitting model (χ^2 [35] = 70.66; GFI = .92; RMR = .07) in a second sample of adults. Therefore, the factor structure of the decisional balance for exercise instrument, as originally proposed by Nigg et al. (1998, 2001), was not confirmed and the third hypothesis of Study 1 was not supported.

Principal-Components Analysis

As a result of the findings of the confirmatory factor analyses presented above, a principal-components analysis (PCA) was conducted on each of the self-efficacy and decisional balance for exercise instruments separately. PCA of the 18-item multidimensional self-efficacy for exercise instrument used an oblique rotation rather than an orthogonal rotation to extract potential 2, 3, 4, 5, 6, and 7-factor solutions because of the theoretical model specifying the presence of several correlated factors of self-efficacy for exercise (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001), as opposed to an orthogonal rotation that would specify several independent or uncorrelated

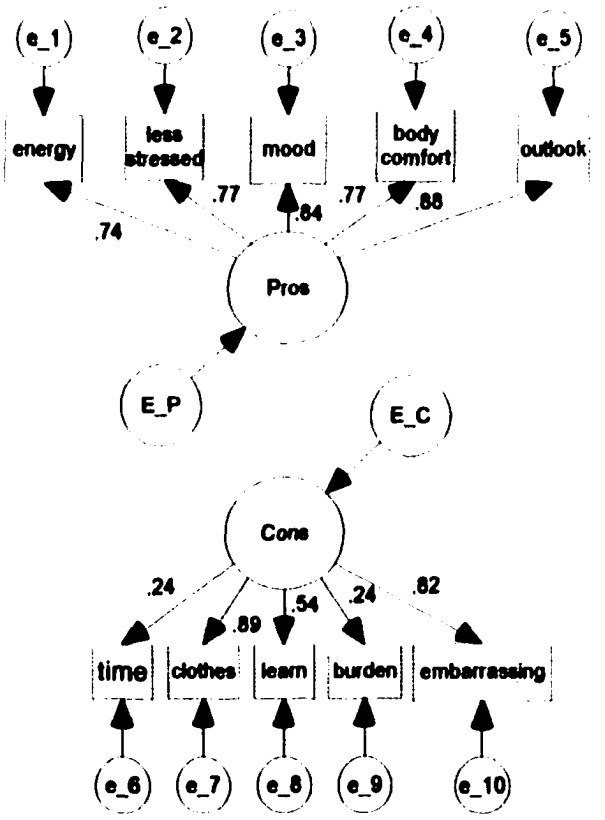
Table 6

Study 1 - Decisional Balance for Exercise Instrument: Fit Indices of the Alternative Structural Models (N = 164)

Models	χ^2	df	p	χ^2/df	GFI	AGFI	CFI	TLI	RMR	RMSEA
Null (Independence)	770.12	45	<.01	17.11	.43	.31	.00	.00	.67	.31
2 Uncorrelated Factors	111.82	35	<.01	3.20	.88	.82	.89	.86	.26	.12

Note. χ^2 = Chi-square, df = degrees of freedom, GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMR = Root Mean-Square Residual, RMSEA = Root Mean Square Error of Approximation

Figure 10
Alternative Structural Model of Two Uncorrelated Factors for Decisional Balance for Exercise Instrument



Note: E_ denotes error variances for manifest and latent variables.

factors. Examination of these different factor solutions resulted in the selection of the 6-factor rotated solution because of its near approach to Thurstone's (1947) simple structure criteria and its ease of interpretation. Factor loading coefficients, communalities, and rotated sums of squared loadings of the 6-factor rotated solution for the self-efficacy for exercise instrument are presented in Table 7, and the correlations between the six factors are presented in Table 8. This 6-factor rotated solution accounted for 77.3% of the total variance and yielded relatively high communalities for all 18 items of the self-efficacy for exercise instrument, suggesting that each of the 18 items contributed substantially to the total variance accounted for by the 6-factor rotated solution. The rotated sums of squared loadings of the six factors presented in Table 7 provide estimates of the degree and rank of the six factors in their contribution to the total variance accounted for, but because these six factors are correlated and were subsequently extracted using an oblique rotation, the rotated sums of squared loadings cannot be summed to obtain the total variance accounted for. These six rotated factors will be presented below, with some preliminary interpretation immediately following, and some more general interpretation to follow in the Discussion-Study 1 section.

Interestingly, the six rotated factors that were extracted by PCA seem to be grouped largely by items with similar content as well as by similar percentages of 0 (does not apply to me) responses for the items of the instrument. The "significant other," "friends," "exercise partner," and "family/friends" items loaded on the first factor, named Interpersonal Situations because all of these items had interpersonal content that dealt with affecting or being effected by other people. Interpersonal Situations consisted of the three items comprising the Resistance From Others factor extracted in the original study

Table 7

Study 1 - Principal Component Analysis of Multidimensional Self-Efficacy for Exercise Instrument: Factor Loading Coefficients, Communalities, and Rotated Sums of Squared Loadings for Six-Factor Solution (N = 164)

Item	Interpersonal Situations	Negative Feeling States	Weather	Excuses	Inconvenience	Isolation	Communalities
stress	.296	**.880**	.359	.358	.373	.368	.804
depressed	.216	**.845**	.340	.484	.299	.544	.804
anxious	.269	**.856**	.428	.432	.260	.406	.774
time	.176	.587	.402	**.790**	.409	.196	.757
feel like	.128	**.681**	.443	.594	.560	.427	.728
busy	.360	.324	.403	**.914**	.280	.360	.869
alone	.314	.556	.435	.343	.364	**.861**	.823
exercise alone	.393	.413	.529	.387	.334	**.874**	.820
exercise partner	**.707**	.398	.489	.238	.517	.374	.645
access	.290	.368	.570	.347	**.735**	.605	.744
traveling	.383	.315	.371	.292	**.847**	.169	.749
gym closed	.480	.169	.451	.345	**.751**	.438	.676
friends	**.823**	.128	.461	.325	.413	.371	.730
significant other	**.844**	.306	.495	.291	.282	.268	.753
family/friends	**.672**	.291	.520	.438	.553	.312	.620
raining/snowing	.415	.292	**.933**	.378	.455	.469	**.888**
cold	.479	.279	**.937**	.436	.345	.388	.897
snowy	.431	.302	**.910**	.259	.346	.306	.843
Rotated Sums of Squared Loadings	4.026	4.484	5.627	3.791	4.190	3.950	

Note. When factors are correlated, rotated sums of squared loadings cannot be added to obtain the total variance.

Table 8

Study 1 - Principal Component Analysis of Multidimensional Self-Efficacy for Exercise Instrument: Factor Correlation Matrix for Six-Factor Solution (N = 164)

Factor	1	2	3	4	5	6
1. Interpersonal Situations	-					
2. Negative Feeling States	.18	-				
3. Weather	.46	.32	-			
4. Excuses	.24	.39	.37	-		
5. Inconvenience	.35	.29	.41	.32	-	
6. Isolation	.27	.34	.40	.29	.30	-

reported by Rossi et al. (2001; Benisovich et al., 1998a, 1998b, 1998c), with the addition of the "exercise partner" item. In Study 1, each of these four items had very high percentages of 0 (does not apply to me) responses (see Table 1). It appears that these four items formed the Interpersonal Situations factor because they covaried in the sense that most participants of this sample responded to most or all of them with a 0 (does not apply to me) response, and so each of these four items had limited response variability, as further evidenced by the small standard deviations in Table 1.

The "stress," "anxious," "depressed," and "feel like" items loaded on the second factor, named Negative Feeling States because it comprised the three items of the Negative Affect factor found in the original study, along with the addition of the "feel like" item, all of which seem to represent negative feeling states. In Study 1, these four items had comparable percentages of 0 (does not apply to me) responses that were small, and standard deviations that were reasonable (see Table 1). These findings suggest that these four items covaried in the usual manner of being items that were answered on a continuous scale and that were significantly associated with one another, in order to form the Negative Feeling States factor.

The "cold," "raining/snowing," snowy" items loaded on the third factor, named Weather because it replicated the factor found in the original study. In Study 1, these three items had comparable percentages of 0 (does not apply to me) responses that were in the mid-range when compared to the other 18 items, as well as standard deviations that were reasonable (see Table 1). These findings suggest that these three items covaried in the usual manner, similar to those items of the Negative Feeling States factor, in order to form the Weather factor.

The "busy" and "time" items loaded on the fourth factor, named Excuses because these are two of the three items comprised by the Excuse Making factor of the original study. As stated above, the third item of the original Excuse Making factor ("feel like") loaded on the Negative Feeling States factor in Study 1, and did not covary with the "busy" and "time" items, which apparently covaried in the usual manner to a larger degree with each other. In study 1, these two items also had comparable percentages of 0 (does not apply to me) responses that were fairly small when compared to the other items, as well as standard deviations that were reasonable (see Table 1).

The "traveling," "gym closed," and "access" items loaded on the fifth factor, named Inconvenience because it replicated the factor found in the original study. However, in Study 1, each of the three items comprising Inconvenience had comparable percentages of 0 (does not apply to me) responses that were fairly high, as well as standard deviations that were small (see Table 1). It appears that these three items formed the Inconvenience factor because they also covaried in the sense that most participants responded to most or all of them with a 0 (does not apply to me) response, similar to Interpersonal Situations.

Finally, the "exercise alone" and "alone" items loaded on the sixth factor, named Isolation because these items ask about exercising when unaccompanied by other people. This factor comprised two of the three items of the Exercising Alone factor of the original study. As stated above, the third item of the original Exercising Alone factor, "exercise partner," loaded on the Interpersonal Situations factor in Study 1 and did not covary with the "exercise alone" and "alone" items, which apparently covaried in the usual manner to a larger degree with each other. In Study 1, these two items had

comparable percentages of 0 (does not apply to me) responses that were small, and standard deviations that were reasonable (see Table 1). These items seem to represent the opposite of the Interpersonal Situations factor, which did not seem to be applicable to this specific sample, to form the Isolation factor that is probably very descriptive more often than not of the lives of people with longstanding mobility impairments. More detailed interpretation and discussion of the results concerning the self-efficacy for exercise instrument will take place in the Discussion-Study 1 section.

PCA of the 10-item decisional balance for exercise instrument used an orthogonal varimax rotation to examine potential 2, 3, and 4-factor rotations because of the theoretical model specifying the presence of two independent or uncorrelated factors (Nigg et al., 1998, 2001). Examination of these different factor solutions resulted in the selection of the 3-factor solution because of its near approach to Thurstone's (1947) simple structure criteria and its ease of interpretation. Factor loading coefficients, communalities, and rotated sums of squared loadings of the 3-factor rotated solution for the decisional balance for exercise instrument are presented in Table 9. This 3-factor rotated solution yielded fairly high communalities for the 10 items, indicating that each of the 10 items contributed substantially to the total variance accounted for by the 3-factor rotated solution. In contrast to an oblique rotation, the total variance accounted for by an orthogonal rotation can be calculated by summing the communalities of all the items, as well as summing the rotated sums of squared loadings of all the factors. The 3-factor rotated solution explained 71.6% of the total variance accounted for of the 10-item decisional balance for exercise instrument. The first factor explained 35.4% of the total variance accounted for, the second factor 20.7%, and the third factor 15.5%. These three

Table 9

Study 1 - Principal Component Analysis of Decisional Balance for Exercise Instrument: Factor Loading Coefficients, Communalities, and Rotated Sums of Squared Loadings for Three-Factor Solution (N = 164)

Item	Pros	Cons-Personal	Cons-Interpersonal	Communalities
energy	**.798**	.060	.112	.652
embarrassing	.152	**.901**	.019	.835
less stressed	**.809**	.234	.004	.710
time	.215	.076	**.726**	.579
mood	**.877**	-.024	.058	.773
clothes	.126	**.892**	.103	.822
body comfort	**.794**	.188	.070	.671
learn	.082	**.588**	.498	.600
outlook	**.871**	.093	.194	.805
burden	.020	.082	**.840**	.713
Rotated Sums of Squared Loadings	3.542	2.068	1.551	Variance Accounted For 7.160

rotated factors will be presented below, with some preliminary interpretation immediately following, and some more general interpretation to follow in the Discussion-Study 1 section.

The "mood," "outlook," "less stressed," "energy," and "body comfort" items loaded on the first factor, named Pros because it replicated the same factor found by the original authors (Nigg et al., 1998, 2001). The high factor loadings of these items suggest that the Pros factor is a very salient and distinct one. The "embarrassing," "clothes," and "learn" items loaded on the second factor, named Cons-Personal because these items seem to represent the negative effects of exercise that are more individualistic or personal in nature. The "burden" and "time" items loaded on the third factor, named Cons-Interpersonal because these items seem to represent the negative effects of exercise that are more interpersonal in nature ("Exercise puts an extra burden on my significant other" and "Exercise prevents me from spending time with my friends). These findings essentially split the original Cons factor found by Nigg et al. (1998, 2001) into two separate factors: the Cons-Interpersonal and Cons-Personal factors. More detailed interpretation and discussion of the results concerning the decisional balance for exercise instrument will take place in the Discussion-Study 1 section.

Results-Study 2

Descriptive Statistics

As stated in the Methods-Study 2 section, a total of 171 participants completed the stages of change for exercise behavior questionnaire, and of these 171 participants, 141 completed each of the 17 items of the DHPB questionnaire, 166 completed each of the 10 items of the decisional balance for exercise instrument, and 144 completed each of

the 18 items of the self-efficacy for exercise instrument appropriately. Within this sample of 171 participants, 66.1% were female, the average age was 49.2 years, the average number of years of education was 12.8 years, 90.1% were Caucasian, 22.8% were married, and 14.6% were currently employed. This sample is substantially older than the samples from which the two instruments were developed (49.2 years vs. 19.8 years), but not substantially older than the second sample in which the decisional balance for exercise instrument was confirmed (49.2 years vs. 43.0 years), and it appears to be comparable to the other samples on gender, education, ethnicity, and marital status characteristics (Benisovich et al., 1998a, 1998b, 1998c; Nigg et al., 1998, 2001; Rossi et al., 2001).

The means, standard deviations, values of Cronbach's alpha, and percentages of 0 (does not apply to me) responses for the items and scales of the multidimensional self-efficacy for exercise instrument are presented in Table 10. The reader is reminded that the values presented in all subsequent Tables and Figures relevant to the self-efficacy for exercise instrument for Study 2 are those that were calculated after completing mean replacement of all 0 (does not apply to me) responses for each particular item (variable) of this instrument. The means and standard deviations presented in Table 10 for Study 2 appear to be comparable to those presented in Table 1 for Study 1, and again lower than those originally reported by the authors of the instrument (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001). Again, as with Study 1, these slightly lower means are not surprising because this specific sample of Medicaid beneficiaries with longstanding mobility impairments might be expected to have a lower degree of self-efficacy to

Table 10

Study 2 - Multidimensional Self-Efficacy for Exercise Instrument: Means, Standard Deviations, and Internal Consistency (Cronbach's Alpha) Coefficients for the Items and Factor Scales (N = 144)

Scale and Items	Mean	SD	Cronbach's Alpha	Percentage of 0 (DNA) Responses
Negative Affect	7.50	3.12	.87	
I am under a lot of stress.[a]	2.54	1.20		13.2%
I am depressed.	2.32	1.17		16.0%
I am anxious.	2.64	1.14		20.8%
Excuse Making	6.96	2.61	.77	
I feel I don't have the time.[a]	2.30	1.00		38.2%
I don't feel like it.	2.38	1.14		26.4%
I am busy.	2.28	1.00		38.2%
Exercising Alone	8.47	2.58	.69	
I am alone.	3.03	1.19		31.9%
I have to exercise alone.[a]	2.85	1.19		33.3%
My exercise partner decides not to exercise that day.	2.59	0.86		66.0%
Inconvenience	7.03	2.03	.62	
I don't have access to exercise equipment.[a]	2.72	1.19		47.9%
I am traveling.	1.96	0.70		63.2%
My gym is closed.	2.35	0.72		74.3%
Resistance from Others	8.21	1.77	.69	
My friends don't want me to exercise.	3.00	0.59		77.8%
My significant other does not want me to exercise.	2.52	0.58		82.6%
I am not spending time with friends or family who do not exercise.[a]	2.69	1.00		52.8%
Weather	7.99	3.41	.91	
It's raining or snowing.[a]	2.67	1.19		29.9%
It's cold outside.	2.77	1.23		27.8%
The roads or sidewalks are snowy.	2.55	1.30		22.2%
Full 18-item Global Self-Efficacy for Exercise Instrument	46.17	11.46	.90	
Short Form 6-item Global Self-Efficacy for Exercise Instrument	15.77	4.46	.74	

Note. [a] Denotes item of Short Form 6-item Global Self-Efficacy for Exercise Instrument.

exercise in most of the particular situations or circumstances detailed in the 18 items of the instrument, as well as a lower degree of global self-efficacy for exercise.

Regarding values of Cronbach's alpha of the scales for this instrument, several of those values presented in Table 10 are lower than their corresponding values presented in Table 1. These reduced values of Cronbach's alpha were for the Exercising Alone, Inconvenience, and Resistance from Others factor scales, all of which were below .70, suggesting questionable internal consistency (George & Mallery, 1999). Additionally, the value of Cronbach's alpha was reduced for the Short Form 6-Item scale as well. These reductions are likely due to the decreased sample size for the analyses of the self-efficacy for exercise instrument in Study 2 ($\underline{N}$ = 144 vs. $\underline{N}$ = 164 in Study 1). Furthermore, Table 10 indicates that higher percentages of the sample responded with 0 (does not apply to me) responses to specific items of the Excuse Making, Exercising Alone, Inconvenience, and Resistance from Others factor scales of the self-efficacy for exercise instrument than those percentages presented in Table 1 for Study 1, although the percentages for the Negative Affect and Weather were comparable.

The Pearson product-moment correlation matrix between the 18 items of the multidimensional self-efficacy for exercise instrument for Study 2 is presented in Table 11. Compared to the intercorrelations presented Table 2 for Study 1, where all were significant at the .05 level, several item intercorrelations in Table 11 were nonsignificant. Most of these intercorrelations appear to be between the "inapplicable" items of Study 1 dealing with interpersonal content and access to a gym or exercise equipment and items dealing with subjective feelings. However, the remaining observed intercorrelations in

Table 11

Study 2 - Multidimensional Self-Efficacy for Exercise Instrument: Item Intercorrelations (N = 144)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. stress	-																	
2. depressed	.68**	-																
3. anxious	.68**	.70**	-															
4. time	.39**	.44**	.44**	-														
5. feel like	.44**	.47**	.47**	.54**	-													
6. busy	.37**	.25**	.25**	.53**	.54**	-												
7. alone	.52**	.45**	.52**	.29**	.43**	.31**	-											
8. exercise alone	.40**	.43**	.42**	.30**	.29**	.21**	.58**	-										
9. exercise partner	.12	.12	.25**	.18*	.13	.16*	.34**	.35**	-									
10. access	.16	.22**	.36**	.23**	.25**	.20*	.36**	.37**	.40**	-								
11. travelling	.21**	.24**	.33**	.25**	.23**	.31**	.26**	.20*	.30**	.28**	-							
12. gym closed	.15	.09	.31**	.08	.10	.19*	.28**	.26**	.33**	.38**	.57**	-						
13. friends	.16	.12	.24**	.10	.16*	.17*	.25**	.27**	.60**	.21**	.34**	.36**	-					
14. significant other	.12	.13	.24**	.32**	.18*	.31**	.26**	.28**	.45**	.21**	.33**	.34**	.46**	-				
15. family/friends	.31**	.19*	.40**	.28**	.22**	.26**	.33**	.28**	.48**	.24**	.41**	.30**	.54**	.43**	-			
16. raining/snowing	.38**	.34**	.45**	.31**	.36**	.29**	.38**	.39**	.26**	.23**	.31**	.25**	.33**	.30**	.54**	-		
17. cold	.42**	.34**	.49**	.36**	.40**	.30**	.44**	.37**	.37**	.35**	.21**	.26**	.32**	.25**	.44**	.80**	-	
18. snowy	.47**	.39**	.53**	.33**	.44**	.25**	.44**	.35**	.29**	.22**	.29**	.23**	.28**	.17*	.43**	.72**	.76**	-

Note. ** Denotes $p \leq .01$ level (2-tailed).
* Denotes $p \leq .05$ level (2-tailed).

the matrix are significant and appear to be in accordance with general self-efficacy theory and previous empirical results.

The means, standard deviations, and values of Cronbach's alpha for the items and scales of decisional balance for exercise instrument are presented in Table 12. These values are comparable to their respective values presented in Table 3 for Study 1, which seem to be the only basis for comparison, because the raw score means and standard deviations of the items and scales were not reported by the authors in the original study (Nigg et al., 1998, 2001). The values of Cronbach's alpha reported in Table 12 suggest acceptable levels of internal consistency (George & Mallery, 1999).

The Pearson product-moment correlation matrix between the 10 items of the decisional balance for exercise instrument for Study 2 is presented in Table 13. The pattern of this observed correlation matrix appears to resemble the expected pattern consistent with decisional balance for exercise theory, and seems to do so more closely than the pattern observed in Table 3 for Study 1. Those items comprising the Pros scale (Items 1, 3, 5, 7, and 9) correlated with each other strongly and were substantially larger than their correlations with items comprising the Cons scale (Items 2, 4, 6, 8, and 10), and those items comprising the Cons scale (Items 2, 4, 6, 8, and 10) correlated with each other strongly and were substantially larger than their correlations with items comprising the Pros scale (Items 1, 3, 5, 7, and 9), which is in accordance with decisional balance for exercise theory and previous empirical results.

The means, standard deviations, and values of Cronbach's alpha for the items of the Disability and Health Perceived Barriers (DHPB) questionnaire, which measured the level of perceived difficulty for potential problems or barriers for participation in an

Table 12

Study 2 - Decisional Balance for Exercise Instrument: Means, Standard Deviations, and Internal Consistency (Cronbach's Alpha) Coefficients for the Items and Factor Scales (N = 166)

Scale and Items	Mean	SD	Cronbach's Alpha
Pros	16.02	6.00	.91
I would have more energy for my family and friends if I exercised regularly.	3.08	1.38	
I would feel less stressed if I exercised regularly.	3.17	1.36	
Exercising puts me in a better mood for the rest of the day.	3.13	1.31	
I would feel more comfortable with my body.	3.27	1.47	
Regular exercise would help me have a more positive outlook on life.	3.37	1.42	
Cons	7.94	3.89	.74
I would feel embarrassed if people saw me exercising.	1.87	1.35	
Exercise prevents me from spending time with my friends.	1.37	0.85	
I feel uncomfortable or embarrassed in exercise clothes.	1.92	1.39	
There is too much I would have to learn to exercise.	1.45	0.88	
Exercise puts an extra burden on my significant other.	1.34	0.93	
Decisional Balance	23.96	7.46	.80
Pros Minus Cons	8.08	6.82	

Table 13

Study 2 - Decisional Balance for Exercise Instrument: Item Intercorrelations (N = 166)

Item (Scale)	1	2	3	4	5	6	7	8	9	10
1. energy (Pros)	-									
2. embarrassing (Cons)	.18*	-								
3. less stressed (Pros)	.73**	.13	-							
4. time (Cons)	.04	.29**	.01	-						
5. mood (Pros)	.59**	.02	.71**	-.07	-					
6. clothes (Cons)	.08	.62**	.05	.24**	.07	-				
7. body comfort (Pros)	.59**	.15*	.66**	-.02	.62**	.21**	-			
8. learn (Cons)	.05	.41**	-.04	.38**	-.08	.40**	.02	-		
9. outlook (Pros)	.64**	.08	.76**	-.07	.79**	.13	.73**	.00	-	
10. burden (Cons)	.09	.22**	.01	.54**	.06	.26**	.06	.43**	.05	-

Note. ** Denotes $p \leq .01$ level (2-tailed).
* Denotes $p \leq .05$ level (2-tailed).

exercise program, are presented in Table 14. The mean and standard deviation for the 27-item questionnaire are comparable to those values obtained in previous studies with similar samples (Craig Ravesloot, personal communication, 3/29/2002). The Pearson product-moment correlation matrix between the 27 items of the DHPB questionnaire for Study 2 is presented in Table 15, but no previous results regarding the item intercorrelations of this questionnaire were available for comparison.

Analysis of Variance and Pairwise Comparisons

In order to address the six hypotheses of Study 2, one-way analysis of variance (ANOVA) tests were conducted using SPSS 9.0 on 12 dependent variables: the eight scales of the multidimensional self-efficacy for exercise instrument (Full 18-item Global scale, Short Form 6-item Global scale, and the Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather factor scales), the three scales of the decisional balance instrument (Pros, Cons, and Pros Minus Cons scales), and the one scale of the DHPB questionnaire. An alpha level of .01 had been chosen in order to be conservative given the fact that 12 one-way ANOVA tests were conducted. Consultation with a statistician suggested that conducting a multivariate analysis of variance (MANOVA) test was not necessary because follow-up one-way ANOVA tests would be conducted any way, and foregoing the MANOVA test would insulate against Type I error (John Caruso, personal communication, 8/28/2001).

These one-way ANOVA tests were to be conducted to compare the means of different groupings based on the five stages of change for exercise (Precontemplation, Contemplation, Preparation, Action, and Maintenance) and using these groupings as the independent variable. The number and percentages of participants within each of the five

Table 14

Study 2 - Disability and Health Perceived Barriers Questionnaire: Means, Standard Deviations, and Internal Consistency (Cronbach's Alpha) Coefficient for the Items and Scale (N = 141)

Scale and Items	Mean	SD	Cronbach's Alpha
27-item Disability and Health Perceived Barriers Questionnaire	16.18	10.37	.84
It's difficult to get in and out of my house.	0.50	0.76	
My neighborhood has too few curb cuts.	0.44	0.94	
It is dangerous for me to leave my house.	0.35	0.73	
It would take too long to get to the program.	0.73	1.01	
Chemicals in the environment bother me.	0.67	1.00	
The weather is often too bad to get out.	1.09	1.05	
I have trouble reading printed materials.	0.62	1.00	
Buildings are not accessible to me.	0.35	0.71	
I don't have accessible transportation.	0.79	1.14	
I don't have the assistive equipment that I need.	0.37	0.86	
My disability is limiting me too much these days.	1.16	1.03	
I have a hard time thinking and concentrating.	0.87	1.03	
I lose control over my bowel and bladder functions.	0.40	0.80	
My weight makes it hard to get around.	0.64	0.99	
I get tired easily.	1.72	1.03	
I have pain when I do too much.	2.01	1.00	
I can't see well enough to get around.	0.15	0.49	
I have trouble hearing what people say.	0.41	0.77	
I have to take time off from my job.	0.28	0.79	
I'm too busy to take time away from other important activities.	0.45	0.81	
I have to arrange day car for my children.	0.17	0.62	
I take care of another family member.	0.30	0.78	
My family will not support my coming.	0.17	0.61	
My daily self-care needs take too much energy.	0.63	0.89	
I need someone to help me.	0.63	0.99	
My doctor will not approve of my coming.	0.14	0.54	
Other important people tell me not to come.	0.11	0.49	

Table 15

Study 2 - Disability and Health Perceived Barriers Questionnaire: Item Intercorrelations (N = 141)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1. access house	-																										
2. curb cuts	.31**	-																									
3. danger leave house	.43**	.46**	-																								
4. time	.35**	.17*	.20*	-																							
5. chemicals	.27**	.23**	.18*	.30**	-																						
6. weather	.24**	.10	.17*	.27**	.34**	-																					
7. reading print	.14	.04	.22**	.09	.31**	.17*	-																				
8. buildings	.32**	.47**	.18*	.24**	.21**	.18*	.14	-																			
9. transportation	.21**	.28**	.10	.32**	.28**	.27**	.12	.34**	-																		
10. equipment	.25**	.44**	.33**	.22**	.18*	.15	.16	.42**	.44**	-																	
11. disability limiting	.42**	.21**	.28**	.26**	.35**	.42**	.23**	.29**	.31**	.37**	-																
12. concentration	.20*	.08	.13	.07	.30**	.05	.44**	.10	.06	.14	.32**	-															
13. bowel & bladder	.23**	.12	.10	.08	.20*	.11	.22**	.13	.03	.00	.09	.30**	-														
14. weight	.24**	.20*	.07	.01	.07	.04	.08	.28**	.19*	.16	.21**	.12	.22**	-													
15. tired	.29**	.13	.21**	.25**	.29**	.24**	.26**	.13	.24**	.21**	.62**	.37**	.07	.33**	-												
16. pain	.28**	.19*	.04	-.01	.19*	.20*	.07	.18*	.13	.20*	.43**	.26**	.13	.33**	.43**	-											
17. can't see	.24**	.10	.23**	.25**	.35**	.19*	.43**	.18*	.10	.06	.12	.26**	.34**	.08	.11	.06	-										
18. trouble hearing	.17*	.15	.15	.08	.21**	.10	.20*	.27**	.13	.24**	.30**	.22**	.11	.25**	.25**	.25**	.18*	-									
19. time from job	.07	.27**	.26**	-.08	.06	.01	.07	.10	.04	.21**	.08	.05	.22**	.00	.08	.02	-.05	.07	-								
20. too busy	.05	.18*	.03	.29**	.14	.08	-.06	.16	.02	.24**	.13	.10	-.09	.00	.05	.13	-.05	.03	.14	-							
21. day care	.01	-.04	-.08	.22**	.01	.02	.01	.04	.13	.08	.09	.00	-.10	.14	.11	.07	-.08	-.04	-.04	.31**	-						
22. family member care	.02	-.05	-.09	.16	.11	.21**	-.10	.04	.03	.05	.12	-.06	-.13	.10	-.01	.03	-.06	-.09	-.04	.34**	.39**	-					
23. lack support	.04	.09	.32**	.06	.08	.30**	.12	.06	.12	.18*	.17*	-.04	.06	-.03	.11	.04	.03	.00	.20*	.09	-.04	.09	-				
24. self-care needs	.29**	.23**	.35**	.22**	.31**	.37**	.21**	.35**	.30**	.29**	.60**	.21**	.05	.20**	.34**	.26**	.11	.26**	.26**	.20*	.09	.06	.16	-			
25. need help	.41**	.40**	.43**	.27**	.19*	.15	.25**	.45**	.23**	.33**	.35**	.19*	.13	.20**	.14	.03	.22**	.15	.25**	.13	.14	.06	.08	.49**	-		
26. doctor	-.02	.00	.04	.03	.23**	.29**	.11	.06	.13	-.04	.14	-.02	-.05	.03	.03	.05	.03	.06	.01	-.05	-.01	.33**	.32**	.15	.02	-	
27. other people	.06	.11	.13	.12	.23**	.30**	.10	.09	.07	.15	.25**	-.11	.01	-.09	.16	.11	.05	.01	.21**	.14	.10	.37**	.48**	.23**	.10	.47**	-

Note. ** Denotes $p \leq .01$ level (2-tailed).
* Denotes $p \leq .05$ level (2-tailed).

stages of change for exercise behavior for each of the one-way ANOVA tests of the self-efficacy for exercise instrument, the decisional balance for exercise instrument, and the DHPB questionnaire are presented in Table 16. The distribution of this sample's observed percentages for the five stages of change does not appear to reflect what would be expected from a population of Medicaid beneficiaries with longstanding mobility impairments. The observed frequencies and percentages in the Action and Maintenance stages for Study 2 appear to be particularly inflated, as they indicate that approximately 35-40% of this population with mobility impairments self-reported themselves as currently exercising "regularly." This observed percentage would be higher than previous estimates that only 15-40% of the general adult population in the U.S. currently meets the USCDCP and ACSM guidelines (ACSM, 1990; Pate et al., 1995) for regular physical activity and exercise, which is in contrast with the findings that people with disabilities appear to be more sedentary and underactive than people without disabilities (Marcus, Forsyth et al., 2000; Pate et al., 1995; USDHHS, 1996, 2000). Furthermore, the observed percentages for the Precontemplation, Contemplation, and Preparation stages seem to be lower than would be expected for this specific population. Specific comparisons and additional interpretation of these findings will be presented and discussed in the Discussion-Study 2 section.

After examining the observed frequencies and percentages of the sample for each of the five stages of change for exercise and placing these numbers in the context of previous research and the discussion regarding statistical power analysis (Cohen, 1988) during the dissertation prospectus meeting, the decision was made to conduct the 12 one-way ANOVA tests using three groupings of the five stages of change. The first group

Table 16

Study 2 - Stages of Change for Exercise Behavior: Frequencies and Percentages of the Stages for ANOVA Tests of Self-efficacy for Exercise Instrument (N = 144), Decisional Balance Instrument (N = 166), and DHPB Questionnaire (N = 141)

	Stages of Change					Total
Scale	Precontemplation n (%)	Contemplation n (%)	Preparation n (%)	Action n (%)	Maintenance n (%)	N (100%)
Self-efficacy for Exercise	24 (16.7%)	40 (27.8%)	28 (19.4%)	12 (8.3%)	40 (27.8%)	144 (100%)
Decisional Balance for Exercise	29 (17.5%)	42 (25.3%)	30 (18.1%)	16 (9.6%)	49 (29.5%)	166 (100%)
DHPB Questionnaire	26 (18.4%)	34 (24.1%)	25 (17.7%)	12 (8.5%)	44 (31.2%)	141 (99.9%)

comprised both the Precontemplation and Contemplation stages, the second comprised the Preparation stage, and the third comprised both the Action and Maintenance stages. This grouping method had been used in previous research concerning the stages of change for exercise behavior (e.g., Marcus, Pinto et al., 1994; Marcus & Simkin, 1993; Wyse et al., 1995), and it was thought to maximize the comprehensiveness of the hypotheses, inferences, and observed data that could be tested statistically in Study 2. This grouping method resulted in three unequal numbers of participants per group that were relatively small in size. The Preparation group had the fewest number of participants per group across the one-way ANOVA tests, ranging from 25 to 30 participants. The number of participants for the Action/Maintenance group ranged from 52 to 65 participants, and the number of participants for the Precontemplation/Contemplation group ranged from 60 to 71 participants.

The results of the 12 one-way ANOVA tests for the multidimensional self-efficacy for exercise instrument scales, the decisional balance for exercise instrument scales, and the DHPB questionnaire are presented in Tables 17, 18, and 19, respectively. As explained in the Methods-Study 2 section, raw scores of the instrument scales were converted to T scores ($\underline{M}$ = 50, $\underline{SD}$ = 10) in order to be consistent with previous studies (e.g., Marcus & Owen, 1992; Marcus, Pinto et al., 1994; Marcus, Rakowski, & Rossi, 1992; Nigg & Courneya, 1998; Nigg et al., 1998, 2001) and provide a standard measure for comparison across the three groups. The results presented in Tables 17, 18, and 19 indicate that the majority of the one-way ANOVA tests conducted on the 12 scales were not significant across the three groupings of the stages of change for exercise, and the only significant difference was the Weather factor scale of the self-efficacy for exercise

Table 17

Study 2 - Multidimensional Self-Efficacy for Exercise Instrument: One-Way Analysis of Variance for Groups Based on Stages of Change for Exercise (N = 144)

	Pre/Con[a] (n = 64)	Prep[b] (n = 28)	Act/Maint[c] (n = 52)				
Scale	Mean T-Score (SD)[d]	Mean T-Score (SD)[d]	Mean T-Score (SD)[d]	F (2, 141)	p	Levene Statistic[e] (2, 141)	p
Full 18-Item Self-efficacy	48.16 (9.18)	49.30 (10.98)	52.64 (10.04)	3.05	.051	0.66	.518
Short Form 6-Item Self-efficacy	48.57 (9.50)	48.88 (10.41)	52.36 (10.13)	2.32	.102	0.25	.781
Negative Affect	49.28 (10.01)	49.34 (10.35)	51.24 (9.88)	0.62	.540	0.02	.984
Excuse Making	49.48 (9.22)	47.00 (8.51)	52.25 (11.25)	2.73	.069	1.01	.367
Exercising Alone	48.39 (9.12)	50.77 (10.65)	51.57 (10.56)	1.57	.212	0.10	.910
Inconvenience	49.36 (8.56)	49.93 (12.15)	50.83 (10.52)	0.31	.737	1.39	.253
Resistance from Others	48.11 (7.82)	49.98 (10.55)	52.33 (11.65)	2.62	.077	1.93	.149
Weather	47.46 (9.57)	50.01 (9.46)	53.13 (10.09)	4.86	.009	0.47	.626

Note. [a] Pre/Con denotes Precontemplation/Contemplation. [b] Prep denotes Preparation. [c] Act/Maint denotes Action/Maintenance. [d] denotes standard deviation. [e] The Levene Statistic is a test for the homogeneity of variance between the three groups.

Table 18

Study 2 - Decisional Balance for Exercise Instrument: One-Way Analysis of Variance for Groups Based on Stages of Change for Exercise (N = 166)

	Pre/Con[a] (n = 71)	Prep[b] (n = 30)	Act/Maint[c] (n = 65)				
Scale	Mean T-Score (SD)[d]	Mean T-Score (SD)[d]	Mean T-Score (SD)[d]	F (2, 163)	p	Levene Statistic[e] (2, 163)	p
Pros Minus Cons	48.11 (10.55)	50.81 (8.19)	51.69 (9.92)	2.34	.100	1.71	.184
Pros	49.17 (10.83)	50.97 (9.03)	50.46 (9.55)	0.45	.638	2.61	.077
Cons	52.04 (11.86)	50.07 (9.20)	47.74 (7.46)	3.22	.042	5.89	.003

Note. [a] Pre/Con denotes Precontemplation/Contemplation. [b] Prep denotes Preparation. [c] Act/Maint denotes Action/Maintenance. [d] denotes standard deviation. [e] The Levene Statistic is a test for the homogeneity of variance between the three groups.

Table 19

Study 2 - DHPB: One-Way Analysis of Variance for Groups Based on Stages of Change for Exercise (N = 141)

	Pre/Con[a] (n = 60)	Prep[b] (n = 25)	Act/Maint[c] (n = 56)				
Scale	Mean T-Score (SD)[d]	Mean T-Score (SD)[d]	Mean T-Score (SD)[d]	F (2, 138)	p	Levene Statistic[e] (2, 138)	p
DHPB	51.47 (10.04)	50.68 (13.26)	48.13 (7.97)	1.71	.186	3.04	.051

Note. [a] Pre/Con denotes Precontemplation/Contemplation. [b] Prep denotes Preparation. [c] Act/Maint denotes Action/Maintenance. [d] denotes standard deviation. [e] The Levene Statistic is a test for the homogeneity of variance between the three groups.

instrument [F (2, 141) = 4.06, p = .009]. The Full 18-Item Self-efficacy, Short Form 6-Item Self-efficacy, Excuse Making, Resistance from Others, Pros Minus Cons, and Cons scales approached significance across the three groups. Additionally, only one post hoc pairwise comparison using Tukey's honestly significant difference (HSD) test yielded a significant difference, as the mean value of the Weather factor scale for the Action/Maintenance group was significantly greater than the corresponding value for the Precontemplation/Contemplation group (p = .005). The Levene statistic, which is a measure of the homogeneity of variance between the three groups, for the Weather factor scale suggests that the variances between the groups were not significantly different (p = .626) and that the significant difference between the Precontemplation/Contemplation and Action/Maintenance groups is acceptable. Because no additional one-way ANOVA tests or pairwise comparisons between the groups were significant, the Levene statistic was not relevant for any additional analyses. Overall, these results did not provide support for the majority of the hypotheses of Study 2 as specifically explicated in the Introduction-Rationale, Purposes, and Hypotheses-Study 2 section.

Results-Study 3

Descriptive Statistics

As stated in the Methods-Study 3 section, a total of 164 Medicaid beneficiaries with longstanding physical mobility impairments appropriately completed all of the items of the instruments necessary for the purposes of Study 3 and were being recruited into the exercise programs of the grant-funded study. Table 20 presents the demographic characteristics of the total sample and the recruitment strategy and recruitment outcome

Table 20

Study 3 - Demographic Characteristics of the Total Sample (N = 164) and Recruitment Strategy and Recruitment Outcome Subsamples

			Reactive Recruitment Strategy		Proactive Recruitment Strategy	
Variable		Total (N = 164)	Not Recruited (n = 72)	Recruited (n = 10)	Not Recruited (n = 64)	Recruited (n = 18)
Age	Mean Years	48.29	49.68	45.40	47.32	47.72
	SD	11.13	10.69	7.69	12.22	10.45
Gender	% Female	64.6%	61.1%	90.0%	62.5%	72.2%
Education	Mean Years	12.98	12.82	13.00	13.10	13.18
	SD	2.70	2.94	2.28	2.48	2.83
Race	% Caucasian	90.2%	87.5%	100.0%	89.1%	100.0%
Employment	% Employed	11.6%	12.5%	20.0%	9.4%	11.1%
Marital Status	% Married	17.1%	22.2%	10.0%	7.8%	33.3%

subsamples of Study 3. Visual inspection of Table 20 suggests that the subsamples were fairly similar in their demographic composition.

Logistic Regression

As the hypotheses for Study 3 involved the prediction of a dichotomous categorical dependent variable (i.e., "recruited" versus "not recruited") from an interaction between a continuous predictor variable (i.e., self-efficacy and/or decisional balance for exercise) and a dichotomous categorical predictor variable of recruitment strategy (i.e., either the proactive recruitment strategy utilizing motivational interviewing or the reactive recruitment strategy utilizing direct mailings of newsletters), a hierarchical, sequential progression of analyses utilizing logistic regression was conducted using SPSS 9.0. First, a logistic regression model predicting exercise program recruitment outcomes based on the main effects of three predictor variables of recruitment strategy, global self-efficacy for exercise (Short Form 6-item scale), and decisional balance for exercise (Pros Minus Cons scale) was tested. The sample size of 164 participants was perceived to be adequate for conducting logistic regression analysis on this main effects model, because according to Aldrich and Nelson (1984), at least 50 participants for every predictor variable are needed to achieve adequate statistical power with logistic regression analysis. For prediction purposes, a classification cutoff of .25 was implemented, as opposed to .50, because it was estimated that the probability or likelihood of being "recruited" would be less than the probability or likelihood of being "not recruited," based on observed recruitment outcomes in previous research with health-promotion interventions (see Prochaska & Marcus, 1994), but there was no specific indication as to how much less probable for this specific behavior of exercise

recruitment within this specific sample, and so a value half-way between 0 and .50 appeared to be reasonable. This main effects model yielded values of 137.67 for the –2 Log Likelihood and 166.33 for the Goodness of Fit index, which suggested that this main effects model fit the observed data adequately. Furthermore, this main effects model yielded a value of $\chi^2 = 12.24$ ($df = 3$, $p = .007$), which rejected the null hypothesis that none of the predictor variable coefficients of this model would differ from zero in the population, using an α level of .05. The Cox and Snell R^2 value estimated that this model explained approximately 7% of the total variance accounted for in predicting recruitment outcomes, while the Nagelkerke R^2 value estimated that this model explained approximately 12% of that variance.

Additional results of the main effects model are presented in Table 21, and the majority of the interpretation of these results are directly taken from and based on the definitions and clarifications of Wright (1995), with some additional guidance from Mallery and George (1999) where indicated. The values of B are the raw coefficients of the predictor variables of the logistic regression model and represent the changes in the natural logarithm of the odds ratios (OR) for the dichotomous categorical dependent variable. The odds of membership for a target group for a dichotomous categorical dependent variable are equal to the ratio between the probability of membership in the target group and the probability of membership in the other group. For the purposes of Study 3, the group of participants who were "recruited" was classified as 1, whereas the "not recruited" group was classified as 0. Odds basically inform how much more likely it is that an observation is a member of the target group (e.g., "recruited") rather than a member of the other group (e.g., "not recruited"). Odds values greater than 1 signify that

Table 21

Study 3 - Logistic Regression Analysis Predicting Exercise Program Recruitment Outcomes- Model With Main Effects of Recruitment Strategy, Short Form 6-item Self-efficacy for Exercise, and Pros Minus Cons (N = 164)[a]

Variable	B	Standard Error	Wald Statistic	df	p	R	e^B
Recruitment Strategy[b]	-0.78	0.45	3.06	1	.080	-.08	0.46
Short Form 6-item Self-Efficacy for Exercise Scale	-0.04	0.04	0.75	1	.386	.00	0.96
Pros Minus Cons Scale	0.12	0.04	8.28	1	.004	.20	1.13
Constant	-1.72	0.71	5.93	1	.015	-	-

Note. [a] Recruitment Outcomes were coded as follows: 0 = not recruited, 1 = recruited

[b] Recruitment Strategies were coded as follows: 0 = proactive recruitment strategy utilizing motivational interviewing, 1 = reactive recruitment strategy utilizing a direct mailing of newsletters.

the target group or event is more likely than the other event, while odds values less than 1 signify that the target group or event is less likely than the other event, and odds values equal to 1 signify that both events are equally likely. The value of e^B represents the odds ratio (OR), which "estimates the change in the odds of membership in the target group for a one-unit increase in the predictor" (Wright, 1995, p. 223). The Wald statistic is a distribution statistic based on a predictor variable's calculated values of B and standard error, which yields a statistical significance value for B in combination with its associated degrees of freedom. A significant Wald statistic indicates that the value of B for a predictor variable is significant, which in turn signifies that there is a significant relationship between the predictor variable and the odds and OR of the predicted outcomes. Finally, R is the partial correlation between the predictor variable and the predicted outcome variable, which means it is the correlation that is independent from the other predictor variables in the logistic regression model (George & Mallery, 1999).

With respect to recruitment strategy as a dichotomous categorical predictor variable, where the proactive recruitment strategy utilizing motivational interviewing was assigned a value of 0 and the reactive recruitment strategy utilizing a direct mailing of newsletters was assigned a value of 1. The negative value of B in this case indicates that the predicted odds of being "recruited" into an exercise program for those participants who were assigned to the reactive recruitment strategy utilizing a direct mailing of newsletters was less than the odds of being "recruited" into an exercise program for those who were assigned the proactive recruitment strategy utilizing motivational interviewing. The value of e^B presented in Table 21, representing the OR, signifies that the odds of being "recruited" when assigned to receive the reactive recruitment strategy utilizing a

direct mailing of newsletters were only .46 times the odds of being assigned to receive the proactive recruitment strategy utilizing motivational interviewing. Another way of looking at this finding would be that the odds of being "recruited" when assigned to receive the proactive recruitment strategy utilizing motivational interviewing was 2.18 times greater than the odds of being assigned to receive the reactive recruitment strategy utilizing a direct mailing of newsletters. This figure was obtained by calculating the inverse of .46 (i.e., 1/.46 = 2.18). Thus, it seemed to be more likely for participants to be "recruited" when assigned to the proactive strategy as opposed to the reactive strategy, although the Wald statistic unfortunately indicates that this finding was nonsignificant and only approached significance ($p = .08$), when using an α level of .05. This finding indicates that there was not a significant relationship between recruitment strategies and the predicted odds of recruitment outcomes in this model, and so recruitment strategies did not seem to be predictive of recruitment outcomes.

With respect to global self-efficacy for exercise, as measured by the Short Form 6-item scale, as a continuous predictor variable, the negative value of B presented in Table 21 indicates that the predicted odds of being "recruited" into an exercise program decreased slightly as scores on the Short Form 6-item scale increased, which is in the opposite direction of what would be expected from a main effect of this predictor variable. However, the value of e^B indicates that the OR for this scale was .96, which is close to 1 and signifies that it was almost as likely to be "recruited" as it was to be "not recruited." These findings, in conjunction with the nonsignificant Wald statistic ($p = .386$), indicate that there was not a significant relationship between global self-efficacy for exercise, as measured by the Short Form 6-item scale, and the predicted odds of

recruitment outcomes in this model, and so global self-efficacy for exercise did not seem to be predictive of recruitment outcomes.

With respect to decisional balance as measured by the Pros Minus Cons scale as a continuous predictor variable, the positive value of B presented in Table 21 indicates that the predicted odds of being "recruited" into an exercise program increased as scores on the Pros Minus Cons scale increased, which is in the direction of what would be expected from a main effect of this predictor variable. The value of e^B indicates that the OR for this scale was 1.13, meaning that the predicted odds for being "recruited" were 1.13 times greater for each one-unit increase on the Pros Minus Cons scale. Thus, it became more likely for observations to be "recruited" than "not recruited" as scores on the Pros Minus Cons scale increased, and the Wald statistic indicates that this finding was significant ($p = .004$). This finding indicates that there was a significant relationship between decisional balance and the predicted odds of recruitment outcomes in this model, and so the Pros Minus Cons scale seemed to be the only predictor variable that predicted recruitment outcomes.

Table 22 indicates that this model's overall percentage accuracy in classification (PAC; Wright, 1995) of recruitment outcomes was a modest 76.22%, its sensitivity 42.86% (i.e., the probability that the observation was predicted to be "recruited" when the observation actually was "recruited"), its specificity 83.09% (i.e., the probability that the observation was predicted to be "not recruited" when the observation actually was "not recruited"), its positive predictive power 34.29% (i.e., the probability that the observation actually was "recruited" when the observation was predicted to be "recruited"), and its negative predictive power 87.60% (i.e., the probability that the observation actually was

Table 22

Study 3 - Classification Table of Exercise Program Recruitment Outcomes-

Main Effects Model (N = 164)

		Predicted		
		Not Recruited	Recruited	Percent Correct
Observed	Not Recruited	113	23	83.09%
	Recruited	16	12	42.86%
	Percent Correct	87.60%	34.29%	
			Overall PAC	76.22%

Note. Classification cutoff = .25.

"not recruited" when the observation was predicted to be "not recruited"). These classification rates were due mainly to the significant effect of the Pros Minus Cons scale as a predictor variable, because the other two predictor variables did not yield statistically significant effects. Overall, the results presented in Tables 21 and 22 indicate that the main effects model was substantially better at predicting which participants were "not recruited" than which participants were "recruited," and only partially support the first hypothesis of Study 3.

A second logistic regression model containing the three main effects of the first model with the addition of the interaction between recruitment strategy and the Short Form 6-item global self-efficacy for exercise scale in predicting recruitment outcomes was examined in order to test the second hypothesis. This model yielded values of 137.47 for the –2 Log Likelihood and 166.51 for the Goodness of Fit index, which suggested that this model fit the observed data adequately. Furthermore, this model yielded a value of $\chi^2 = 12.44$ ($df = 4$, $p = .014$), which rejected the null hypothesis that none of the predictor variable coefficients of this model would differ from zero in the population. A statistical test of the improvement in prediction when the interaction term was added yielded a value of $\chi^2 = 0.20$ ($df = 1$, $p = .655$): we failed to reject the null hypothesis that this model did not improve prediction. Again, the Cox and Snell R^2 value estimated that this model with the addition of the recruitment strategy by Short Form 6-item global self-efficacy for exercise scale interaction term explained approximately 7% of the total variance accounted for in predicting recruitment outcomes, while the Nagelkerke R^2 value estimated that this model explained approximately 12% of that variance.

Additional results of this model are presented in Table 23, which indicates again that the Pros Minus Cons scale was the only predictor variable that significantly predicted recruitment outcomes ($p = .004$), while the interaction between recruitment strategy and the Short Form 6-item global self-efficacy for exercise scale was highly nonsignificant ($p = .655$). The classification table of this model is presented in Table 24, and the PAC did not change substantially from the main effects model, and the sensitivity and specificities remained modest as well. Overall, these results suggest that the model including the interaction between recruitment strategy and the Short Form 6-item global self-efficacy for exercise scale was not any better at predicting recruitment outcomes than the main effects model, which does not support the second hypothesis of Study 3 that recruitment strategies may moderate the relationship between global self-efficacy and recruitment outcomes.

A third logistic regression model containing the three main effects of the first model with the addition of the interaction between recruitment strategy and the Pros Minus Cons scale in predicting recruitment outcomes was examined in order to test the third hypothesis. This model yielded values of 136.28 for the –2 Log Likelihood and 175.59 for the Goodness of Fit index, which suggested that this main effects model fit the observed data adequately. Furthermore, this model yielded a value of $\chi^2 = 13.63$ ($df = 4$, $p = .009$), which rejected the null hypothesis that none of the predictor variable coefficients of this model would differ from zero in the population. A statistical test of the improvement in prediction when the interaction term was added yielded a value of $\chi^2 = 1.39$ ($df = 1$, $p = .238$): we failed to reject the null hypothesis that this model did not improve prediction. The Cox and Snell R^2 value estimated that this model with the

Table 23

Study 3 - Logistic Regression Analysis Predicting Exercise Program Recruitment Outcomes - Model With Recruitment Strategy By Short Form 6-item Self-efficacy for Exercise Interaction Term (N = 164)[a]

Variable	B	Standard Error	Wald Statistic	df	p	R	e^B
Recruitment Strategy[b]	-1.38	1.42	0.94	1	.332	.00	0.25
Short Form 6-item Self-Efficacy for Exercise Scale	-0.05	0.05	0.91	1	.341	.00	0.95
Pros Minus Cons Scale	0.12	0.04	8.33	1	.004	.21	1.13
Recruitment Strategy By Short Form 6-item Self-efficacy for Exercise Interaction Term	0.04	0.08	0.20	1	.655	.00	1.04
Constant	-1.52	0.83	3.38	1	.066	-	-

Note. [a] Recruitment Outcomes were coded as follows: 0 = not recruited, 1 = recruited

[b] Recruitment Strategies were coded as follows: 0 = proactive recruitment strategy utilizing motivational interviewing, 1 = reactive recruitment strategy utilizing a direct mailing of newsletters.

Table 24

Study 3 - Classification Table of Exercise Program Recruitment Outcomes - Model With Addition of Recruitment Strategy By Short Form 6-item Self-efficacy for Exercise Interaction Term (N = 164)

		Predicted		
		Not Recruited	Recruited	Percent Correct
Observed	Not Recruited	112	24	82.35%
	Recruited	16	12	42.86%
	Percent Correct	87.50%	33.33%	
			Overall PAC	75.61%

Note. Classification cutoff = .25.

addition of the recruitment strategy by Pros Minus Cons scale interaction term explained approximately 8% of the total variance accounted for in predicting recruitment outcomes, while the Nagelkerke R^2 value estimated that this model explained approximately 13% of that variance.

Additional results of this model are presented in Table 25, which indicate that none of the predictor variables significantly predicted recruitment outcomes, and the interaction between recruitment strategy and the Pros Minus Cons scale was nonsignificant ($p = .252$). The classification table of this model is presented in Table 26, and the PAC of this model was not substantially different from the main effects model presented in Table 22. These results suggest that the model including the interaction between recruitment strategy and the Pros Minus Cons scale was not any better at predicting recruitment outcomes than the main effects model, which does not support the third hypothesis of Study 3 that recruitment strategies may moderate the relationship between global self-efficacy and recruitment outcomes. Overall, these results did not provide support for the majority of the hypotheses of Study 3 as specifically explicated in the Introduction-Rationale, Purposes, and Hypotheses-Study 3 section.

Table 25

Study 3 - Logistic Regression Analysis Predicting Exercise Program Recruitment Outcomes - Model With Recruitment Strategy By Pros Minus Cons Interaction Term (N = 164)[a]

Variable	B	Standard Error	Wald Statistic	df	p	R	e^B
Recruitment Strategy[b]	-1.83	1.06	2.98	1	.084	-.08	0.16
Short Form 6-item Self-Efficacy for Exercise Scale	-0.03	0.04	0.41	1	.522	.00	0.97
Pros Minus Cons Scale	0.08	0.05	2.60	1	.107	.07	1.09
Recruitment Strategy By Pros Minus Cons Interaction Term	0.10	0.09	1.31	1	.252	.00	1.11
Constant	-1.51	0.71	4.51	1	.034	-	-

Note. [a] Recruitment Outcomes were coded as follows: 0 = not recruited, 1 = recruited

[b] Recruitment Strategies were coded as follows: 0 = proactive recruitment strategy utilizing motivational interviewing, 1 = reactive recruitment strategy utilizing a direct mailing of newsletters.

Table 26

Study 3 - Classification Table of Exercise Program Recruitment Outcomes - Model With Addition of Recruitment Strategy By Pros Minus Cons Interaction Term (N = 164)

		Predicted		
		Not Recruited	Recruited	Percent Correct
Observed	Not Recruited	108	28	79.41%
	Recruited	15	13	46.43%
	Percent Correct	81.20%	31.07%	
			Overall	73.78%

Note. Classification cutoff = .25.

Chapter 4

Discussion-Study 1

The purposes of Study 1 were to confirm the measurement models and original psychometric findings of the Full 18-item multidimensional self-efficacy for exercise instrument, the Short Form 6-item global (unidimensional) self-efficacy for exercise instrument, and the 10-item decisional balance for exercise instrument in a sample of Medicaid beneficiaries with longstanding mobility impairments. Results of Study 1 were mixed regarding the specific hypotheses. The hypothesized measurement models and factor structures of the 18-item multidimensional self-efficacy for exercise instrument originally constructed by Rossi et al. (2001; Benisovich et al., 1998a, 1998b, 1998c) and the 10-item decisional balance for exercise instrument originally constructed by Nigg et al. (1998; 2001) were not confirmed by CFA in the present sample of Medicaid beneficiaries with longstanding mobility impairments. However, in the PCA for each of these instruments, several of the original factors were replicated in the present sample, and the hypothesized measurement model of the Short Form 6-item global (unidimensional) self-efficacy for exercise scale was confirmed by CFA in this sample.

The results of Study 1 are likely due to the fact that this study collected data from a sample that was derived from a population of Medicaid beneficiaries with longstanding mobility impairments, while the self-efficacy and decisional balance for exercise instruments were both originally developed in college student samples. Furthermore, the sample of Study 1 was substantially older than the samples of the original studies for both the instruments (mean ages 48.1 vs. 19.8 years), although CFA of the decisional balance

instrument in the second study of Nigg et al. (1998, 2001) had confirmed the measurement model with an older population (mean age 43.0 years) (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001). Therefore, the results of Study 1 suggest that the hierarchical factor structure of the multidimensional self-efficacy for exercise instrument and the Pros and Cons factor structure of the decisional balance for exercise instrument constructed by their respective original authors in two separate college student samples does not generalize to a population of Medicaid beneficiaries with longstanding mobility impairments. Fortunately, the results of Study 1 suggest potential explanations as to why the structural models of these instruments do not generalize to this specific population.

Preliminary interpretation regarding the results of the CFA and subsequent PCA of the self-efficacy and decisional balance for exercise instruments was initiated in the Results-Study 1 section in order to discuss the item content of the rotated factors that were extracted from the two instruments, and discussion of these results will continue here in this section. These results of Study 1 concerning the self-efficacy for exercise instrument were obtained largely because most participants responded with at least one 0 (does not apply to me) to several of the 18 items, and because six items of the instrument had substantial percentages ranging from 43.9% to 70.1% of participants who responded with a 0 (does not apply to me) to them. Table 1 indicates that all of the 18 items had at least 13.4% of the sample respond to each of them with a 0 (does not apply to me) response. At a micro level of analysis, it seems to be a logical inference that a 0 (does not apply to me) response to an item would signify that the specific content of the particular item was "inapplicable" for the particular respondent. At a macro level, the

varying percentages of 0 (does not apply to me) responses across the 18 items suggest that particular items may be applicable and some may be "inapplicable" for this specific sample that was derived from a population of Medicaid beneficiaries with longstanding mobility impairments.

More specifically, the six items with substantial percentages of 0 (does not apply to me) responses listed in order of increasing percentages were "family/friends," "traveling," "exercise partner," "friends," "gym closed," and "significant other." The finding that four of these items contained interpersonal content and had a substantial number of 0 (does not apply to me) responses does not seem entirely surprising for specific sample. Rather, there seems to be a rational explanation for this finding, as people with mobility impairments and disabilities often have fewer active social supports and interactions in their lives, such as significant others, friends, family members, and exercise partners than an individual from the "walking well" or mobile population might have. Furthermore, it does not seem surprising that the "traveling" item would be "inapplicable" for this specific population because of this population's significant financial and physical limitations. Briefly stated, this population is not likely to travel as frequently or as far as an individual from the general "walking well" or mobile population might do. Additionally, the item "gym closed" might have been "inapplicable" for this specific sample because the majority of these individuals do not belong to a gym facility because they are largely sedentary and/or have financial limitations, all of which were reasons for carrying out the purposes of the aforementioned Grant-Funded Study of The Montana University Affiliated Rural Institute on Disabilities (see Grant-Funded Study and purposes of Study 3 above). Therefore, these findings

seem to empirically confirm a rational explanation of why these six items of the self-efficacy for exercise instrument had substantial percentages of 0 (does not apply to me) responses for this specific sample of Medicaid beneficiaries with longstanding physical mobility impairments; that they are "inapplicable" to them.

The results of the PCA of the 18-item multidimensional self-efficacy for exercise instrument provide additional support for the conclusion that the original hierarchical factor structure of Negative Affect, Excuse Making, Exercising Alone, Inconvenience, Resistance from Others, and Weather factors does not generalize to a population of Medicaid beneficiaries with longstanding mobility impairments. This PCA yielded a 6-factor rotated solution that was consistent with the pattern of "inapplicable" data presented above, consisting of six correlated factors named Negative Feeling States, Excuses, Isolation, Inconvenience, Interpersonal Situations, and Weather. The six factors of Study 1 were similar to the six factors of the original study in content, but they differed because these new factors comprised two, three, or four items per factor, as opposed to the original six factors comprising three items per factor. The Interpersonal Situations and Inconvenience factors of Study 1 comprised all of the six items with substantial percentages of 0 (does not apply to me) responses, and so these two factors appear to be "inapplicable" for a population with longstanding mobility impairments, and do not appear to be useful or important for measuring the construct of self-efficacy for exercise in such a population. However, the other four factors of Negative Feeling States, Weather, Excuses, and Isolation seem to be applicable for this population, and are likely to be useful and important for measuring the construct of self-efficacy for exercise in this specific population.

Regarding the second hypothesis of Study 1, the hypothesized measurement model of the Short Form 6-item global self-efficacy for exercise scale was confirmed by CFA, and so this hypothesis was supported. In the context of the findings regarding the 18-item self-efficacy for exercise instrument, this finding suggests that a shorter measure of global self-efficacy for exercise may be more applicable, and hence, more useful and efficient for this specific population of Medicaid beneficiaries with longstanding mobility impairments. Although this 6-item scale is comprised of two items representing the original Resistance from Others and Inconvenience factors, which had substantial percentages of 0 (does not apply to me) responses and seemed to be "inapplicable" factors for this specific population, the specific items of "access" and "family/friends" representing these factors had the lowest percentages of such 0 (does not apply to me) responses for these two factors. This may explain why CFA of the Short Form 6-item measurement model yielded fit indices that were adequate in order to confirm the model, in addition to producing a value of .83 for Cronbach's alpha, which suggests adequate internal consistency of the 6-item scale.

Regarding the third hypothesis of Study 1, the measurement model of the 10-item decisional balance for exercise instrument consisting of two factors representing the Pros and Cons scales was not confirmed by CFA, and so this hypothesis was not supported. The subsequent PCA of this instrument extracted three uncorrelated factors, replicating the original 5-item Pros factor found by Nigg et al. (1998, 2001), but splitting the original 5-item Cons factor into the 3-item Cons-Personal factor and the 2-item Cons-Interpersonal factor. These findings regarding the factor structure of the decisional balance for exercise instrument appear to be similar to the findings concerning the factor

structure of the multidimensional self-efficacy for exercise instrument, namely that items with interpersonal content covary more closely and "hang together" distinctly from other item content.

The two items forming the Cons-Interpersonal factor likely covary together and distinctly from the other Cons-Personal because they seem to be "not important" for this specific sample of Medicaid beneficiaries with longstanding mobility impairments as the three other items of the Cons-Personal factor; an interpretation which is supported by the slightly lower means for the "time" and "burden" items (see Table 3). Furthermore, such findings seem to be in accordance with the findings regarding the factor structure and applicability of the interpersonal items of the self-efficacy for exercise instrument, which would suggest that these interpersonal items might possibly be "inapplicable" for this population. The reduced variability of these items as evidenced by the slightly smaller standard deviations for these two items (see Table 3) would seem to support this conclusion. However, the decisional balance for exercise instrument in Study 1 did not have a 0 (does not apply to me) response option for the 10 items, as the self-efficacy for exercise did have for its 18 items, so this speculative conclusion could not be directly confirmed or disconfirmed. Similar conclusions regarding the factor structure and applicability of the interpersonal items of the decisional balance for exercise instrument may be warranted, because it appears as if the items of the original Cons factor that have interpersonal content are "not important" or even "inapplicable," for this specific sample of Medicaid beneficiaries with longstanding mobility impairments, and so they may not be useful for measuring the Cons factor of the decisional balance for exercise instrument for this specific sample.

The discussion of the results presented above regarding the self-efficacy for exercise instrument are based on statistical analyses that were conducted on the observed data after replacing the 0 (does not apply to me) responses with respective item means. This imperfect solution was suggested in order to carry out the necessary statistical analyses required to test the hypotheses regarding the specific purposes of Study 1 of the dissertation project. However, it is worth mentioning that there seems to be another suggested solution for addressing the observed "inapplicability" of particular items and examining the factor structure of the self-efficacy instrument. More specifically, this suggestion essentially would be to transform this scale from measuring the level of confidence in one's ability to exercise regularly despite situations that might interfere with plans to exercise, which is the construct of self-efficacy for exercise, to a scale measuring the degree to which these situations are perceived as problematic for these respondents to participate in regular exercise. More specifically, the 0 (does not apply to me) response might have signified that the item was "inapplicable" in the sense that it did not apply to the respondent because the situation could not have been a problem for the respondent (e.g. because the individual has no "exercise partner," a partner's absence could not be a problem). Therefore, reversing the scoring of the other responses of the scale [i.e., 5 (completely confident) becomes 1 (not much of a problem), 4 (very confident) becomes 2 (somewhat of a problem), etc.) and allowing the 0 responses to stand as they are (i.e., 0 (does not apply) becomes 0 (not a problem)] would transform this scale into a continuous interval scale measuring the degree to which respondents perceive these situations as being problematic for participation in regular exercise. Analysis of the observed data of this new scale would ensure greater variability for each

item than if the data underwent mean replacement. However, this alternative interpretation of the 0 (does not apply to me) response and its subsequent suggestions for data transformation and analyses were not carried out because of the specific purposes of Study 1 and because of the fact that they also have their own difficulties and limitations. However, there are plans to carry out such data transformations and analyses in the near future, either by the principal investigator of this project or the principal investigator of the Grant-Funded Study, Craig Ravesloot. Further implications for future research are presented and discussed in the General Discussion section.

Discussion-Study 2

The purposes of Study 2 were to examine if the various indices of self-efficacy and decisional balance for exercise, as well as the subjective perceptions of potential problems or barriers to participation in exercise programs, would vary across three groupings based on the transtheoretical model's five stages of change for exercise in a disabled sample in the same manner as previous empirical studies have found. At the time of this dissertation research proposal, no empirical studies that examined the stages of change of the transtheoretical model, the constructs of self-efficacy and decisional balance, and their relationship to exercise adoption and maintenance within a disabled population had been identified.

Overall, the results of Study 2 did not provide support for its specific hypotheses. The mean values of the three groupings of the five stages of change for exercise (Precontemplation/Contemplation, Preparation, and Action/Maintenance) were not significantly different from one another on 11 of the 12 scales of the indices of self-efficacy for exercise, decisional balance for exercise, and the potential barriers to

participation in exercise programs. The only significant finding was that the mean value of the Weather factor scale for the Action/Maintenance group was significantly greater than the corresponding value for the Precontemplation/Contemplation group, but not significantly greater than the corresponding value for the Preparation group. All other findings of Study 2 were nonsignificant. Although several of the 12 scales of the indices approached significance (See Table 17, 18 and 19), they failed to achieve the stringent significance criterion of the .01 alpha level, which had been set because of the fact that 12 one-way ANOVA tests were conducted.

The results of Study 2 suggest prima facie that the three grouping of the five stages of change for exercise (Precontemplation/Contemplation, Preparation, and Action/Maintenance) do not differ with respect to their levels of self-efficacy, decisional balance, or perceived difficulty of potential barriers for exercise within this population of Medicaid beneficiaries with longstanding mobility impairments. More specifically, the findings regarding seven of the eight scales of the self-efficacy for exercise instrument seem to suggest that there are comparable levels of global (unidimensional) as well as situational (multidimensional) aspects of self-efficacy for exercise, which represent the perceived level of confidence in one's ability to exercise regularly despite situations that might interfere with one's plans to exercise, in each of these three groups. The findings suggest that those individuals in the Action/Maintenance group differ from those in the Precontemplation/Contemplation group, but not from those in the Preparation group, only with respect to levels of self-efficacy for exercise concerning situations involving the weather. The findings regarding all three of the Pros, Cons, and Pros Minus Cons scales of the decisional balance for exercise instrument also seem to suggest that there are

comparable levels of perceived benefits of exercise (i.e. Pros), perceived costs of exercise (i.e. Cons), and perceived benefits minus costs (i.e. Pros Minus Cons) indices across these three groups for this population as well. Finally, the results regarding the DHPB questionnaire suggest that there are comparable levels of perceived difficulty with potential problems or barriers to participation in exercise programs across these three groups for this population. The results for Study 2 seem to suggest that individuals with longstanding mobility impairments who are in the more advanced stages of change with respect to exercise behavior do not exhibit higher levels of self-efficacy for exercise, higher levels of perceived benefits and perceived benefits minus the costs of exercise, nor lower levels of perceived costs of exercise than those individuals in less advanced stages of change with respect to exercise behavior. Therefore, *prima facie*, the results of Study 2 do not seem to provide empirical support for the generalizability of the transtheoretical model to this specific population of Medicaid beneficiaries with longstanding mobility impairments with respect to exercise behavior.

However, such an interpretation, which is based on the nearly complete lack of significant findings of Study 2, is likely premature and unwarranted because it fails to consider the results of Study 2 in the comprehensive context of previous research regarding exercise behavior within the transtheoretical model, and fails to consider the potential methodological limitations of Study 2. The results of Study 2 are largely inconsistent with the highly significant results obtained in several cross-sectional empirical studies that have demonstrated that there is a significant increase in the levels of global and multidimensional aspects of self-efficacy for exercise, a significant increase in the levels of perceived benefits and perceived benefits minus the costs of exercise, and

a significant decrease in the level of perceived costs of exercise between the transtheoretical model's five stages of change for exercise behavior (e.g., Gorely & Gordon, 1995; Herrick et al., 1997; Marcus & Owen, 1992; Marcus, Pinto et al., 1994; Marcus, Rakowski, & Rossi, 1992; Marcus, Selby et al., 1992; Nigg et al., 1998, 2001; Nigg & Courneya, 1998; Rossi et al., 2001; Wyse et al., 1995). The results of these previous studies support the expected patterns of the indices of self-efficacy and decisional balance for exercise across the transtheoretical model's five stages of change for exercise behavior. As reported in the Introduction section, the majority of these studies have found significant results (e.g., $p < .01$) for the reported values of F statistics of one-way ANOVA tests when comparing the five stages of change for exercise behavior on indices of self-efficacy and decisional balance for exercise. Furthermore, many of the post hoc pairwise comparisons in these studies between the five stages of change for exercise were significant ($p < .05$), and a fairly consistent finding was that most of the time Action and Maintenance stage groups were significantly different from the Precontemplation and Contemplation stage groups on most of the indices of self-efficacy and decisional balance for exercise.

The results obtained by Study 2 can more likely be explained by the limitations of its specific methodology than by the implication that the transtheoretical model comprising self-efficacy, decisional balance, and the stages of change for exercise behavior does not generalize to this specific disabled population with respect to exercise behavior. One possible explanation would suggest that some of the nonsignificant findings might have been a result of the "inapplicability" of several of the items of the multidimensional self-efficacy and decisional balance for exercise instruments for this

specific population, which had been first introduced in Study 1 and replicated in Study 2. Again, several items of the multidimensional self-efficacy for exercise instrument had substantial percentages of the sample responding with 0 (does not apply to me) responses to them, and mean replacement of these responses likely reduced the variability of the items and subsequent scales and factor scales of the self-efficacy for exercise instrument, which might have reduced the likelihood of obtaining significant differences between the three groups. However, Table 17 indicates that of the factors with relatively smaller percentages of 0 (does not apply to me) responses to them, namely Negative Affect and Excuse Making (see also Table 10), the F statistic for Negative Affect was highly nonsignificant [F (2, 141) = 0.62, p = .540], while the F statistic for Excuse Making approached significance [F (2, 141) = 2.73, p = .069], but the differences between the three groups was not consistent with the expected pattern of increasing mean values (i.e., Action/Maintenance > Precontemplation/Contemplation > Preparation). Furthermore, Table 17 also indicates that the F statistic for Resistance from Others, which comprised three items with substantial percentages of 0 (does not apply to me) responses (see also Table 10), actually approached significance [F (2, 141) = 2.61, p = .077]. Additionally, regarding the decisional balance for exercise instrument, the F statistic for the Pros scale/factor, which had been replicated and interpreted as being applicable for this population in Study 1, was highly nonsignificant [F (2, 163) = 0.45, p = .638]. Furthermore, the F statistic for the Cons scale/factor, which had not been replicated in Study 1 because it seemed to have two "inapplicable" items, approached significance [F (2, 163) = 3.22, p = .042]. Lastly, the F statistic for the DHPB questionnaire, which had been specifically developed for use with this population to measure the levels of

perceived difficulty with potential problems or barriers to participation in exercise programs, and had been hypothesized to behave similarly to the Cons scale across the stages of change, was nonsignificant as well [F (2, 138) = 1.71, p = .186]. These specific findings do not appear to support the alternative explanation that the lack of significant findings of Study 2 was due to the "inapplicability" of the items of the instruments for this specific population of Medicaid beneficiaries with longstanding mobility impairments.

However, another potential explanation of the lack of significant findings would suggest that these results might be due to a lack of statistical power, because of the relatively small sample size of Study 2 and the resulting small numbers of participants in the three groups. Those studies that did compare the five stages of change for exercise on the indices of self-efficacy and decisional balance for exercise and obtained highly significant results often did so utilizing large samples, ranging between 352 and 1172 participants, which were often composed of worksite, college student, adolescent, young adult, middle-aged adult, and elderly samples (Gorely & Gordon, 1995; Herrick et al., 1997; Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992; Marcus, Selby et al., 1992; Nigg et al., 1998, 2001; Nigg & Courneya, 1998; Rossi et al., 2001). Study 2 had a substantially smaller sample size that ranged between 141 and 166 participants for its analyses, and so the five stages of change were grouped in accordance with several earlier studies (Marcus, Pinto et al., 1994; Marcus & Simkin, 1993; Wyse et al., 1995) in order to compare the stage groups (Precontemplation/Contemplation, Preparation, and Action/Maintenance) on indices of self-efficacy and decisional balance for exercise. Marcus and Simkin (1993) had found significant differences in self-reported physical

activity and exercise levels between these three stage groups in an adult worksite sample (N = 235). Marcus, Pinto et al. (1994) found several significant demographic differences between these three stage groups in an adult all female worksite sample (N = 431). Lastly, Wyse et al. (1995) found significant differences in levels of self-efficacy and self-reported physical activity and exercise levels between these three stage groups of change in a sample of young British adults aged between 16 and 21 years (N = 244). Therefore, based on the results obtained by previous studies, the hypotheses of Study 2 that these same three groupings of the stages of change for exercise should have significantly differed from one another on the indices of self-efficacy and decisional balance for exercise appears to have been reasonable. However, the hypothesized results of Study 2 were not obtained, and so the possible explanation of inadequate or marginal statistical power will now be examined.

Based on an alpha level of .01 and a large effect size (e.g., f = .40) and three groups, 31 participants would be required per group in order to produce a power level of .81. Based on an alpha level of .01 and a medium effect size (e.g., f = .25) and three groups, 75 participants would be required per group in order to produce a power level of .80. Based on an alpha level of .01and a small effect size (e.g., f = .10) and three groups, 465 participants would be required per group in order to produce a power level of .81. Previous studies have suggested that self-efficacy for exercise tends to yield a large effect size (e.g., Nigg & Courneya, 1998; Rossi et al., 2001), while other studies have suggested that decisional balance indices might have small to medium effect sizes (e.g., Marcus, Rakowski, & Rossi, 1992; Nigg & Courneya, 1998). The sample sizes of Study 2 were the smallest of any previous studies encountered that examined differences in indices

across any combination of groupings of the five stages of change for exercise (Gorely & Gordon, 1995; Herrick et al., 1997; Marcus & Owen, 1992; Marcus, Pinto et al., 1994; Marcus, Rakowski, & Rossi, 1992; Marcus, Selby et al., 1992; Nigg et al., 1998, 2001; Nigg & Courneya, 1998; Rossi et al., 2001; Wyse et al., 1995). The numbers of participants per group in Study 2 ranged from 25 to 71 for the one-way AONVA tests conducted on the dependent variables (i.e., 12 scales of three instruments), and so these group sizes may have been insufficient and marginal at best for achieving the statistical power necessary for the analyses to possibly yield significant results, especially since an alpha level of .01 was used.

Thus, if it were the case that there was insufficient statistical power for Study 2 because of its small sample size, it should be noted that several of the scales of the self-efficacy and decisional balance for exercise instruments did in fact approach significance (See Tables 17 and 18). The findings that the Full 18-item and Short Form 6-item scales, the Resistance from Others, Weather, and Pros Minus Cons scales demonstrated the expected pattern of increasing mean values of these scales across the Precontemplation/Contemplation, Preparation, and Action/Maintenance groups, while the Cons scale also demonstrated the expected pattern of decreasing mean values across the three groups, and the fact that these mean group differences for these scales approached significance would then be important, as they would seem to support the assertions of the transtheoretical model. However, some findings would still remain that would not seem to support the assertions of the transtheoretical model, such as the finding that the Excuse Making factor scale did not demonstrate the expected pattern of increasing mean values between the three groups, as the mean value for the Preparation group was less than the

mean value for the Precontemplation/Contemplation group, and this finding approached significance as well [F (2,141) = 2.73, p = .069]. Furthermore, as noted before, the Negative Affect, Inconvenience, Exercising Alone, and Pros scales were highly nonsignificant (See Tables 17 and 18). The DHPB potential barriers scale, though not a direct index pertaining to the transtheoretical model, but one that would rationally be expected to simulate the expected pattern of the Cons scale because of the similarities of the constructs being measured by the two scales, was nonsignificant as well. Barriers to exercise instruments have been empirically shown to approximate a decreasing pattern across the stages of change for exercise, similar to the Cons for exercise, in studies with both elderly cardiac patients and young adults (Hellman, 1997; Myers & Roth, 1997). Thus, the possibility that there was marginal statistical power in Study 2 seems to be a partial but insufficient explanation for its lack of significant results.

Another plausible explanation for the lack of significant findings of Study 2 would suggest that the specific questionnaire used to categorize the participants into the five stages of change for exercise behavior in Study 2 was an inadequate and/or inaccurate measure. As stated in the Methods-Study 2 section, the specific questionnaire used in Study 2 (See Appendices I and J) was a self-report measure that was a version of the questionnaire that had been used by the Marcus and Simkin (1993) study. However, a difference between the version of the questionnaire used in Study 2 and the Marcus and Simkin (1993) study was the fact that the version used for Study 2 did not operationalize the term "exercise regularly" with specific criteria within the items assessing the Preparation, Action, and Maintenance stages, such as defining "regular exercise = three or more times per week for 20 minutes or longer" as Marcus and Simkin (1993) had

done, or using the newer USCDCP and ACSM guidelines (ACSM, 1990; Pate et al., 1995). This had been done in order to make the questionnaire more readable and less complex for the specific population of Medicaid beneficiaries with longstanding mobility impairments examined in the grant-funded study and Study 2.

However, because the questionnaire was a self-report measure and the term "exercise regularly" was not operationalized with any specific criteria, in retrospect there would likely be considerable variability in what participants might subjectively interpret and self-report as exercising "regularly." This lack of operationalization likely caused considerable inconsistency across and heterogeneity within the Preparation, Action, and Maintenance stages as measured by this questionnaire. For example, one participant who exercises three days a week for at least 30 minutes might not perceive this frequency and duration as exercising "regularly" because he or she subjectively interprets exercising "regularly" to be something that is performed everyday, and would be incorrectly classified as being in Preparation when Action is the correct stage for this participant. Another participant who has exercised only every Friday for 10 minutes for the past 8 months might perceive this as exercising "regularly" because he or she subjectively interprets exercising "regularly" as meaning consistently regardless of duration or frequency, and would incorrectly be classified as being in Maintenance when Preparation in the correct stage. This lack of operationalization would likely result in an overrepresentation of this sample in the Action and Maintenance stages and a possible underrepresentation in the Precontemplation, Contemplation, and Preparation stages in Study 2, which would likely reduce the size and significance of any real differences between the three groupings of the stages of change.

As first alluded to in the Results-Study 2 section, this speculation appears to have been the case, as the results presented in Table 16 indicate that approximately 35-40% of the sample was classified as being in the Action and Maintenance stages, while previous estimates based on epidemiological studies with larger samples suggest that only 15-40% of the general adult population in the U.S. currently meets the USCDCP and ACSM guidelines (ACSM, 1990; Pate et al., 1995) for regular physical activity and exercise (Marcus, Forsyth et al., 2000; Pate et al., 1995; USDHHS, 1996, 2000). Again, 35-40% seems quite high for a disabled population, which has been reported to be more sedentary than the non-disabled or "walking well" general population in the U.S., because approximately 27.2% of individuals with disabilities and chronic illnesses have reported participating in regular moderate physical activity, while only 9.6% have reported participating in regular vigorous activity (Marcus, Forsyth et al., 2000; USDHHS, 1996). These statistics were some reasons for proposing and carrying out the aforementioned Grant-Funded Study of The Montana University Affiliated Rural Institute on Disabilities. Furthermore, Table 16 also indicates that only approximately 18% of the sample was classified as being in the Preparation stage, which seems particularly low, in addition to relatively low percentages of the Precontemplation and Contemplation stages.

The epidemiological estimates seem to be a better standard of comparison for levels of physical activity and exercise in the U.S. population than the empirical findings of previous studies of the transtheoretical model and its relationship to exercise behavior, because there has been considerable variability concerning the distribution of individuals across the five stages of change for exercise behavior (e.g., Marcus & Owen, 1992; Marcus, Pinto et al., 1994; Marcus, Rossi et al., 1992; Marcus, Selby et al., 1992; Marcus

& Simkin, 1993). Such variability seems to be a result of the inconsistent use of many different questionnaires to measure the stages of change for exercise behavior, as well as different criteria for defining regular exercise in this empirical literature (Reed et al., 1997). Specific illustrative examples of this literature will be presented because they seem to support the contention that the sample of disabled individuals of Study 2 was overrepresented in the Action and Maintenance stages and underrepresented in the Precontemplation, Contemplation, and Preparation stages.

Marcus and Simkin (1993), who used the version of the questionnaire that had been adapted for Study 2, reported in their study with a worksite sample that the percentages of participants in the Precontemplation, Contemplation, Preparation, Action, and Maintenance stages were 22.4%, 28.3%, 17.8%, 8.7%, and 22.8%, respectively. Comparing these values with those presented in Table 16 indicates that there were considerably fewer participants classified in Study 2 as being in the Precontemplation stage, slightly fewer in the Contemplation stage, approximately the same number in the Preparation and Action stages, and considerably more participants in the Maintenance stage. Additional studies using different stages of change questionnaires reported different percentages for the Precontemplation, Contemplation, Preparation, Action, and Maintenance stages. More specifically, Marcus, Selby et al. (1992) reported 7.3%, 23.1%, 30.4%, 16.6%, and 22.6%, respectively, for their worksite sample. Marcus, Rossi et al. (1992) reported 24.4%, 33.4%, 9.5%, 10.6%, and 22%, respectively, for their worksite sample. Marcus, Pinto et al. (1994) reported 8.2%, 30.4%, 33.9%, 12.4%, and 15.1%, respectively, in their all female worksite sample. Finally, Marcus and Owen (1992) reported 8.0%, 30.8%, 28.8%, 13.2%, and 19.2%, respectively, for their U.S.

worksite sample, and 7.2%, 35.9%, 25.4%, 6.8%, and 24.7%, respectively, for their Australian worksite sample. These different questionnaires and different studies have not produced any salient consistencies concerning the prevalence, proportion, or percentages of individuals across these five stages of change, but have consistently produced robust findings concerning the relationship between the stages of change and the indices of self-efficacy and decisional balance for exercise. Even though the percentages for the studies reported above resulted from different questionnaires to measure the stages of change and some appear to be comparable to those percentages reported for Study 2, it must be reiterated that all of the studies reported above used operationalized criteria for defining regular exercise, such as the USCDCP and ACSM guidelines (ACSM, 1990; Pate et al., 1995), as well as non-disabled samples, and all of the studies obtained significant results. These differences seem to place the percentages of Study 2 in context and support the contention that the Action and Maintenance stages were overrepresented, and that at a minimum, the Preparation stage was underrepresented, along with the possibilities that the Precontemplation and Contemplation stages were underrepresented as well.

Clearly stated, operationalizing the term "exercising regularly" in the stages of change for exercise questionnaire used in Study 2 would have likely resulted in a more accurate distribution of the sample, with fewer participants being classified in the Action and Maintenance stages, more being classified in the Preparation stage, and possibly more being classified in the Precontemplation and Contemplation stages. This distribution would have created more accurate and homogenous groups, which would have increased the likelihood that significant differences between the three groups of Study 2 on the indices of self-efficacy for exercise, decisional balance for exercise, and

potential barriers for participation in exercise programs would have been obtained. Along similar lines of thought, the methodological limitations regarding the marginal statistical power coupled with the inadequacies of the stages of change for exercise questionnaire seem to be a better explanation of the lack of significant results obtained for Study 2, as opposed to the interpretation that the transtheoretical model does not seem to generalize to a population of Medicaid beneficiaries with longstanding mobility impairments with respect to exercise behavior. Further implications for future research are presented and discussed in the General Discussion section.

Discussion-Study 3

The purposes of Study 3 were to examine whether recruitment strategies moderate the effects of global self-efficacy for exercise, as measured by the Short Form 6-item scale, and decisional balance for exercise, as measured by the Pros Minus Cons scale, in predicting exercise program recruitment outcomes. Overall, the results of Study 3 did not support the majority of its specific hypotheses. Regarding the first hypothesis, the results indicated a significant main effect for decisional balance for exercise in predicting exercise program recruitment outcomes, but did not indicate significant main effects for recruitment strategies or global self-efficacy for exercise in predicting exercise program recruitment outcomes, although the main effect of the recruitment strategies predictor variable approached significance ($p = .08$). Therefore, the first hypothesis of Study 3 was only partially supported. Overall, the main effects model was not very accurate in predicting successful recruitment outcomes (i.e., being "recruited"), as it had much higher negative predictive power and specificity than positive predictive power and sensitivity, and this was likely a reflection of the overall low probability of being

"recruited" as opposed to being "not recruited" (28 out of 164 participants, or approximately 17.1%, were "recruited").

Additionally, as the findings regarding the main effects model would likely portend, there were no significant interactions between recruitment strategies and global self-efficacy for exercise or between recruitment strategies and decisional balance for exercise. The lack of significant interactions between these predictor variables did not support the second and third hypotheses, and so recruitment strategies did not appear to moderate the effects of global self-efficacy and decisional balance for exercise on predictions of exercise program recruitment outcomes. Thus, the proactive recruitment strategy utilizing motivational interviewing techniques did not appear to have a stronger effect on recruiting individuals with lower levels of global self-efficacy and decisional balance for exercise into exercise programs than the reactive recruitment strategy utilizing the direct mailings of newsletters had for this specific sample. Since the lack of significant findings regarding the interactions directly follows from the findings regarding the main effects model, the majority of the Discussion-Study 3 section will focus on the interpretation, explanation, and limitations of the findings of the main effects model for Study 3.

The findings of the main effects model suggest that only decisional balance for exercise had an effect in predicting whether individuals with longstanding mobility impairments were "recruited" or "not recruited" into exercise programs, and that the different recruitment strategies and global self-efficacy for exercise did not have an effect in predicting these recruitment outcomes. Regarding the effect of decisional balance for exercise, as measured by the Pros Minus Cons scale, the finding indicated that, as

expected, the odds of being "recruited" into an exercise program increased significantly as scores increased on the Pros Minus Cons scale, which signified that the difference between the perceived benefits (Pros) and costs (Cons) of exercise of a participant predicted whether the participant would be "recruited" into an exercise program by attending the requisite intake interview. As the Pros progressively outweighed the Cons of exercise for participants, it increased the likelihood that participants would attend the intake interview and participate in the exercise programs, and so participants with higher levels of decisional balance were more likely to be "recruited" than participants with lower levels of decisional balance.

This specific finding of Study 3 is important because it seems to be an extension of previous research regarding the transtheoretical model with respect to exercise behavior in a number of ways. Firstly, previous studies had only found that indices of decisional balance for exercise were associated with and predictive of levels of both self-reported and objectively measured physical activity and exercise, and more specifically, had found that increasing scores on the Pros Minus Cons scale were associated with increasing levels of such physical activity and exercise (Gorely & Gordon, 1995; Herrick et al., 1997; Marcus, Eaton, et al., 1994; Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992; Nigg & Courneya, 1998; Nigg et al., 1998, 2001). Secondly, it should be noted that this new finding occurred within a sample of individuals with longstanding mobility impairments, a population that has been described as being vulnerable to an underactive or sedentary lifestyle (USCDCP, 1994a, 1994b; USDHHS, 1996, 2000; Marcus et al., 2000), as well as a population in which empirical research regarding the transtheoretical model with respect to exercise behavior had not yet been examined.

Therefore, this specific finding provides some support for the generalizability of the transtheoretical model with respect to exercise behavior, and specifically the construct of decisional balance for exercise, to a population of individuals with longstanding mobility impairments. Increasing the perceived benefits (Pros) of exercise in relation to the perceived costs (Cons) of exercise for this population seems to increase the likelihood that these individuals will participate in a formal exercise program, which may lead to more positive health benefits and reduce long-term health care costs, both of which are outcomes that the longitudinal grant-funded study will be examining in the near future.

Regarding the effects of global self-efficacy for exercise, as measured by the Short Form 6-item scale, the finding was unexpected because it was nonsignificant, as well as in the opposite direction of what might be expected from the relationship between global self-efficacy for exercise and recruitment outcomes. It was expected that increasing scores of global self-efficacy would be predictive of being "recruited" because previous empirical literature had found a direct relationship between increasing levels of global self-efficacy and increasing levels of self-reported and objectively measured physical activity and exercise (Benisovich, Rossi, Norman, & Nigg, 1998a, 1998b, 1998c; Gorely & Gordon, 1995; Herrick et al., 1997; Marcus, Eaton, et al., 1994; Marcus & Owen, 1992; Marcus, Selby, et al., 1992; Nigg & Courneya, 1998; Rossi et al., 2001; Wyse et al., 1995). However, the findings of Study 3 indicated that the odds of being "not recruited" into an exercise program increased, though not significantly, as scores on the global Short Form 6-item self-efficacy for exercise scale increased.

Additionally, regarding the effects of the recruitment strategies, there was only a trend in the predicted direction for the proactive recruitment strategy to predict

membership in the "recruited" target group as opposed to the "not recruited" group. This trend might be clarified by looking more closely at the 28 of the 164 participants examined in Study 3 who were "recruited" into exercise programs of the New Directions facility for the grant-funded study, which appears to be a low recruitment rate of 17.1% across both recruitment strategies. Table 20 indicates that of the 28 participants who were recruited, 10 had come from the reactive recruitment strategy, a recruitment rate of 12.2%, while 18 had come from the proactive recruitment strategy, a recruitment rate of 22.0%. The latter finding seems somewhat unexpectedly low and disappointing, given the support of research suggesting that proactive recruitment strategies and motivational interviewing techniques are more effective at recruiting participants for positive health behavior changes in the general "walking well" population (Miller & Rollnick, 1991; Prochaska & Marcus, 1994; Walitzer et al., 1999). For example, Prochaska and Marcus (1994) reported the results of a study that yielded a recruitment rate of 75-80% when using proactive strategies to recruit smokers into matched self-help smoking cessation programs, which is substantially larger than the 22% obtained for recruitment into exercise programs for this sample.

There are several potential explanations for the findings regarding the nonsignificant effects of the predictor variables of recruitment strategies and global self-efficacy for exercise, and those that seem most plausible will now be presented and discussed. A potential explanation for the nonsignificant effect of recruitment strategies in Study 3 might be due to the limitations of the methodology and procedures regarding the specific motivational interviewing techniques employed for the proactive recruitment strategy in Study 3, as well as the limitations of the specific sample of Medicaid

beneficiaries with longstanding mobility impairments examined in Study 3. Proactive recruitment strategies utilizing motivational interviewing techniques might not be as effective for the specific behavior of exercise adoption as they appear to be for smoking cessation or substance abuse, even in the general "walking well" population, according to a recent review by Dunn, Deroo, and Rivara (2001). These authors concluded that there was considerable evidence that brief interventions adapted from motivational interviewing and targeting substance abuse were effective overall, but that there was inadequate data regarding the effectiveness of similar interventions targeting other behavioral domains of smoking cessation, HIV risk, and diet/exercise. However, regarding the studies that were reviewed concerning motivational interviewing and exercise, those that did increase exercise levels consisted of six 40-minute sessions of motivational interviewing, as opposed to one session. This finding suggests that the motivational interviewing techniques employed for the purposes of Study 3 and the grant-funded study, which consisted of having up to three telephone contacts and one in-person meeting, might have been insufficient to produce a significant effect in recruiting participants drawn from a "walking well" sample into the exercise programs, and it seems reasonable to expect that underactive or sedentary participants drawn from a population of Medicaid beneficiaries with longstanding mobility impairments population might require more motivational interviewing phone contacts or sessions than participants drawn from the general "walking well" population to be "recruited" into exercise programs. Therefore, more overall time spent engaging in motivational interviewing techniques with each participant might have been required in order to more effectively recruit participants from this specific sample into exercise programs.

However, a related but rival explanation for the finding regarding the nonsignificant effect of recruitment strategies could be that the motivational interviewing techniques were conducted improperly, in terms of reliability, adherence, or competence, rather than being insufficient via an inadequate number of phone contacts or amount of phone contact time. However, this explanation does not seem plausible because of the following: 1) there was only one staff member who carried out the motivational interviewing with these participants; 2) this staff member was trained by watching several videotapes that demonstrated motivational interviewing techniques, in addition to receiving direct instruction from an extensively-trained expert in motivational interviewing; 3) this staff member followed an explicit, written protocol for each motivational interviewing contact with participants, and this protocol had been approved by the expert, and 4) this staff member was supervised regularly by the primary investigator of the grant-funded study, and occasionally by the motivational interviewing expert. Therefore, the motivational interviewing techniques of Study 3 appear to have been conducted properly, in terms of reliability, adherence, and competence.

Additionally, the trend of the recruitment strategy might appear to have a stronger and possibly significant effect when placed in the context of some additional information. As stated at the end of the Methods-Study 3 section, there were several participants who were assigned to the proactive recruitment strategy who were not contacted by telephone by the trained staff member to initiate the motivational interviewing techniques because of common logistical difficulties of carrying out a longitudinal effectiveness study. Once again, regarding those 107 participants assigned to receive the proactive recruitment strategy for the grant-funded study: 56 had been contacted by phone for five minutes or

more, 37 had not been contacted because they had either moved, disconnected their phones, or provided wrong numbers, and an additional 14 had never been reached after at least three attempts by the trained staff member. Thus, the recruitment rate for the proactive recruitment strategy utilizing motivational interviewing techniques was higher when only considering the number of participants who were actually contacted by phone and engaged in motivational interviewing with the trained staff member (e.g., 32.1% with 56 participants who were contacted versus 22.0% with 82 participants who had been attempted to be contacted), suggesting that it might be more efficacious at recruiting participants from this sample into exercise programs. However, it was not necessarily more efficacious then the reactive recruitment strategy utilizing direct mailings of newsletters, because specific numbers were not available regarding those participants who were assigned to receive the reactive recruitment strategy but did not actually receive their newsletters. Therefore, it was not known if the subsequent recruitment rate for the reactive recruitment strategy would have increased commensurate with the increased rate for the proactive recruitment strategy. If this recruitment rate increased proportionately with that of the proactive recruitment strategy as well, it would likely result in the observed finding that the two recruitment strategies did not significantly predict recruitment outcomes, and similar conclusions would likely be drawn.

Thus, it appears plausible that the extent of the motivational interviewing techniques used for the proactive recruitment strategy might have been insufficient to produce a significant effect in recruiting participants from this disabled population into exercise programs. However, the finding that the effect of the recruitment strategies actually approached significance in the logistic regression analyses with the total sample

size of 164 is encouraging. This trend suggests that if more participants assigned to the proactive recruitment strategy were actually contacted in order to engage in motivational interviewing techniques, and the number of phone contacts or amount of time per phone contact with each participant assigned to this strategy were increased slightly, then this proactive recruitment strategy might have produced a significant effect in recruiting participants with longstanding mobility impairments into exercise programs.

The finding regarding the nonsignificant, opposite-than-expected directional effect of global self-efficacy for exercise in Study 3 appears to be more difficult to interpret or explain than the finding regarding recruitment strategies. Additionally, in contrast to the significant finding regarding decisional balance for exercise, this particular finding does not seem to extend previous research regarding the transtheoretical model with respect to exercise behavior, nor does it add support for the generalizability of the model with this specific sample of individuals with longstanding mobility impairments. Therefore, one potential explanation of this nonsignificant finding could be a straightforward interpretation that higher levels of global self-efficacy for exercise might be exclusively associated with or predictive of higher levels of self-reported and objectively-measured physical activity and exercise, which had been obtained by several previous studies (Benisovich, Rossi, Norman, & Nigg, 1998a, 1998b, 1998c; Gorely & Gordon, 1995; Herrick et al., 1997; Marcus, Eaton, et al., 1994; Marcus & Owen, 1992; Marcus, Selby, et al., 1992; Nigg & Courneya, 1998; Rossi et al., 2001; Wyse et al., 1995), but that they do not significantly predict exercise program recruitment outcomes per se for this specific sample. However, Marcus, Eaton, et al. (1994) found that both self-efficacy and decisional balance for exercise were significant predictors of levels of

physical activity, and more specifically, that self-efficacy for exercise was found to have a stronger effect than decisional balance for exercise. Additionally, decisional balance was found to be a significant predictor of recruitment outcomes in Study 3, and so these findings suggest that self-efficacy for exercise probably should have significantly predicted exercise recruitment outcomes for this sample.

Therefore, another potential explanation could be that the Short Form 6-item self-efficacy for exercise scale might not have been as sensitive as the Pros Minus Cons scale for this specific sample, as evidenced by the measurement issue discussed in Studies 1 and 2 regarding the degree of "inapplicable" items and 0 (does not apply to me) responses of the multidimensional self-efficacy for exercise scale for this specific sample, along with their subsequent replacement with the item means. However, as discussed in Study 1, the Short Form 6-item global self-efficacy for exercise scale used for Study 3 contained the items from the Resistance from Others and Inconvenience factors with the lowest percentages of such 0 (does not apply to me) responses (i.e., "access" and "family/friends") and the measurement model of this scale had been confirmed in Study 1. Although Study 1 found two items that seemed to be "inapplicable" on the decisional balance for exercise instrument for this specific sample, this instrument had 10 items from which the Pros Minus Cons scale was calculated, and so these two items represent 1/5 of the total number of items of this scale, while the two "inapplicable" items of the Short Form 6-item scale represent 1/3 of the total number of items of the scale itself. These findings suggest that the Short Form 6-item global self-efficacy for exercise scale might be more "applicable" than the Full 18-item scale for this sample, but not necessarily more so than the Pros Minus Cons scale. Furthermore, it seems to have had a

restricted range of variability due to the item mean replacement and the fact that it only has six items, and its overall mean value seems to be substantially lower for this specific sample than for a general "walking well" sample of college students (Benisovich et al., 1998a, 1998b, 1998c; Rossi et al., 2001). All of these findings seem to support that there might have been somewhat of a floor effect that might have resulted in the observed finding that the Short Form 6-item global self-efficacy for exercise scale did not predict recruitment outcomes for this specific sample. Therefore, the Short Form 6-item scale might not have been sensitive enough to predict exercise recruitment outcomes for this specific sample.

Lastly, it should be acknowledged that the results of Study 3 could have been influenced to some degree by the unique historical context during which it was conducted. More specifically, the results could have been influenced by the national fallout of the tragic terrorist attacks of September 11, 2001 and the anthrax scare involving the U.S. Postal Service in the fall of 2001. Since much of the data was collected after September 11, 2001, these events could have reduced the overall likelihood that participants of this disabled sample would be successfully "recruited" into the exercise programs of New Directions and thus might explain the low recruitment rates of both recruitment strategies. Unfortunately, there was no way to confirm or disconfirm this potential explanation for Study 3's results, but future studies lacking such historical influences might in fact obtain different results.

Therefore, in summary, the lack of a significant effect for recruitment strategies to predict exercise recruitment outcomes in Study 3 was likely due to the limitations of the motivational interviewing techniques employed with this specific sample of Medicaid

beneficiaries with longstanding mobility impairments for the purposes of the grant-funded study. Furthermore, the lack of a significant effect for global self-efficacy for exercise might have been due to the insensitivity of the Short Form 6-item self-efficacy for exercise scale for this specific sample. Additionally, it should be noted that the results of Study 3 could be potentially influenced by its idiosyncratic historical context involving the terrorist attacks of September 11, 2001 and the anthrax scare. Further implications for future research are presented and discussed below in the General Discussion section.

General Discussion

The overarching purpose of these three studies of the dissertation project was to examine the extent to which the transtheoretical model comprising the constructs of the stages of change, self-efficacy, and decisional balance, as well as their respective measurement instruments, would be replicated and seem useful for the promotion of exercise behavior in a sample of Medicaid beneficiaries with longstanding mobility impairments. Although the majority of the specific hypotheses of the three studies were not supported, general interpretations and implications for future research regarding these issues seem to be clear.

One of the clear implications of this dissertation project is that the instruments currently being used to measure the constructs of multidimensional and global self-efficacy and decisional balance for exercise need to be changed and improved upon in order to measure these constructs adequately within physically disabled populations. Future research needs to be undertaken to develop such instruments for the physically disabled before researchers can accurately examine the generalizability and utility of the

transtheoretical model for exercise behavior within physically disabled populations. Another implication is that future research needs to be more systematic in the way it measures the five stages of change for exercise behavior, in the general population as well as in physically disabled populations, before it can adequately address the utility of the transtheoretical model for understanding exercise behavior within physically disabled populations. The results of Study 2 indicate that, at a minimum, specific criteria operationalizing "regular exercise" should be used on any questionnaire measuring the five stages of change for exercise behavior. Furthermore, another implication is that future research should examine if proactive recruitment strategies utilizing motivational interviewing techniques might be more effective in recruiting participants with longstanding mobility impairments into exercise programs when the number of phone contacts or amount of time per phone contact with each participant is increased, and if so, then how much more effective they are.

Some specific recommendations and suggestions for future research would be for the 18-item multidimensional self-efficacy and 10-item decisional balance for exercise instruments to delete those items and factors from them that are "inapplicable" for this population, and possibly add other items that would rationally appear to be "applicable" for this specific population. For example, for the self-efficacy instrument, this would entail deleting the items of the Interpersonal Situations and Inconvenience factors that were extracted from the PCA of Study 1, and adding potentially new "applicable" situations. Likewise, for the decisional balance instrument, the two items of the Cons-Interpersonal factor extracted from the PCA of the 10-item decisional balance for exercise could be removed and replaced with additional Con items that would rationally

be "applicable" for this population. Potential "applicable" items for both instruments might come from the items of the DHPB questionnaire, which had been developed specifically for this population, and it might just be a matter of rewording these items to be in accordance with the respective constructs of self-efficacy and decisional balance for exercise. After the rational formulation of such "applicable" items, future research should attempt to validate them empirically by conducting PCA and CFA of the potential self-efficacy and decisional balance for exercise instruments within several samples of disabled individuals. This process would likely yield multidimensional and global self-efficacy for exercise and decisional balance for exercise instruments that are sensitive and specific for a disabled population.

Also, the possibility of external factors not contained within the transtheoretical model that might influence exercise behavior in disabled populations should be examined by future research as well. Such research should examine factors that are more external and tend to fall outside the realm of the subjective perception or control of disabled individuals, as opposed to the intra-psychic constructs of self-efficacy and decisional balance encompassed within the transtheoretical model. Examples of such factors might be medical conditions or factors that contribute to their disabilities, such as presence of migraine headaches, pain, decreased energy level, or exacerbations of multiple sclerosis, or other factors such as transportation availability, education level, socioeconomic status, or income level. Even while still conceding the measurement problems of the self-efficacy and decisional balance for exercise instruments with this population of disabled individuals brought to light in Study 1, these external factors could feasibly have had an effect upon the constructs of self-efficacy and decisional balance and subsequently

accounted for greater amounts of variance in the stages of change groupings of Study 2 and exercise program recruitment outcomes of Study 3 than these two intra-psychic constructs. In short, such external factors may be contributing more to disabled individuals' exercise behavior than the intra-psychic constructs of self-efficacy and decisional balance, and future studies addressing possible external factors should be undertaken as well in order to adequately and exhaustively examine the generalizability of the transtheoretical model with respect to exercise behavior in disabled populations.

In order to elaborate upon the implication that future research needs to be more systematic in the way it measures the five stages of change for exercise behavior, not just for physically disabled populations but for the general population as well, the findings and recommendations of Reed et al. (1997) will be briefly summarized. The reader is directed to the original article for a more comprehensive review. As noted in the Methods-Study 2 section above, these authors examined the issue regarding the various questionnaires with different formats that were used to measure the stages of change for exercise behavior within the numerous different studies. They emphasized the importance of accurately classifying individuals into their proper stages for exercise behavior in order to adequately operationalize the transtheoretical model with respect to exercise behavior and produce accurate stage-matched interventions.

Reed et al. (1997) prescribed four specific "Lessons" representing the necessary criteria that a stage of change questionnaire needs to address in order to achieve accurate stage classification for exercise behavior. Lesson One: Selecting a Discrete Behavior refers to explicitly defining a discrete behavior. For example, the three broad categories of exercise behavior in past empirical studies have been vigorous, lifestyle, and moderate

exercise. Lesson Two: Selecting a Criterion refers to explicitly defining the frequency, duration per interval, and intensity of exercise, such as using the USCDCP and ACSM guidelines (ACSM, 1990; Pate et al., 1995). Lesson Three: Implementing Criterion for Self-assessment refers to specifying a criterion that is optimally answered with minimal effort and difficulty by the majority of the respondents of the population being examined. For example, it is easier for individuals to answer items asking them to recall the frequency and duration of vigorous exercise behaviors, but it can be more difficult to ask them to recall more frequent but shorter intervals of moderate exercise behaviors. It is also fairly difficult for most respondents to specify the intensity of the exercise behavior because they are often measured by highly specific indicators such as VO_2 max and kilocalories expended per interval, which are not convenient for most respondents. However, the intensity criterion has usually been achieved by listing several examples which meet the criterion and several that do not, such as brisk walking and gardening being examples of moderate activity, and jogging and cycling being examples of vigorous exercise. Lesson Four: Selecting the Best Format refers to the actual structure of the algorithm to measure the stages, either with multiple questions or single items for the stages. Past studies have utilized True/False, 5-point Likert scale, and 5-Choice scale item formats to measure the stages of change for exercise behavior.

Reed et al. (1997) critically examined the eight different questionnaires that were used to measure the five stages of change for exercise behavior in the past empirical literature, and their findings will be recounted here. These researchers found that questionnaires that used longer and more complete definitions of regular exercise yielded higher proportions in the earlier stages (Precontemplation and Contemplation) than

instruments that used shorter definitions. Definitions that utilized the more recent USCDCP and ACSM joint guidelines (Pate et al., 1995) of regular exercise (i.e., at least 30 minutes of moderate physical activity (e.g., brisk walking, gardening) on most, preferably all, days of the week) classified a higher proportion of samples in the Maintenance stage than definitions exclusively utilizing the older ACSM (1990) guidelines specifying vigorous exercise (i.e., at least 20 minutes of exercise three times a week). These researchers also found that the Preparation stage was the most inconsistently described stage across the different measurements of the numerous studies, while the Maintenance stage was the most consistently described stage. Questionnaires utilizing the True/False and 5-Choice formats appeared to be comparable when they both explicated a long definition of regular exercise, as they tended to have high concordance rates for stage classification. The questionnaire explicating regular exercise in a long definition utilizing vigorous exercise criteria within a 5-Choice format was found to be the best at matching the previous patterns of the Pros for exercise increasing, the Cons for exercise decreasing, and the levels of self-reported exercise increasing across the stages of change found in previous studies. Lastly, this same questionnaire and another one that explicated regular exercise in a long definition utilizing vigorous exercise criteria within a True/False format demonstrated comparable effect sizes for the Pros and Cons for exercise, self-efficacy for exercise, and levels of self-reported exercise. More specifically, large effect sizes were found for the Pros for exercise and self-efficacy for exercise, while medium effect sizes were found for the Cons for exercise and levels of self-reported exercise.

In summary, Reed et al. (1997) recommended that the questionnaire explicating regular exercise in a long definition utilizing vigorous exercise criteria within a 5-Choice format was the most reliable and valid measure of the eight alternative questionnaires measuring the five stages of change for vigorous exercise behavior. This is precisely the same questionnaire that is now posted on the website of the Cancer Prevention Research Center (CPRC), which is the major organization involved in coordinating research with the transtheoretical model and its relationship to various behaviors. The posting of this questionnaire on the CPRC website seems to be a direct endorsement of it's being the questionnaire of choice for the purpose of measuring the five stages of change for exercise. See Appendix N for this questionnaire. This questionnaire seems to be the best for a general population based on empirical studies utilizing worksite, college student, adolescent, young adult, middle-aged adult, and elderly adult samples, but the question remains as to whether or not this questionnaire should be utilized for examining the transtheoretical model within a disabled population. One limitation might be that the vigorous criteria for regular exercise espoused by the ACSM (1990) may be too stringent and possibly even unattainable for disabled populations, in which case the less stringent moderate criteria for regular exercise and physical activity espoused by the USCDCP and ACSM joint guidelines (Pate et al., 1995) might be more appropriate. It is worth repeating that, at a minimum and according to the four Lessons espoused by Reed et al. (1997), specific criteria that describe and operationalize the discrete behavior, e.g. moderate exercise, as well as specific examples of them, should be explicated in the questionnaire. Additionally, whatever specific criteria is chosen, it seems as if the 5-Choice format should be used for any population, disabled or non-disabled, based on the

recommendations of Reed et al. (1997) and its face validity of being easy to understand and answer.

An implication from Study 3 is that future research needs to be conducted in order to clarify whether or not proactive recruitment strategies utilizing motivational interviewing techniques are either more efficacious or effective than reactive recruitment strategies for recruiting participants with longstanding mobility impairments into exercise programs. In light of the results of the few studies reviewed by Dunn, Deroo, and Rivara (2001) that examined the efficacy of motivational interviewing techniques to increase levels of exercise, the motivational interviewing techniques employed in Study 3 appear to have been slightly insufficient in intensity or dosage, although the finding that the effect of the recruitment strategies actually approached significance is encouraging. Increasing the amount of time engaging in motivational interviewing techniques with each participant is likely to produce a significant positive effect in recruiting participants with longstanding mobility impairments into exercise programs. Additional support for this contention comes from the significant finding regarding decisional balance for exercise predicting exercise program recruitment outcomes for this sample. Motivational interviewing techniques explicitly call for the examination of the individual's decisional balance in order to address ambivalence about changing his or her behavior (Miller & Rollnick, 1991), and so increasing the amount of time engaging in these techniques might be more adequate to increase the difference between the perceived benefits (Pros) and costs (Cons) of exercise for each specific individual, which would likely lead to higher exercise program recruitment rates for this proactive recruitment strategy.

However, the specific degree of any increase that would be necessary to produce a significant effect for this specific population appears to be an empirical question that is capable of being examined and answered only by future research. Such an increase could be accomplished in several ways, such as by increasing the number of contacts or amount of time per contact with each participant. Additionally, procedures that would facilitate and improve the longitudinal follow-up and tracking of participants and their necessary contact information so that they actually are contacted would likely increase the effect of the proactive recruitment strategy utilizing motivational interviewing in predicting exercise recruitment outcomes. However, specific suggestions and recommendations of how to go about this do not seem straightforward or apparent at this point in time. Lastly, the degree of any chosen increase in the amount of time spent engaging in motivational interviewing techniques, as well as the implementation of any new specific procedure designed to improve the tracking of participants longitudinally, are likely to be influenced by whether the purposes of potential studies are efficacy studies or effectiveness studies that would be limited by an applied, real-world setting.

Future research that adheres to the suggestions and recommendations concerning the questionnaires of the stages of change, multidimensional self-efficacy, and decisional balance for exercise, in addition to examining the possible influences of external factors relevant to disabled individuals, will likely examine accurately and appropriately the transtheoretical model with respect to exercise in disabled populations. Furthermore, studies that adhere to both the suggestions and recommendations concerning the questionnaires of self-efficacy and decisional balance for exercise and those concerning the proactive recruitment strategies utilizing motivational interviewing techniques will

likely be able to examine adequately the notion that recruitment strategies might be more effective or might moderate these constructs of the transtheoretical model in predicting either exercise program recruitment outcomes or levels of exercise.

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Demographic Information

In order to better understand the health care needs of people with disabilities, we need to find out specific information about you.

Personal

Date of Birth: _____

Sex: ____ Male
____ Female

County of Residence: _____

Years of Education (including 1st grade and beyond): _____

Marital Status: ____ Single
____ Married
____ Separated

Race

____ White
____ Black or African American
____ American Indian or Alaska Native
____ Native Hawaiian of Other Pacific Islander
____ Asian

Ethnicity

____ Hispanic or Latino
____ Not Hispanic or Latino

Employment Status (check ✔all that apply)

____ Not Currently Employed
____ Retired
____ Volunteer
____ Employed Part-Time
____ Homemaker
____ Employed Full-Time
____ Student

Health Care Coverage (check ✔all that apply)

____ Medicaid
____ VA, CHAMPUS, CHAMP-VA
____ Private Health Insurance
____ Medicare
____ Indian Health Service
____ No Health Insurance

DEMOGRAPHIC INFORMATION

In order to better understand the health care needs of people in our research, we need to find out specific information about you.

PERSONAL

Date of Birth: _____
(month/day/year)

Sex: _____ Male
_____ Female

County of Residence: _____

Years of Education (including 1st grade and beyond): _____

Marital Status: _____ Single
_____ Married
_____ Separated

RACE

_____ White
_____ Black or African American
_____ American Indian or Alaska Native
_____ Native Hawaiian of Other Pacific Islander
_____ Asian

ETHNICITY

_____ Hispanic or Latino
_____ Not Hispanic or Latino

EMPLOYMENT STATUS (check ✔all that apply)

_____ Not Currently Employed
_____ Retired
_____ Volunteer
_____ Employed Part-Time
_____ Homemaker
_____ Employed Full-Time
_____ Student

EXERCISE

This section looks at how confident you are that you'll participate in exercise when other things get in the way. Read the following items and circle the number that best expresses how each item relates to you in your leisure time. If you feel the item does not apply to you, please circle "0" on the line provided. Please answer using the following 5-point scale:

0 = Does not apply to me
1 = Not at all confident
2 = Somewhat confident
3 = Moderately confident
4 = Very confident
5 = Completely confident

(circle one number on each line)

I am confident I can participate in regular exercise when...	Does not apply to me	Not at all confident	Somewhat confident	Moderately confident	Very confident	Completely confident
1. I am under a lot of stress.	0	1	2	3	4	5
2. I am depressed.	0	1	2	3	4	5
3. I am anxious.	0	1	2	3	4	5
4. I feel I don't have the time.	0	1	2	3	4	5
5. I don't feel like it.	0	1	2	3	4	5
6. I am busy.	0	1	2	3	4	5
7. I am alone.	0	1	2	3	4	5
8. I have to exercise alone.	0	1	2	3	4	5

I am confident I can participate in regular exercise when...	Does not apply to me	Not at all confident	Somewhat confident	Moderately confident	Very confident	Completely confident
9. My exercise partner decides not to exercise that day.	0	1	2	3	4	5
10. I don't have access to exercise equipment.	0	1	2	3	4	5
11. I am traveling.	0	1	2	3	4	5
12. My gym is closed.	0	1	2	3	4	5
13. My friends don't want me to exercise	0	1	2	3	4	5
14. My significant other does not want me to exercise.	0	1	2	3	4	5
15. I am spending time with friends or family who do not exercise.	0	1	2	3	4	5
16. It's raining or snowing.	0	1	2	3	4	5
17. It's cold outside.	0	1	2	3	4	5
18. The road or sidewalks are snowy.	0	1	2	3	4	5

This section look at positive and negative aspects of exercise. Read the following items and indicate how important each statement is with respect to your decision to exercise or not to exercise in your leisure time. Please circle the number that corresponds to the following 5-point scale.

1 = Not important
2 = A little bit important
3 = Somewhat important
4 = Quite important
5 = Extremely important

If you disagree with a statement and are unsure how to answer, the statement is probably "not important" to you.

How important are the following opinions in your decision to exercise or not to exercise?

(circle one number on each line)

	Not important	A little bit important	Somewhat important	Quite important	Extremely important
1. I would have more energy for my family and friends if I exercised regularly.	1	2	3	4	5
2. I would feel embarrassed if people saw me exercising.	1	2	3	4	5
3. I would feel less stressed if I exercised regularly.	1	2	3	4	5
4. Exercise prevents me from spending time with my friends.	1	2	3	4	5
5. Exercising puts me in a better mood for the rest of the day.	1	2	3	4	5
6. I feel uncomfortable or embarrassed in exercise clothes.	1	2	3	4	5
7. I would feel more comfortable with my body if I exercised regularly.	1	2	3	4	5
8. There is too much I would have to learn to exercise.	1	2	3	4	5

	Not important	A little bit important	Somewhat important	Quite important	Extremely important
9. Regular exercise would help me have a more positive outlook on life.	1	2	3	4	5
10. My exercising puts an extra burden on my significant other.	1	2	3	4	5

DEPARTMENT OF
PUBLIC HEALTH AND HUMAN SERVICES
HEALTH POLICY & SERVICES DIVISION

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Notice
January, 2000

The Montana Department of Public Health and Human Services, Health Policy and Services Division (Medicaid Services Bureau) is working with the Rural Institute at the University of Montana to learn more about the needs of people with chronic medical conditions. As part of this project, the Rural Institute wants to survey people who have chronic medical conditions that limit movement and who also receive Medicaid. The Rural Institute will use the survey information to develop programs to help people with chronic conditions to maintain or improve their functioning.

The Rural Institute wants to survey people, ages 18 - 65, who:

- ✔ Have a physical disability
- ✔ Have a limitation in these activities
  - walking,
  - climbing stairs,
  - reaching, lifting, or carrying items
- ✔ Need help from other people or use special equipment for the above activities

If you or someone in your household are 18 to 65 years old and can answer yes to any one of the three requirements listed above and also receive Medicaid, please return the enclosed postage paid postcard. You may return the postcard even if you do not want to get the survey. If you want to have the Health Survey sent to you, just write your address on the enclosed postcard. Once you receive the Health Survey in the mail, it will take about 30 to 40 minutes to complete. When you return the Health Survey with all the pages completed, the Rural Institute will send you $10 for your time. This project will provide important information about services that are needed.

Your answers to the Health Survey will be completely confidential. **The Rural Institute will not allow the Montana Medicaid Program, or anyone, to identify your name with your survey.** The survey information will simply be combined into a report.

The Health Policy and Services Division is mailing this letter for the Rural Institute in order to keep your name private. However, we hope you will return the enclosed postcard to the Rural Institute and help them with this project.

Sample Selection Questionnaire

1. **Are you between the ages of 18 and 65** **Yes ☐** **No ☐**

2. **Do you have a Physical Disability?** **Yes ☐** **No ☐**
   If yes, please describe _____
   _____

3. **Do you have Blindness, deafness, or a severe vision or hearing impairment?** **Yes ☐** **No ☐**

4. **Do you have a long-lasting condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying?** **Yes ☐** **No ☐**

5. **Do you use special equipment to perform basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying?** **Yes ☐** **No ☐**

6. **If offered in your area, would you attend a program about health which would be offered two hours each week for eight weeks?** **Yes ☐** **No ☐**

7. **Would you like to receive the Health survey described in the enclosed letter?** **Yes ☐** **No ☐**

In order to receive the Health Survey, please write your address here:

Name: _____
Address: _____
_____
City, State, Zip: _____

Please fold and drop this post-paid card in the mail.
Thanks for your help!

Craig Ravesloot, Ph.D.
New Directions
1605 Stephens
Missoula, MT 59801
(406)543-9356

Health Research Project
Informed Consent for Survey

Thank you for your interest in the Exercise and Health research project being conducted by the New Directions Program of the University of Montana. We are doing this project to learn how to inform people with medical problems about the benefits of exercise. We are also hoping to help adults with ongoing medical problems to develop an exercise program for themselves.

If you agree to participate in this project by signing this form and returning the enclosed survey, you will answer questions about your current exercise habits, your medical problems, and the problems you have with going out to community events. When we receive your survey, we will mail you a check for $10.00. We will also keep your name, address, and phone number in order to contact you again sometime in the next 2 years. We will contact you either by telephone or mail to describe a free exercise program and to solicit your participation in that program. By signing this form, you are not agreeing to begin an exercise program, you are simply giving us permission to contact you about an exercise program.

Your name will never be connected to the answers given on the survey. Your records will be kept private and will not be released without your consent except as required by law. The information will be kept in a locked file cabinet at the University of Montana for 3 years. Your signed consent will be stored separately. Only the research staff will have access to the information. Otherwise, it will be kept totally confidential. No one else will know about your health status.

"In the event that you are injured as a result of this research you should individually seek appropriate medical treatment. If the injury is caused by the negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A., Title 2, Chapter 9. In the

negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A., Title2, Chapter 9. In the event of a claim for such injury, further information may be obtained from the University's Claims representative or University Legal Counsel. (Reviewed by University Legal Counsel, July 6, 1993)"

We do not think this study will hurt you in any way.

If you have any questions, you may contact Craig Ravesloot, Ph.D, New Directions, 1605 Stephens, Missoula, MT 59801 (406) 543-9356. By signing this form, you are consenting to participate in this study.

I understand this consent form. I have been informed of the risks and benefits involved in completing this survey and all my questions have been answered. I also know that this form will be used as an informed consent to access my Medicaid records. I know that I can call Craig Ravesloot with any more questions I may have. I voluntarily agree to take part in this study.

_____ _____

Signature Date

First Name: _____

Last Name: _____

Street Address or PO: _____

City: _____ State: _____

Zip Code: _____

Telephone Number: _____

Social Security Number: _____

Date Approved by UM IRB June 27, 2001

Approval Expires on June 27, 2002

Tom A. Roberts, IRB Chair

Craig Ravesloot, Ph.D.
New Directions
1605 Stephens
Missoula, MT 59801
(406)543-9356

Exercise and Health Research Project
Informed Consent for Medicaid Records

Thank you for your interest in the Exercise and Health research project being conducted by the New Directions Program of the University of Montana. We are doing this project to learn how to inform people with medical problems about the benefits of exercise. We are also hoping to help adults with ongoing medical problems to develop an exercise program for themselves.

If you agree to participate in this project, return the enclosed survey which asks questions about your health status, daily activities and beliefs about exercise. When we receive your survey, we will mail you a check for $10.00. Your name will never be connected to the answers you given on the survey.

We also would like to examine records kept by the state Medicaid Department because we are examining healthcare service use patterns as part of our research. This research will not affect your eligibility for services in any way. We will get records from the Medicaid Department by providing the department with a copy of this informed consent that includes your social security number on it.

Your records will be kept private and will not be released without your consent except as required by law. The information will be kept in a locked file cabinet at the University of Montana for 3 years. Your signed consent will be stored separately. Only the research staff will have access to the information. Otherwise, it will be kept totally confidential. No one else will know about your health status.

"In the event that you are injured as a result of this research you should individually seek appropriate medical treatment. If the injury is caused by the

negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A., Title2, Chapter 9. In the event of a claim for such injury, further information may be obtained from the University's Claims representative or University Legal Counsel. (Reviewed by University Legal Counsel, July 6, 1993)"

We do not think this study will hurt you in any way.

If you have any questions, you may contact Craig Ravesloot, Ph.D, New Directions, 1605 Stephens, Missoula, MT 59801 (406) 543-9356. By signing this form, you are consenting to participate in this study.

I understand this consent form. I have been informed of the risks and benefits involved in completing this survey and all my questions have been answered. I also know that this form will be used as an informed consent to access my Medicaid records. I know that I can call Craig Ravesloot with any more questions I may have. I voluntarily agree to take part in this study.

_____ _____

Signature Date

First Name: _____

Last Name: _____

Street Address or PO: _____

City: _____ State: _____

Zip Code: _____

Telephone Number: _____

Social Security Number: _____

Date Approved by UM IRB June 24, 2001

Approval Expires on June 24, 2001

Tom G. Griffin, IRB Chair

Current Exercise Habits

1. I currently do not exercise.

   _____ True _____ False

2. I intend to exercise in the next six months.

   _____ True _____ False

3. I currently exercise *regularly*.

   _____ True _____ False

4. I have exercised *regularly* for the past six months.

   _____ True _____ False

5. I have exercised *regularly* in the past for a period of at least 3 months.

   _____ True _____ False

Appendix J

Scoring Algorithm for Stages of Change for Exercise Questionnaire

(Marcus & Simkin, 1993)

If Item 1 = True and Item 2 = False, then = Precontemplation.

If Item 1 = True and Item 2 = True, then = Contemplation.

If Item 1 = False and Item 3 = False, then = Preparation.

If Item 3 = True and Item 4 = False, then = Action.

If Item 3 = True and Item 4 = True, then = Maintenance.

(Item 5 not applicable for this study.)

POTENTIAL PROBLEMS WITH GOING TO EVENTS

We are interested in how easy or difficult it would be for you to visit the New Directions health promotion program twice a week for six months. If you are currently coming to the New Directions program, please rate the difficulty you have with each item. For each statement, circle the number that represents how difficult it would be for you to attend twice weekly exercise or a similar activity. If a statement does not apply to you or if it would not be a problem for attending a health promotion program, please rate it as zero.

	Not a problem			A big problem
1. It's difficult to get in and out of my house.	0	1	2	3
2. My neighborhood has too few curb cuts.	0	1	2	3
3. It is dangerous for me to leave my house.	0	1	2	3
4. It would take too long to get to the program.	0	1	2	3
5. Chemicals in the environment bother me.	0	1	2	3
6. The weather is often too bad to get out.	0	1	2	3
7. I have trouble reading printed materials.	0	1	2	3
8. Buildings are not accessible to me.	0	1	2	3
9. I don't have accessible transportation.	0	1	2	3
10. I don't have the assistive equipment that I need.	0	1	2	3
11. My disability is limiting me too much these days.	0	1	2	3
12. I have a hard time thinking and concentrating.	0	1	2	3
13 I lose control over my bowel and bladder functions.	0	1	2	3
14. My weight makes it hard to get around.	0	1	2	3
15. I get tired easily.	0	1	2	3

	Not a problem			A big problem
16. I have pain when I do too much.	0	1	2	3
17. I can't see well enough to get around.	0	1	2	3
18. I have trouble hearing what people say.	0	1	2	3
19. I have to take time off from my job.	0	1	2	3
20. I'm too busy to take time away from other important activities.	0	1	2	3
21. I have to arrange day care for my children.	0	1	2	3
22. I take care of another family member.	0	1	2	3
23. My family will not support my coming.	0	1	2	3
24. My daily self-care needs take too much energy.	0	1	2	3
25. I need someone to help me.	0	1	2	3
26. My doctor will not approve of my coming.	0	1	2	3
27. Other important people tell me not to come.	0	1	2	3

FITNESS-AND-WELLNESS-FOR-PEOPLE-WITH-PHYSICAL-LIMITATIONS-OR-DISABILITIES

NEW DIRECTIONS

FITNESS-AND-WELLNESS-FOR-PEOPLE-WITH-PHYSICAL-LIMITATIONS-OR-DISABILITIES

Would you like to feel better and have more energy?

Interested in help to reduce pain?

No cost to you while you participate in our research

Give us a call at New Directions.

Start an exercise program today!

NEW DIRECTIONS
1605 Stephens Ave.
Missoula, MT 59801
543-9356

A program of
The University of Montana

GIVE NEW DIRECTIONS A TRY

New Directions is more than a fitness center. It is a place to make friends and share experiences while becoming healthier. New Directions has fitness equipment for people with physical limitations and staff trained to design fitness programs for people with disabilities.

Would you like to participate in a research project around health and fitness? People who take part in this research at New Directions can meet with a physical therapist, plan an exercise program, use facility exercise equipment, and access a personal trainer for free. It is as simple as a phone call or visit to the New Directions program. Call 543-9356 and tell staff that you received this newsletter and are interested in learning more.

Many people who join New Directions feel less depressed, have more energy, and have less pain. New Directions is a place to gain strength in all areas in your life. Don't let your body hold you back!

INSIDE THIS ISSUE

- RELIEF FROM PAIN
- CHOOSING NEW DIRECTIONS
- FITNESS CORNER

✖ PAIN ✖

SOME QUESTIONS AND ANSWERS

Q. When is pain ongoing or chronic?

A. Pain is ongoing when it continues for six months. However, many pain doctors describe pain as ongoing after a shorter period of time. The decision to describe pain as ongoing depends on many things including how the pain started and the expected period of time for healing following an illness, injury, or surgery.

Q. Why doesn't my pain go away?

A. Good question! There are many researchers who are trying to figure out why pain sometimes goes on and on. What is clear is that ongoing pain often needs many types of treatment like physical therapy, medication, and counseling.

Q. Why can't the doctor figure out what is wrong and make the pain stop?

A. Even though medical knowledge has grown in the last 100 years, we are still learning how pain is communicated to the brain and why it doesn't stop. Ongoing pain is even more confusing. It is not unusual for a doctor to have difficulty finding the cause of pain.

Q. If the doctor can't find anything wrong, does it mean that the pain is all in my head?

A. No! Research has found that pain can exist without clear physical problems. And, some people do not experience pain when physical problems indicate they should have pain. Still, many people believe pain must be in your head if there are not physical explanations. This view does not take into account that the mind and body work together. Body affects mind and mind affects body. As an example, close your eyes and think of riding on a roller coaster. Just thinking about it can make your heart beat faster or make your palms damp. The mind has actually changed the body!

Q. If my doctor can't find a cure, is there anything else that can help?

A. Physical therapy and exercise are an important part of managing ongoing pain. Unlike acute pain where rest is important for healing, keeping strength is important for ongoing pain. When we are in pain, we tend to avoid activity. This may mean being inactive for many months - even years! The body will get more and more weak as a result. This can make the pain worse and cause pain in other parts of the body. Of course, any physical therapy or exercise should be done only after a complete medical examination and clearance from your doctor.

Q. Is there anything else that can help?

A. Ongoing pain is very stressful and can affect peoples' lives in many ways. It can cause depression or anxiety. This stress can make the pain worse. Counseling can help provide skills for coping with ongoing pain such as relaxation techniques and helping people become more hopeful that pain can get better.

Q. What about medications?

A. Medications can help. Of course, determining the correct medications is done by a doctor and can take some time. It is possible that medications will not eliminate the pain. That is why these other areas of pain management are very important.

QUESTIONS AND ANSWERS ABOUT PAIN, CONT.

Q. Where can I find out more about chronic pain?

A. Ongoing pain is truly one of the greatest challenges any one of us can face. However, there is hope and help. New Directions is just one of the many resources that are available to you.

Q. What are some techniques to manage my ongoing pain?

A. Dr John Klocek offers monthly pain management classes at New Directions. The four-week workshop teaches skills and strategies for coping with pain.

Kristine Working Out at New Directions*

**Name has been changed to protect individual privacy*

CHOOSING NEW DIRECTIONS

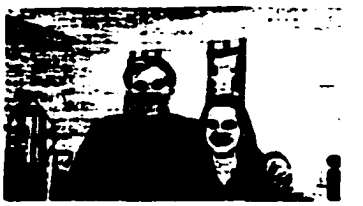
Kristine Price was diagnosed with Type I diabetes at the age of seven. By age 29, when Kristine first came to New Directions, it was hard for her to get through the day. Her blood sugars were often very high making her feel sluggish and tired. She also had sharp pains in her legs that limited her ability to walk more than a few blocks. Because she felt so limited by these problems, she often felt hopeless and depressed that her life would ever be better

Kristine came to New Directions with the hope that she could improve her health. Currently, she is involved in several opportunities. Kristine attends the "Living Well with a Disability" class which focuses on goal setting as the reason to improve health. She is faithful to her workout schedule, averaging three fitness workouts a week plus stretching.

In the 16 months since Kristine began her fitness program, her blood sugar numbers have gone down 25%. Insulin can cost a lot for people with diabetes and Kristine lowered her insulin use by almost half. In addition, Kristine is experiencing half the insulin reactions as before. Her blood pressure has also gone down and she has lost 21 pounds. Pain in the short muscles of Kristine's legs used to keep her from walking further than three blocks at a time. She now walks across a large university campus free of pain.

How does all this change Kristine's life? She is working toward her university degree and has a part time job. She moved away from home and to an apartment of her own. Through the use of pain management skills, Kristine lowered the effects of pain on her daily life. Her most recent goal is widening social opportunities for herself. She reports that she is "thrilled" with her new feelings of independence. Finally, Kristine says it is important for people to know that New Directions exists and that everyone "deserves the programs that New Directions offers." Interested? Call us at 543-9356.

WHY SHOULD I EXERCISE?
OUR FITNESS EXPERTS ASKED PEOPLE LIKE YOU.....



Exercise builds strong bodies...but there are other benefits to exercise that might be more meaningful. We asked people who exercise regularly at New Directions what *other* positive effects they have experienced.

More energy!

"Some days I don't want to make the effort to come here and exercise, but I always feel so much better when I do."

"When I exercise, I have more energy to do the things I have to do, like grocery shopping and housecleaning. More importantly, I have enough get up and go to do the things I *want* to do as well."

Less depression!

"The fellowship at New Directions is the most important thing to me. Everyone is so supportive and I look forward to seeing everyone."

"I feel so much better when I exercise...not just physically, but how I feel about myself too. I don't have as many days where I stay home because I'm feeling down or sad."

Greater independence!

"One of my goals was to learn to ride the Special Transit buses. Because of the confidence I gained, I now ride the regularly scheduled routes, giving me much more freedom."

"I thought the chronic pain in my leg would keep me from ever working again. I now have a part time job and find I can manage the pain much better than before."

NEW DIRECTIONS
The University of Montana
Rural Institute on Disabilities
32 Campus Drive, MS 7056
Missoula, MT 59812-7056

New Directions
1605 Stephens Ave.
Missoula, MT 59801
Phone (406)543-9356
Fax (406)543-0375

Physical Therapists:
James Lastin, PT, Ph.D.
Huw Griffiths, PT, MS
Psychologists:
Craig Ravesloot, Ph.D.
John Klocek, Ph.D.
Occupational Therapist:
Theresa McGeary, MS, OTR/L
Dietician:
Scashy Allen

Dear Doctor:

RE:

_____ would like to participate in the New Directions Program. This program is focused on improving the quality of preventive health care for people with physical limitations. A component of this program involves the initiation of a physical activity (fitness) program which includes: flexibility, muscular strength, aerobic endurance, and functional activities under the supervision of a physical therapist. Based on your recommendation of activity level and after an initial physical activity screen performed by a physical therapist your patient will begin their program on _____.

☐ I know of no reason why the person named above may not participate.

☐ I believe the person named above may participate, but use caution because:
_____
_____

☐ I recommend the person named above NOT participate for the following reasons:
_____
_____

Please specify any recommendations, limitations, or comments that the New Directions staff should be aware of: _____
_____
_____

Please complete this form and fax a copy to our office at 543-0375 to expedite this process. If you have any questions, please feel free to contact us at 542-9356. Thank you for your attention.

Physician's Signature _____ Date _____

Physician's printed or typed name _____

Appendix N

Exercise: Stages of Change

Regular Exercise is any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 to 5 times per week for 20-60 minutes per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

Question: Do you exercise regularly according to that definition?

Please circle your answer.

- Yes, I have been for MORE than 6 months.
- Yes, I have been for LESS than 6 months.
- No, but I intend to in the next 30 days.
- No, but I intend to in the next 6 months.
- No, and I do NOT intend to in the next 6 months.