Using Second-Transitionary Phase Cognitive Factors to Predict Adherence to a Walking Routine

by

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Running Head: EXERCISE ADHERENCE

The dissertation entitled, "Using Second-Transitionary Phase Cognitive Factors to Predict Adherence to a Walking Routine", by Donna B. Konradi is accepted by the faculty of the School of Nursing, Indiana University, in partial fulfillment of the requirements for the Doctor of Nursing Science degree.

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ABSTRACT

The purpose of the study was to test a regression model designed to predict adherence to a walking for exercise routine. An extension of the Second-Transitionary (Adherence) phase of the Natural History of Exercise Model, referred to as the Natural History of Walking for Exercise Model (NHWEM) was the organizing framework. PEARSON CORRELATIONS and standard regression were used to assess the relationship between adherence to a self-set walking routine and the following NHWEM factors: personal factors (age, gender, marital status and education); cognitive factors (social support, self-efficacy, normative beliefs, perceived health status and benefits/barriers); and environmental factors (safety, comfort, weather, and the proximity of the walking environment to home).

A total of 66 adults currently participating in a walking for exercise routine completed the mailed survey and for the next 12 weeks recorded in the log actual walking for exercise activities. An additional 31 participants, who completed the survey but failed to return the log, described their 12 week walking for exercise behaviors during a telephone interview. The adherence score was calculated by comparing the intended walking for exercise routine described in the survey booklet with the log and telephone reports of actual walking activities.

Demographic and environmental factors significantly correlated with walking adherence were combined with cognitive factors (individually and combined) to predict walking routine adherence. In most of the regression equations, age was the single significant predictor of walking routine adherence. NHWEM support was limited because unique variability was consistently attributed to only one or two variables and not variable combinations.

Participants 65 and older were significantly more adherent to their intended walking routine; reported significantly higher perceived health status scores and friend/fellow walker support scores; and reported lower social support scores, benefits scores, barriers scores, and family support scores than participants younger than 65. Cognitive factor scores for participants reporting a walking relapse of 3 or more weeks significantly differed from total sample scores. This difference is consistent with the NHEM assumption that predictors of exercise are transitionary-phase speci[redacted]

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CHAPTER I

THE NATURE OF THE STUDY

Introduction

Because the achievement of public health related benefits depends on regular exercise participation, it is critical that interventions be designed to help individuals initiate and adhere to their exercise routines (Hovell, Sallis, Hofstetter, Spry, Faucher & Caspersen, 1989). With approximately 40% of the individuals adopting a walking for exercise routine dropping out in the first year (Garcia & King, 1991) it is clear that adherence enhancing interventions are critically needed. The present study was completed to extend a theory that describes and predicts factors that contribute to walking for exercise adherence. Extending the theory base is the first step in a program of research designed to guide the development of nursing interventions directed at increasing walking routine adherence rates.

The physiological and psychological benefits of regular participation in exercise and physical activity have been well documented in the literature. Studies suggest that regular participation in exercise may play a preventive role, significantly reducing the risk of coronary artery disease (Haskell, W. 1984), hypertension (Siscovick, D., LaPorte, R., & Newman, J. 1985), and fractures (Krolner, B., & Taft, B. 1983; Dishman, 1988). In addition to disease prevention, exercise can be used as an adjunctive health enhancing treatment modality for persons who have established diseases such as hypertension, cardiovascular diseases, diabetes, respiratory disease, and low back pain (Siscovick, D., LaPorte, R., & Newman, J. 1985; Deyo, R. 1983; and Simon, H. 1984). Habitual exercise also provides a broad spectrum of psychological benefits such as improved confidence, feeling of well-being, increased sexual satisfaction, anxiety reduction, and improved intellectual

function (Taylor, C., Sallis, J., & Needle, R. 1985). Based on the health protecting and enhancing effects of exercise, it has been postulated that the potential exists for longer and more productive lifespans (Sallis & Hovell, 1990, p. 308).

Research suggests that funding directed at health promoting programs such as exercise, has been shown to be money wisely invested in terms of immediate and long term outcomes (Pender, 1987). Findings from one study noted that money spent on promotion of healthy routines produced greater benefits than equal amounts spent on disease detection (Weinstein, M., & Stason, W., 1976). The Consensus Statement emanating from the 1988 International Conference on Exercise, Fitness, and Health held in Toronto, echoed a similar economic theme affirming that exercise participation has the potential to produce fiscal benefits which outweigh immediate program costs (Bouchard, Shephard, Stephens, Sutton, & McPherson (1990).

Unfortunately, numerous studies and reports document that most Americans do not get the quality and quantity of exercise required for beneficial health outcomes. Research suggests that about 40% of Americans do not exercise during their leisure time and another 40% are active at levels probably too low and infrequent for fitness and health gains (Dishman, 1988; Stephens, Jacobs, & White, 1985). Furthermore, it is estimated that only 20% of Americans exercise regularly and intensely enough to meet the American College of Sports Medicine's guidelines for fitness or reduced risk for several chronic diseases and premature death (Dishman, 1988; Powell, Spain, Christenson, & Mollenkamp, 1986; Paffenbarger, Hyde, Wing, & Hsieh, 1986).

Over 77 million walkers have turned walking into the number one fitness activity in America (Seiger & Hesson, 1990). Epidemiologic reports furthermore suggest that persons

are more likely to participate in moderate intensity activity, especially walking, than in vigorous activity (Caspersen, Christenson & Pollard, 1986; Stephens, Jacobs, & White, 1985). This increased likelihood may be due to the fact that walking is incidental to daily living (Brownell & Stunkard, 1980) and is viewed by the public as a relatively acceptable form of exercise.

The theoretical framework used to guide the current study was an extension of the second transitionary phase of the Natural History of Exercise Model (NHEM) proposed by Sallis & Hovell (1990). Because walking was the targeted moderate intensity exercise, the proposed model extension has been referred to as the Natural History of Walking for Exercise Model (NHWEM). According to the NHWEM (second transitionary phase), specific cognitive, personal and environmental factors predict adherence to a walking for exercise routine.

The five cognitive factors; (1) self-efficacy, (2-3) perceptions of benefits and barriers, (4) perceived health status, and (5) normative beliefs have origins in social learning theories. Although social learning theories use different terminology and propose different intervariable relationships, a common premise is shared. This premise is the assumption that cognitive factors influence the self-regulation of behavior. The cognitive factors proposed to predict walking for exercise adherence and related social learning theory origins follows: (1) **self-efficacy** was originally described in Social Cognitive Theory by Bandura (1986); (2-3) **perceptions of benefit and barriers** were included as predictors of health-behaviors in the Health Belief Model (Rosenstock, 1966; Rosenstock, Strecher, & Becker, 1988); (4) **perceived health status** was described by Pender (1987) as a predictor of health promotion behaviors in the Health Promotion Model; and (5) perceptions of approval and influence are **normative beliefs** described in the Theory of Reasoned Action (Fishbein & Ajzen, 1975).

Although the cognitive factor social support has not been derived from a social learning theory, research links with exercise adherence justify NHWEM second transitionary phase inclusion (Sallis, Grossman, Pinski, Patterson & Nader, 1987).

The NHEM (figure 1) describes four phases of exercise participation: sedentary, adoption, maintenance/drop-out, and resumption. In the model, three transitions are used to outline the process of behavior change experienced by individuals as they move from one phase to the next. The first transition is the sedentary to adoption phase. The second transition is the adoption to maintenance (adherence)/drop-out phase. The third transition is the drop-out to resumption phase. (Sallis & Hovell, 1990) Activity maintenance or adherence, which is the desirable outcome of the second phase, is the focus of this study.

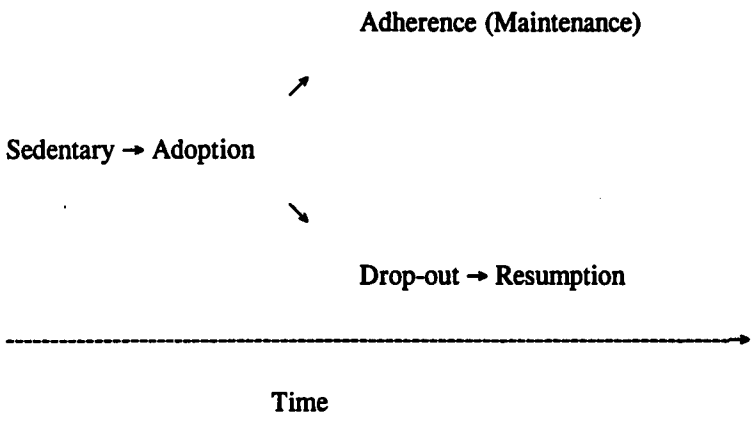
NHWEM Second Transitionary Phase Factors

The present prospective correlational study was designed to describe the relationship between the proposed NHWEM second transitionary process (adoption to maintenance/drop-out) factors and adherence to a walking routine (figure 2). Three types of second transitionary phase factors were included in the NHWEM: cognitive factors, personal factors, and environmental factors. A description of NHWEM second transitionary phase factors and rationale for model inclusion is explained below.

Cognitive Factors

Bandura's (1986) Social Cognitive Theory (SCT) is a learning theory based on two major assumptions. First, Bandura assumes that people are cognitive beings. Consistent with this assumption, the relationship between the cognitive appraisal process and behavior is emphasized. Second, Bandura assumes a continuous and bidirectional interaction between

Figure 1: Phases of the Natural History of Exercsie Model



Sallis J., & Hovell, M. (1990)

individuals and their environment. The environment influences the individual and the individual influences the environment.

A core concept of SCT is **self-efficacy** which can be defined as the belief that one is capable of executing a given course of action. Unlike traits, self-efficacy beliefs are specific to the behavior in question. For example, a person expressing high walking self-efficacy may participate in a mall walking routine but avoid a step aerobics class. Upon inquiry, this person may express a low self-efficacy for step aerobics stating, "I can't do that because it hurts my knees." The interaction between perceptions of self-efficacy and environmental factors is an important SCT factor and is illustrated in the following example. Ice and snow

may contribute to an outdoor walker's low sense of walking self-efficacy during the winter months. This same individual's walking self-efficacy increases drastically when the walker considers the possibility of persisting with the routine in a controlled shopping mall environment.

Self-efficacy was used as a predictive cognitive factor in the NHWEM for the following reasons. Research suggests that self-efficacy is a predictor of current and future participation in a variety of health-related activities. High perceptions of self-efficacy have been linked with adherence to vigorous exercise (Garcia & King, 1991), weight-reduction diets (Sallis, Pinski, Grossman, Patterson & Nader, 1988), and walking for exercise (Hovell et al. 1989). Additionally, self-efficacy has been shown to be a predictor of behavior during both the first (sedentary to adoption) and second (adoption to maintenances) transitionary phases of exercise participation (Sallis, Hovell & Hofstetter, 1992).

Bandura (1986) notes that people are social beings. Individuals influence other persons and other persons influence them. The belief that a course of action will result in the loss of respect from significant other persons is a negative consideration. The perception that other persons are willing and capable of providing a needed type of support and/or assistance is an important positive consideration. This perceived support from other significant persons is referred to as the concept **social support**.

Research suggests that perceptions of social support are related to a variety of routine related health-related behaviors including smoking cessation (Mermelstein, McIntyre, & Lichtenstein, 1983) and weight loss (Dubbert & Wilson, 1984). Specific links between social support and second-transitionary phase exercise adherence have also been noted (Dishman, Sallis & Orenstein, 1985; Martin & Dubbert, 1982). These suggested links between social

support and health-related routine adherence resulted in the use of social support as a NHWEM cognitive factor predictive of walking adherence.

The Health Belief Model (HBM) was developed in the early 1950's by Rosenstock to provide a framework for predicting use or failure to use preventative measures. Although the **perception of benefits and perception of barriers** factors have often been used as variables to predict behavior, initial theoretical research to determine the relationship between these factors and behavior was guided by the HBM. During the 1950's, the reluctance of individuals to participate in health protection efforts (tuberculosis screening, Pap smear for the detection of cervical cancer, and immunizations) presented a major concern for both the public and private health sectors. The HBM was designed to address this concerns by accomplishing the following two goals: providing a framework for predicting individual use of preventive measures and guiding the development of interventions for increasing participation among resistant individuals. (Pender, 1987)

According to the HBM, the following perceptions are determinants of health related behaviors: susceptibility, severity, benefits and barriers. Perceptions of susceptibility can be described as an individual's estimated probability of the likelihood of encountering a specific health problem. Severity is an evaluation of the consequences of developing the health problem. The perceptions of susceptibility and severity combine to determine a total perception of threat. The higher the degree of threat, the greater the likelihood the individual will take preventative action. For example, if a man diagnosed with hypertension has a family history of myocardial infarction and early death, the threat of a similar personal consequence may lead him to participate in a health prevention program designed to reduce blood pressure. (Pender, 1987; Sonstroem, 1988; Rosenstock, Strecher, & Becker, 1988).

Perceived benefits are beliefs regarding the effectiveness of taking a specific health action. **Perceived barriers** are the potentially negative aspects of adopting a specific health behavior. If the hypertensive man perceives that the threat of death is great and he is also confident that the prevention program can achieve blood pressure reduction, despite considerable barriers he will likely persist with his blood pressure reduction program. Conversely, if the perceived threat is minimal the presence of a single barrier may be enough to cause withdrawal or a decrease in participation. (Pender, 1987; Sonstroem, 1988; Rosenstock, Strecher, & Becker, 1988)

Although HBM variables (benefits and barriers) have been successfully applied to health promotion, important differences between health protection behaviors and health promotion behaviors make the HBM an inappropriate framework for explaining behaviors that are the result of a desire for health promotion. For example, according to the HBM, health protection behavior is directed toward decreasing the probability of experiencing illness (threat). Pender (1987) suggests that for individuals engaging in health promotion activities the motivating force is increased well being and self-actualization. For persons engaged in health promotion activities, threat is not a determinant of behavior. (Pender, 1987)

Pender's (1987) Health Promotion Model (HPM) was designed as a complementary counterpart of the HBM. Whereas the HBM describes health-protecting/disease prevention behaviors, the HPM describes health promotion and wellness behaviors. In the HPM, Pender (1987) clearly differentiates between health promotion and disease prevention. Promotion is viewed as a positive and dynamic process for the purpose of expanding positive health. Prevention focuses on avoidance of disease.

According to the Health Promotion Model (HPM) cognitive-perceptual factors function as major determinants of health-promoting behaviors (Pender, 1987). Cognitive-perceptual factors are defined by Pender (1987) as the primary motivational mechanisms for acquiring and maintaining health-promoting behaviors. Benefits of health-promoting behaviors, barriers to health-promoting behaviors, and perceived health status are cognitive-perceptual factors included in the HPM.

In a pilot study of 25 adults currently involved in a walking for exercise routine, the expressed motivation for participation varied. Although some walkers cited specific threats that prompted continued participation (hypertension, previous heart attack, previous bypass surgery) others expressed reasons more consistent with the notion of "feeling better than ever." (Konradi, 1993). Because individuals who participate in walking for exercise routines expressed varying reasons for participation, it was inappropriate to design a theory based exclusively on threats (HBM) or increased well being (HPM) to predict adherence. For both a threat and an increased well-being motivation for participation, common factors used to predict behavior in both the HBM and the HPM include the perceptions of benefit and barriers. Because these factors are predictors for both threat motivated and increased well-being motivated behaviors, they were included as predictors in the NHWEM.

Numerous **benefits** including improved disposition, better sleep, decreased fatigue, improved muscle tone, increased stamina, improved appearance, entertainment, increased acceptance by others and stress and tension reduction have been linked with participation in exercise routines (Sechrist, Noble Walker, & Pender, 1987). Mall walkers attributed the following positive outcomes to participation in a walking for exercise routine: blood pressure

control, socialization with fellow walkers, weight loss, better sleep, and entertainment (Konradi, 1993).

Barriers to participation can negatively influence continuance in an exercise program. Barriers include cost, time constraints due to work or family, and inaccessibility of facilities (Sechrist, Noble Walker, & Pender, 1987). Specifically, mall walkers noted that the following barriers limited their participation: vacations, health problems, work schedules, and lack of time (Konradi, 1993).

According to the HPM, **perceived health status** is in itself a source of motivation for health action (Pender, 1987). Sidney and Shephard (1976) described a link between perceived health status and the frequency and intensity of physical activity participation. In a 14 week study of older adults engaged in physical training classes, increased physical complaints or symptoms as measured by the Cornell Medical Index Health Questionnaire correlated with lower frequency and lower intensity of participation in an exercise program. Prior to beginning the physical training classes, study participants were examined by a physician to rule out overt clinical symptoms of illness. In a review of the literature focused on the determinants of participation in supervised exercise programs, Dishman, Sallis & Orenstein (1985) concluded that the perception of being in good health was repeatedly associated with an increased probability of continuing exercise behavior.

The final cognitive factor included in the NHWEM, **normative beliefs**, originates from the Theory of Reasoned Action (Fishbein & Ajzen 1975) which was renamed by Ajzen and Madden (1986) the Theory of Planned Behavior. Using the Theory of Reasoned Action as an organizing framework, links between normative beliefs and exercise behaviors have been noted (Pender & Pender, 1986). Of interest has been the power of moderating variables such

as body weight and "habit of exercise" to increase the prediction accuracy for exercise behaviors (Pender & Pender, 1986; Godin, Colantonio, Davis, Shephard & Simard, 1987).

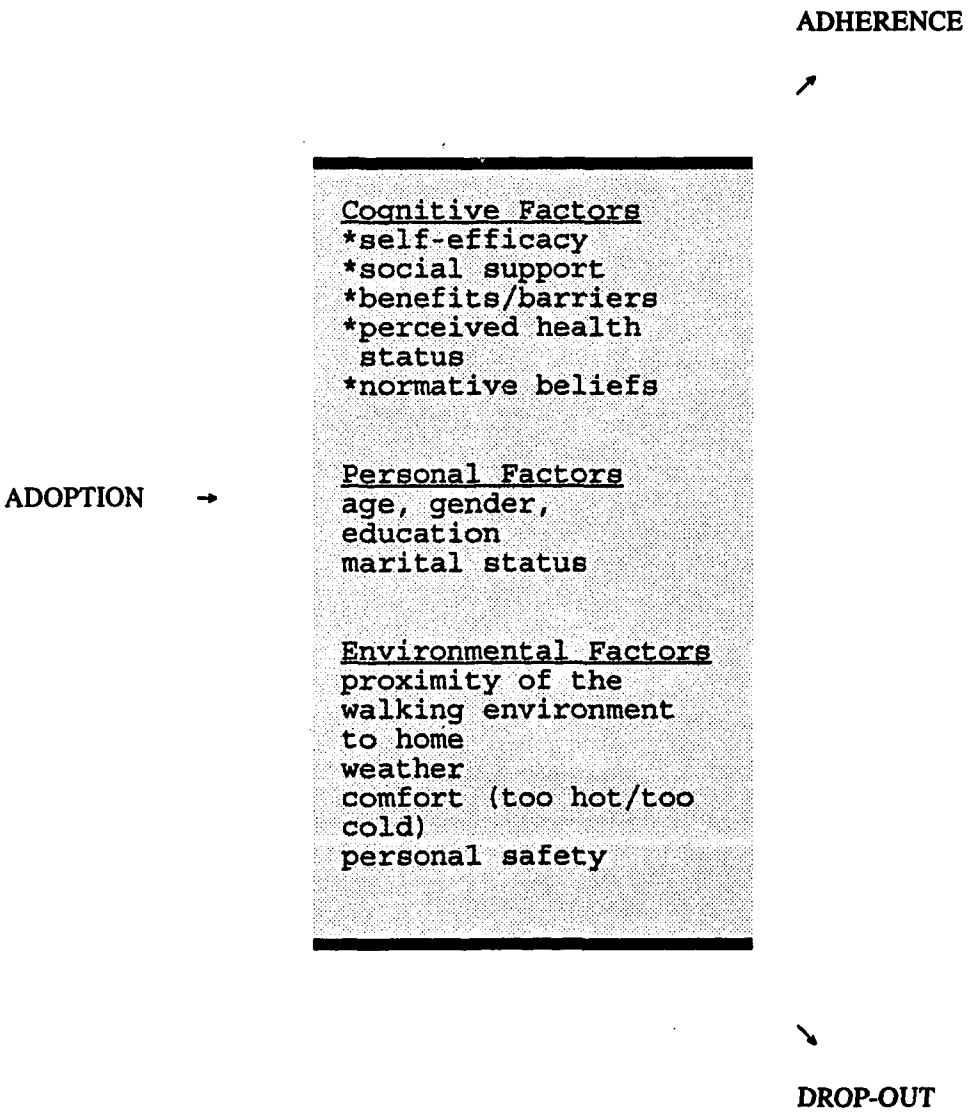
Personal Factors

Age, gender, marital status and education were measured as NHWEM second transitionary phase personal factors. Although body size is also an important second transitionary phase personal factor, measurement accuracy and reliability prohibited the inclusion of the body size factor in the current survey design. Personal factors are important because they potentially exert a moderating influence on the cognitive variables of self-efficacy, social support, benefits/barriers, perceived health status and normative beliefs. Although the personal factors are unalterable, they provide helpful cues for targeting groups that may respond to cognitively based interventions.

Environmental Factors

The environment comprised the third set of factors proposed to influence adherence to a walking routine. Because links between the walking for exercise environment and exercise adherence have been documented in the literature, environmental factors were included in the NHWEM (Sallis, Haskell, Fortmann, Vranizan, Taylor & Solomon, 1986). Environmental factors evaluated in the current study included proximity of the walking environment to home, weather, comfort (too hot/too cold) and safety.

Figure 2: Proposed NHWEM Second Transitionary Phase Factors



Problem Statement

Exercise adherence has been studied extensively by researchers representing a variety of scientific disciplines. Despite the volume of work in the area, scientific reviews of the adherence literature reveal that exercise adherence data is mostly descriptive (Dishman, 1988). In an effort to develop an exercise adherence data base with explanatory and predictive power, the following weaknesses of previous studies need to be addressed.

First, most studies have been atheoretical (Dishman, 1988) making cross study comparisons impossible. The atheoretical approach to research has made it difficult for researchers from different disciplines to dialogue and combine expertise. Second, a variety of definitions have been used to describe study variables. Although some of the definition variances have been subtle, others have been the result of vastly different theoretical frameworks. Third, adherence studies have often focused on fixed variables such as age, sex, and hereditary factors and have little if any potential for guiding the development of interventions which might improve adherence rates. Fourth, data collection instruments (both theoretically and atheoretically developed) have been used without adequate theoretical and/or statistical justification. Finally, adherence has often been evaluated based on the efficiency of the routine rather than demonstrated behavior (Dishman, 1988). An adherence evaluation should focus on behavior rather than an anticipated outcome. For example, an individual participating in a weight loss program may be categorized as nonadherent to a prescribed diet because of a failure to lose weight. Further investigation may reveal diligent adherence to a diet plan that is unlikely to result in weight loss for this person. Categorizing this individual as nonadherent based on a failure to lose weight is an inappropriate and unfair evaluation.

Significance of the Problem

Prevalence estimates suggest that 20% of the population engage in vigorous activity, 40% engage in moderate intensity activities, and 40% are sedentary (Casperson, C., Christenson, G., Pollard, R. 1985; Stephens, T., Jacobs, D., White, C. 1985). Of those who report activity participation, about one-half who begin or renew a personal exercise program fail to maintain it at the level initially intended. Furthermore, a like proportion have a history of failures with previous attempts. (Powell, K., Spain, G., Christenson, G., & Mollenkamp, M. 1986)

Unlike vigorous exercise participation, which is more common among men, moderate intensity activity has broad appeal and is performed by both men and women alike (Sallis, J., Haskell, W., Wood, P., Fortmann, S., Rogers, T., Blair & S., Paffenbarger, R. 1985). Given the relative acceptability to the public, and considering the population-attributable risk related to sedentary lifestyles, an important public health benefit might be achieved by encouraging the 40% who initiate moderately active exercise programs to continue participation as a lifestyle (Haskell, W., Montoye, H., Orenstein, D. 1985).

A prerequisite to designing intervention strategies for increasing adherence to moderate intensity exercise routines is understanding the factors influencing adherence-related decision making. Self-efficacy, social support, benefit/barriers, perceived health status and normative beliefs have been selected for study because of proposed influences on adherence behaviors and therefore potential for manipulation to enhance adherence behaviors.

Purpose of the Study

The purpose of this prospective study was to test a regression model designed to predict adherence to a walking for exercise routine. Potentially alterable cognitive factors including

benefits, barriers, normative beliefs, self-efficacy, social support, and perceived health status were measured as independent variables. Environmental factors (safety, comfort, proximity to home, and weather) and personal factors (age, gender, marital status, education and body size) were also measured as moderators to determine the interrelationships between the cognitive, personal and environmental factors.

Conceptual and Operational Definitions

In order to promote semantic understanding and for the purposes of this study the following conceptual and operational definitions were used:

Walking self-efficacy: A person's judgement of own capability to organize and execute a course of action needed for participation in a moderate intensity walking program (Bandura, 1986, p. 391). Self-efficacy is derived from four sources: inactive or performance attainments, vicarious experience, verbal persuasion and physiological state. Self-efficacy is a multidimensional phenomenon which is positively correlated with interest, exposure to mass media coverage of the object, knowledge about the object, and behaviors indicated as desirable concerning the object (Bandura, 1986; Hofstetter, Sallis, Hovell, 1990).

Operationalization: Self-efficacy as an exercise behavior- specific concept was measured using WCS (Walking Confidence Survey). The WCS is a walking-specific revision of the Exercise Confidence Survey (Sallis, 1988). The 12 item instrument consists of two scales: resisting relapse and making time for walking. For each item the participant was instructed to 'please rate how confident you are that you could really motivate yourself to do things like these consistently, for at least twelve weeks.' Ratings were made on a five point scale from 'I know I cannot' (1) to 'I know I can' (5) with a response option for 'does not apply' (8). The resisting relapse scale consists of items 2, 3, 5, 6, 8, 9, 10, and 11. The making time

for walking scale consists of items 1, 4, 7, and 12. Each scale was scored separately by calculating a mean score for scale items and a total instrument score was obtained by computing a total instrument mean score. (Sallis et al. 1988)

Perceived available social support for exercise: The perception that others (family, friends and fellow walkers) are available and capable of rendering assistance to facilitate exercise participation should it be needed (Sallis et al. 1987).

Operationalization: Perceived available social support for exercise participation was measured using the Social Support for Walking Survey (SSWS). The SSWS is a revision of the Social Support and Exercise Survey developed by Sallis et al. (1987). The SSES is a retrospective two scale, thirteen item survey that directs participants to rate each question twice using the following instructions. 'Under family, rate how often anyone living in your household has said or done what is described during the last three months. Under friends, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.' The SSWS is prospective and directs participants to project anticipated social support for the next 12 weeks. At the suggestion of Dr. Sallis (personal communication, July, 21, 1992) a third scale to evaluate the social support provided by fellow walkers was added to the SSWS. The additional third scale instructions directed participants to 'rate how often a fellow walker(s) might say or do what is described during the next 12 weeks.' A Likert scale with response options ranging from 'none' (1) to 'very often' (5) with an option (8) for does not apply was used for recording responses. Separate family, friends and fellow walkers social support scale scores were calculated by summing responses to items 1-6 and 10-13. Items 7-9 were evaluated separately as family, friends and fellow walkers rewards and punishment scales. (Sallis et al. 1987).

Adherence: The extent to which a person's behavior coincides with a preset standard. Operationalization: Participants first described their intended walking routine by completing the following: "The walking routine that I try to complete consists of walking:__DAYS A WEEK for __MINUTES." If participants routinely used miles as their measure of walking quantity, they were directed to note the number of miles walked per exercise session. After completing the Walking for Exercise Survey, participants recorded their daily walking activities for the next 12 weeks using the Walking for Exercise Log Book. Using weekly charts, participants recorded either actual distance walked or length of time walked per day. For each participant, a days adherence score and a distance adherence score was calculated. Three steps were used to calculate the days adherence score. First the number of days walked per week was summed for each of the 12 weeks. Second the average number of days walked per week was calculated by summing the number of days walked each week and dividing the total by 12. Third, the days adherence score was calculated by dividing the intended number of days walked per week by the average number of days walked per week (obtained in step 2). Three similar steps were also used to calculate the distance adherence score. First, the number of miles (or minutes) walked per week was calculated by summing the daily miles (or minutes) for each of the 12 weeks. Second the mean number of miles (or minutes) walked per exercise day each week was calculated by dividing the number of miles (or minutes) walked per week by the number of exercise days for that week. If the number of exercise days for any given week equaled zero, the mean number of miles walked for that week was scored as zero. Third, the average distance walked per exercise day was calculated by summing the weekly miles (or minutes) per exercise day means obtained in the second step and dividing by 12. Finally, the distance adherence score was calculated by dividing the

mean actual miles (or minutes) walked per exercise session by the intended miles (or minutes) per session. The total adherence score was determined by calculating a mean from the days adherence score and the miles (or minutes) adherence score.

Benefits of walking: Beliefs regarding the positive physical, psychological, and social aspects of walking for exercise (Sechrist, Noble Walker, & Pender, 1987).

Operationalization of Benefits: Benefits of walking were measured using the benefits subscale on the Exercise Benefits/Barriers Scale (Sechrist, Noble Walker & Pender, 1987). The benefits subscale consists of 29 items (1, 2, 3, 5, 7, 8, 10, 11, 13, 15, 17, 18, 20, 22, 23, 25, 26, 27, 29, 30, 31, 32, 34, 35, 36, 38, 39, 41, 43) and includes the following five factors: life enhancement, physical performance, psychological outlook, social interaction, and preventive health. Ratings were made on a Likert scale with the response options ranging from strongly agree = 4 to strongly disagree = 1). A score on the Benefit subscale was obtained by summing the responses. Because missing items totaled less than 5 percent of the total responses, median substitution was used to prevent a falsely low score (Sechrist, 1993).

Barriers to walking: Beliefs regarding the potentially negative aspects of participating in a walking for exercise routine (Sonstroem, 1988).

Operationalization of Barriers: Barriers to walking was measured using the barriers subscale on the Exercise Benefits/Barriers Scale (Sechrist, Noble Walker & Pender, 1987). The barriers subscale consisted of 14 items (4, 6, 9, 12, 14, 16, 19, 21, 24, 28, 33, 37, 40, 42) and included the following four factors: exercise milieu, time expenditure, physical exertion, and family discouragement. Ratings were made on a Likert scale with the response options ranging from strongly agree = 1 to strongly disagree = 4. A Barriers Scale score was

computed by summing the responses. Because missing items totaled less than 5 percent of the total responses, median substitution was used to prevent a falsely low score (Sechrist, 1993).

Perceived health status: the perceived health state of the individual at the current time.

Operationalization: Perceived health status were measured using three questions. The first question asked "To what extent do you believe you are healthy?" The second question asks "To what extent are you experiencing unpleasant or uncomfortable physical symptoms?" The third question asks "To what extent are you able to function at what you believe is your capability level?" The response scale for all three items ranged from not at all (0) to a very great extent (6). The Perceived Health Status score was calculated by reverse scoring question 2 and computing a mean score for the three items. (Lyon & May, 1993)

Normative beliefs: The perceived approval for participation in a walking routine received from family, friends and fellow walkers and the influence this approval exerts on walking behavior.

Operationalization: Perceived approval from family, friends and fellow walkers was assessed using three items. The first item asked the participant, "Does your family approve or disapprove of your participation in a walking for exercise routine?" The second and third items were similar except the second item asked about approval from friends and the third item asked about approval from fellow walkers approval. The response scale for the approval items ranged from strongly disapprove (1) to strongly approve (5). A response option for no contact (6) was also provided. Influence was also assessed using three questions. The first question asked "Does your family influence your participation in your walking for exercise routine?" The second and third influence questions were similar except the second item asked about the influence of friends and the third item asked about the influence of fellow walkers.

The response scale for the influence items ranged from not influence you (1) to strongly influence you (4). The family approval item was paired with the family influence item. The friends items and the fellow walkers items were similarly paired. Using the numerical values on the response scales, scoring was completed for each item pair by multiplying the response for the approval item times the response for the influence item. An Approval/Influence Total score was calculated by summing the family, friends, and fellow walkers scores.

Hypotheses

1. The combination of Exercise Benefits and Exercise Barriers Scale scores and significant demographic and environmental factors will predict adherence to a walking routine.
2. The combination of Social Support and Walking Survey scale scores and significant demographic and environmental factors will predict adherence to a walking routine.
3. The combination of Walking Confidence Survey scale scores and significant demographic and environmental factors will predict adherence to a walking routine.
4. The combination of the Approval/Influence Total Score and significant demographic and environmental factors will predict adherence to a walking routine.
5. The combination of Perception of Health Scale scores and significant demographic and environmental factors will predict adherence to a walking routine.
6. The additive influence of Exercise Benefits Scale, Exercise Barriers Scale, SSWS, WCS, Approval/Influence Family, Approval/Influence Friends, Approval/Influence Fellow Walkers and Health Perception Scale in combination with significant demographic and environmental factors will predict adherence to a walking routine.

Research Questions

1. What demographic characteristics best describe a population of walkers?
2. Are factors predictive of walking for exercise adherence and walking for exercise cessation the same?

Assumptions

1. Participants will answer survey items and record exercise behaviors honestly and accurately.
2. Participants will honestly and accurately record in the Walking for Exercise Log or report during a telephone interview their actual exercise behaviors.
3. Mall walking is an unsupervised, moderate intensity exercise.
4. Study participants have had sufficient walking experience to be considered in the second transitionary phase (adherence) of the Natural History of Exercise Model.

Limitations

1. Participant selection will be primarily a convenience sample of Silver Striders members precluding generalization of findings to larger populations.
2. The Silver Strider member is 50 years or older precluding generalization of finding to younger walkers.
3. Reported exercise behaviors will not be validated with physiological measures.
4. Reported exercise behaviors will not be observed by the researcher.
5. Adherence data collection will be limited to a twelve week diary report and follow up phone call (as needed).

CHAPTER 2

THEORETICAL FRAMEWORK AND REVIEW OF THE LITERATURE

Introduction

Bandura (1986) suggested that the value of a cognitive theory is judged by its ability to effect behavior change. Consistent with Bandura's premise, The Natural History of Exercise Model (Sallis & Hovell, 1990) was designed to increase understanding of the cognitive, personal, and environmental factors influencing exercise participation. The ultimate purpose of the model is to provide a framework for future development of intervention strategies.

Albeit more than 200 studies have been conducted in the past 20 years on determinants of exercise behavior (Dishman, 1988; Sallis & Hovell, 1990), reviews of these studies reveal that most of the exercise adherence information is descriptive data. Despite the volume of research, many studies are of limited merit due to design flaws resulting in an inability to explain or predict exercise adherence with the precision or reproducibility needed to design interventions aimed at changing current physical activity and exercise patterns (Dishman, 1988). The Natural History of Exercise Model (Sallis & Hovell, 1990) was designed to provide a behavior-specific framework for future development of intervention strategies. These strategies will have the potential to favorably influence personal, environmental and cognitive factors hopefully resulting in improved healthy exercise behaviors.

The following review is organized according to NHEM transitionary stages with a focus on literature pertinent to predicting second transitionary phase behavior. In the second transitionary phase section of the literature review, extant research focusing on NHWEM (second transitionary phase) factors is presented. This critical review of NHWEM second transitionary phase research encompasses the empirical literature that treats efficacy, social

support, benefits/barriers, health perception and normative beliefs as situation specific, cognitive independent variables. Empirical support for the links between the cognitive independent variables and moderate intensity exercise adherence is emphasized. Because the present study is based on the premise that predictors of exercise adherence are behavior specific, research documenting the relationship between activity levels and supervision concludes the review.

First Transitionary Process: Sedentary to Adoption Phase

The first transitionary process begins with a sedentary lifestyle and progresses to adoption of an exercise routine (Sallis & Hovell, 1990). According to Janis and Mann (1977) the process of behavior change is initiated when a disturbing event or information threatens an individual's sense of well-being. The threatening information or event produces a temporary personal crisis if the individual begins to correlate a sedentary lifestyle with an undesirable outcome. For example, a sedentary son questions the wisdom of inactivity after visiting his critically ill father in the coronary care unit. After discussing his father's myocardial infarction diagnosis with the physician, the son reads a pamphlet on the risk factors of heart disease in the waiting room. Identifying personal risks and feeling vulnerable to a similar fate, the son schedules a physical exam with his doctor. Diagnostic findings including hypertension and elevated cholesterol levels further intensify the son's personal crisis. Options considered by the son at this time include maintaining the same lifestyle and hoping for a better outcome than the father or initiating a program of diet and exercise to control the blood pressure and cholesterol.

The son will make significant decisions during this first transition process. According to Janis and Mann (1977) a decisional balance sheet may be devised which includes main

considerations that enter into the decision making process. First the son may conclude that valuable personal benefits could be derived from exercise participation. Next, he may decide that walking might be a form of exercise that fits his abilities and preferences. If perceived potential benefits outweigh losses associated with initiating a walking routine, a decision to initiate the walking routine is made. Finally, the time and place to begin exercising is determined and the son completes his first walking for exercise experience. (Sallis & Hovell, 1990)

Studies focusing on this first transitionary process are needed. In a literature review by Sallis & Hovell (1990) only six studies could be located that investigated factors influencing the adoption of physical activity. Most of these studies focused on individuals who joined specific supervised exercise programs. Major design flaws in these studies included: convenience sampling, retrospective designs, and not using exercise as the dependent variable. Studies specifically examining the events of the first transitionary process for unsupervised moderate intensity exercisers were not found (Sallis, Hovell, & Hofstetter, 1992, p. 238).

A computerized literature search using the data base Silver Platter 3.1 SPORT Discus 1975 to December 1992 was completed to locate additional studies on exercise adoption. Despite the volume of literature included in the data base, only one study focusing on exercise adoption was cited (Long & Haney, 1986).

A second computerized literature search using the data base Colorado Alliance of Research Libraries (CARL) Release A.101 was also completed using the words moderate, intensity, exercise, and adoption. The CARL data base includes over 3,000,000 articles with 750,000 articles added annually since 1988. Although 6,552 articles were included in the exercise file, only two citations were identified when the search was limited to exercise adoption/initiation.

Although predictors of exercise adoption differ for moderate and vigorous intensity levels, examining predictors of adoption for vigorous exercise may provide cues for future studies of moderate intensity exercise adoption. A prospective study (Sallis, Haskell, Fortmann, Vranizan, Taylor & Solomon, 1986) involving a community sample of over 1400 adults was designed to examine predictors of vigorous exercise adoption. Univariate data analyses suggested several predictors for the adoption of vigorous exercise for women and/or men. The suggested predictors included: exercise self-efficacy, health knowledge, attitudes toward exercise, and participation in moderate-intensity activity at baseline (Sallis, Haskell, Fortmann, Vranizan, Taylor & Solomon, 1986). Although the findings suggested that it is possible to identify determinants of exercise, an incomplete list of determinants and an atheoretical framework limit the usefulness of the findings (Sallis & Hovell, 1990). A similar prospective study design for moderate intensity exercise coupled with a theoretical framework could provide valuable data for helping persons adopt moderate intensity exercise routines.

Second Transitionary Phase: Adoption to Drop-out or Adherence

The second transitionary (figure 3) process begins after an initial performance of the exercise activity and continues through adherence or drop out. This process is vital because fitness and health gains achieved as a result of exercise adoption require routine maintenance (Sallis & Hovell, 1990). Without routine maintenance, gains are soon lost.

Research indicates that half of the individuals adopting an exercise routine will drop out in the first year. This percentage is similar for clinical cardiac rehabilitation patients (Olridge, N. 1979) and the general population (Sallis, Haskell, Fortmann, Wood & Vranizan, 1986). In order to achieve long term exercise-related benefits, intervention strategies for decreasing drop out rates

need to be developed. Understanding the factors that influence exercise behavior during the second transitional phase is the first step in this process. To date, most of the research on exercise determinants has focused on the second phase. (Sallis & Hovell, 1990)

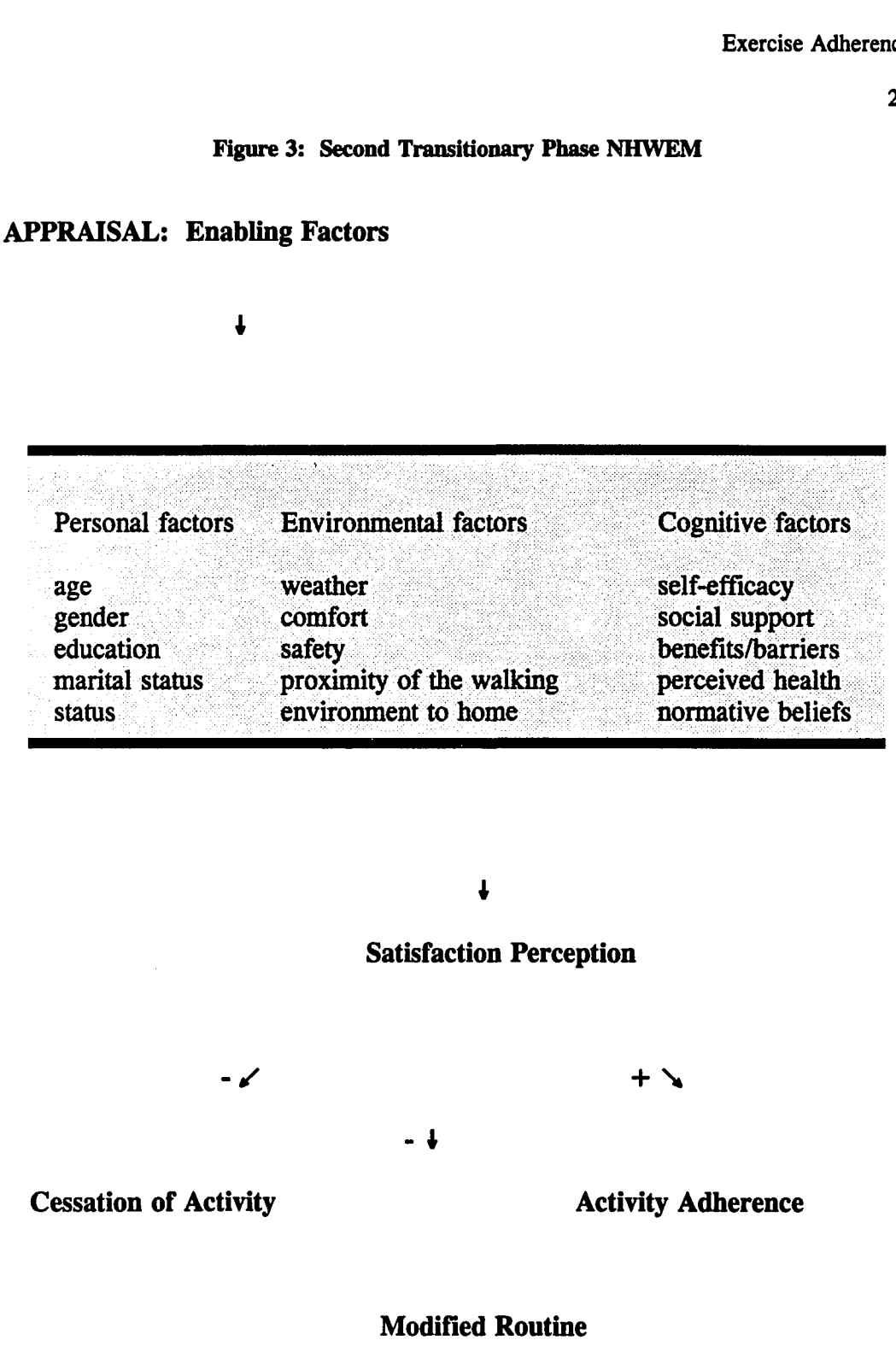
Appraisal and exercise performance are important second transitionary phase activities. The second transitionary phase appraisal differs from the appraisal that resulted in activity initiation. The appraisal process is now shaped by the experience of the initial activity performance. A description of personal, environmental and cognitive factors included in the second transitionary process appraisal process follow.

Personal factors: Age, Gender, Education, and Body Size

Personal factors linked to exercise adherence include age, gender, education and body size. Although specific research data describing the direct relationship between these factors and adherence to moderate intensity exercise routines is limited, some links are suspected. Despite the unalterable nature of age and gender, research suggests that these variables exert a moderating effect on cognitive factors including self-efficacy, social support, perceived benefits, perceived barriers, and perception of health (Sallis, Hovell & Hofstetter, 1992). Because interventions for bolstering these cognitive factors should be population specific, it has been important to include these unalterable variables in the Natural History Models.

Age and gender are factors which have been correlated with exercise adherence. Research findings suggest that women and older adults are the most likely to participate in walking routines for the purpose of moderate intensity exercise (Sallis, J., Haskell, V., Fortmann, S., Wood, P., & Vranizan, K. 1986; Sallis et al., 1985). In a study of over 2050 adults designed to identify the correlates of walking for exercise, the strongest zero-order correlation (0.23) obtained for minutes of walking per week was age (Hovell et al., 1989). Older

Figure 3: Second Transitionary Phase NHWEM



individuals reported more walking for exercise than did younger persons and women engaged in more walking than men (Hovell et al., 1989, p. 864). Research designed to determine the mechanisms accounting for the relationship between age and walking adherence and the interaction between age, walking adherence and cognitive factors is needed to provide answers to some of the following questions. Do older adults select a moderately intense activity because they believe they are incapable of vigorous exercise routines? Do older adults participate in moderately intense activity because of a recommendation from a health provider or friend? Is participation in moderately intense routines a mechanism for social networking? Do older adults perceive themselves to be less capable of participating in an exercise routine?

Results of a study by Sallis et al. (1992) examining predictors of vigorous physical activity adoption suggested that some variable relationships may be gender specific. According to study data, men were most influenced by physical environment variables and women were most influenced by social variables. Although gender as a variable is unalterable, the influencing factors of physical environment and social variables are subject to intervention influences. The mechanisms accounting for the correlation between gender and exercise participation need to be further explored and gender specific intervention strategies designed. The personal factor of education has been inconsistently linked with exercise adherence. Previous exercise participation studies linked education with moderate and high intensity exercise adherence (Dishman, R., Sallis, J., & Orenstein, D. 1985). Recent theoretically developed research however suggested that this linkage may not be universally warranted. In a study of 1,719 individuals designed to identity adoption and maintenance determinants for vigorous physical activity, education as a predictor was gender and transitionary phase dependent (Sallis, Hovell, & Hofstetter, 1992). The study results suggested that education

was a predictor of vigorous exercise adoption for women but not a significant predictor for men. Second transitionary phase NHWEM research is needed to evaluate the mechanisms accounting for the relationship between education and walking adherence and to assess the interaction between education, walking adherence and cognitive factors.

The personal factor of body size as a determinant of physical activity has been evaluated using a variety of frameworks and methods. Sallis et al. (1989) used a physiological measure and a perceptual measure of body size in a study designed to describe the determinants of vigorous exercise. Survey data was collected by mail from 2,053 participants in San Diego. Body mass index, calculated as weight (kg) /height (m^2) was used as a physiological measure and the question "self-conscious about my looks when I exercise" was used as a perceptual measure. Each measure was analyzed separately. Neither variable emerged as an important correlate of physical activity in this study (Sallis et al. 1989). A combined measure capturing both physiological and psychological measures might show higher correlations to activity participation than the single measures analyzed independently.

Dishman and Gettman (1980) proposed the psycholobiologic model to evaluate a combined physiological and psychological measure for predicting exercise adherence. According to the reported data, the combined effects of body weight and self-motivation successfully predicted 80 percent of the adherent individuals in a high intensity exercise program. Subsequent application of the psychobiologic model found it effective in predicting exercise adherence for 83 percent of the males and 91 percent of the females (Ward & Morgan, 1984). Although the data suggests a relationship between body weight and higher intensity, structured public exercising, it would be inappropriate to generalize this relationship to participants in an unstructured moderate intensity walking program (Sallis, Hovell, Hofstetter, Faucher, Elder,

Blanchard, Caspersen, Powell, & Christenson, 1989). Research designed to determine the mechanisms accounting for the relationship between body size and walking adherence and the interaction between body size, walking adherence and cognitive factors is needed.

Personal factors measured in the current study included age, gender and education. This data was recorded by the study participants in the Walking for Exercise Survey booklet. Because an accurate assessment of body size requires physical evaluation beyond the scope of a survey design, body size was not measured.

Environmental factors

Environmental factors can be described as characteristics of the physical environment that influence exercise behavior. Variables such as safety of the exercise environment, convenience (ie. proximity to home or work), temperature, and terrain are examples of environmental factors. Safety concerns for walkers might include traffic, weather, and neighborhood security, and dangerous surfaces (for outdoor walkers). Similar concerns for mall walkers might include: the presence of gangs and disruptive individuals, reports of thefts and/or personal attacks, and inadequate security personnel. Individuals who prefer to walk in shopping malls may identify comfort benefits such as heating in the winter or air conditioning in the summer. Other factors influencing comfort may include walking surface, bathroom facilities, and readily available water fountains. The proximity of the exercise environment to home or work may also influence adherence to the walking routine.

Two reported studies evaluated the relationship between exercise adherence and environmental factors. Hovell et al. (1989) investigated the correlates of walking for exercise and Sallis et al. (1992) investigated predictors of vigorous physical activity adherence. The same data collection instrument representing physiological, psychological, social and physical

environment factors consistent with the NHEM was used for both studies. Data analysis lead to the conclusion that the environment was a significant determinant of vigorous activity participation but not walking. Because many of the environment measures included in the instrument favored vigorous exercisers, use of this instrument to assess the walking environment may have been inappropriate.

In the retrospective study of over 2,050 adults designed to identify the correlates of walking for exercise (Hovell et al. 1989), only an adjusted 20% of the variance in minutes of walking for exercise could be explained. Although environmental variables were included in the study design, they did not contribute significantly to the explained variance. Revision of the instrument used to assess walking adherence is needed to adequately evaluate the significance of the environment factor. First, the environment assessment instrument should be exclusively tailored to reflect a walking for exercise environment. Second, the walking for exercise environment should not be limited to the neighborhood because many walkers prefer to walk in alternate settings. Links between the 'safe neighborhood' variable in the Hovell et al. (1989) study and walking adherence were grounded in the assumption that walking for exercise occurs in neighborhoods. Because some walkers exercise in settings other than their residential neighborhood, (ie. shopping malls, parks, and work neighborhood) items assessing the walking environment need to be broader in scope. For these reasons, conclusions regarding the insignificance of the environmental factor as a predictor of adherence for individuals participating in a walking routine may be faulty.

Additional independent environment variables measured in the walking for exercise study (Hovell et al. 1989) included home equipment and convenience of facilities. Significant correlations between these variables and walking were not found. A possible explanation for

this might be the validity of the measures used for home equipment and convenience. Home equipment was measured by exercise related items including: bicycle, running shoes, workout tapes/records. Convenience was measured by exercise facilities perceived as convenient including: aerobic dance studio, bike land, running track. These equipment and facilities measures favor vigorous activity. Use of valid moderate-intensity exercise and walking specific measures might result in significant correlations.

Correlations between valid vigorous activity environment variables and participation in vigorous physical activity routines were evaluated by Sallis et al. (1992). Participants included 1719 randomly selected men and women who completed the initial survey and an additional 24 month follow-up. The follow up survey assessed vigorous physical activity participation. One way analysis of variance results indicated significant differences among environmental factors, gender, baseline activity (sedentary to active), and the performance of vigorous physical exercise routines at a 24 month follow-up. Significant environmental factor predictors of adoption of vigorous physical activity in sedentary men included: neighborhood environment ($p < .005$), convenience of facilities ($p < .003$) and home equipment ($p < .01$). Results supported the conclusion that the environmental variables exerted a facilitating effect for men who moved into the intermediate level (one to two sessions a week) of vigorous activity. Significant links between environmental factors and women were not supported by the data. According to research results, men were more influenced by environmental factors than women. Examples of survey items provided in the study report represented a variety of vigorous activities and did not appear to be gender biased. (Sallis, Hovell, Hofstetter, 1992)

Limitations of both studies include the use of retrospective designs and the reliance on self-report. Although the validity of self-report as a measure of exercise participation has been

documented using a 7-day recall instrument, (Sallis et al. 1985; Dishman & Steinhardt, 1988), the time interval of 24 months may not produce similarly reliable information.

Environmental variables which may influence adoption and maintenance of 'walking for exercise' need to be studied. Although for a neighborhood walker, the activity does not require a special facility, mall walkers (like vigorous exercisers) may be influenced by a convenience of facility variable. In order to avoid injury and promote comfort, walkers may also be inclined to purchase equipment such as shoes designed for 'walking for exercise' and/or weights designed to enhance the aerobic benefit of the activity. For these reasons, it would be desirable to study the influence of environmental factors on walkers as a unique population.

The importance of the environment may also vary depending on the nature of mediating variables. For example, a group of morning mall walkers may be less troubled by a safety concern than a neighborhood walker exercising alone in the evening. This may be especially true if the neighborhood is in an area known for criminal activity. A comprehensive assessment of walking environments may result in an increased contribution to the explained variance.

A five item Likert style Environment Evaluation was completed by study participants. The response options for each item range from strongly agree to strongly disagree. Environmental factors measured in these items included safety, convenience, proximity to home and personal comfort.

Cognitive Factors: Self-efficacy, social support, Benefits and Barriers, Perceived Health Status and Normative Beliefs

Cognitive factors with suggested links to exercise adherence include self-efficacy, social support, perceived health status, benefits/barriers, and normative beliefs. A discussion of each cognitive factor with specific links to exercise adherence follows.

Self-efficacy

According to Bandura's (1986) Social Cognitive Theory (SCT) behavior has multiple determinants. Personal variables are found within the individual and can be divided into biological and psychological factors. Links between these personal variables and exercise adherence have been suggested. Biological factors with links to adherence include age, sex, and obesity. Psychological factors with links to adherence include specific beliefs such as perceptions of self-efficacy, outcome-efficacy and past learning. (Dishman, 1988; Bandura, 1986)

Correlations between external factors and exercise adherence have also been suggested. Variables found external to the person can be divided into social and physical environmental factors. Social factors correlated with exercise adherence include social reinforcement, spouse support and peer influence. Physical environment factors correlated with exercise adherence include climate, home equipment, neighborhood environment, and convenience of facilities. (Bandura, 1986; Dishman, 1988)

Within Bandura's SCT, self-efficacy has a central role in influencing behavior change and adherence. Self-efficacy is defined as the belief that one can successfully perform a specific activity and is measured by the amount of self-reported confidence the person has in

performing the activity. As self-efficacy increases for the activity, the likelihood of performance increases. (Bandura, 1986)

Research suggests that self-efficacy is a determinant of current exercise and a predictor of future exercise behavior (Hofstetter, Hovell, & Sallis, 1990). When self-efficacy judgement for exercise is high, the belief in one's own capabilities for performing a specific exercise is present and an "I think I can do this" feeling exists. When the self-efficacy judgement for exercise is low, the individual doubts if the personal capabilities needed for exercise performance are present and an "I don't think I can do this" feeling results.

Studies attempting to establish a relationship between cognitive factors and activity adherence have been conducted using a variety of frameworks. Understandably, the use of different frameworks has resulted in inconsistent and often contradictory findings. A major difference in frameworks evolves around the trait versus situation debate. Research frameworks defining self-efficacy and social support as traits or global concepts have relied on the use of generic or trait-oriented instruments. Findings from these studies have been inclusive. Recently however, data suggests that when activity specific models and instruments are used a substantial and consistent link between self-efficacy and behavior can be shown. (Dishman, 1988; Sallis et al. 1988)

Using a prospective quasi-experimental design, Garcia & King (1991) evaluated the constructs self-motivation and self-efficacy as predictors of long-term adherence to an aerobic exercise routine. Dishman, Ickes, & Morgan's (1980) Self-Motivation Inventory (SMI) was used as the measure of self-motivation. The SMI instrument is theoretically based on trait theory. The self-efficacy measure was a 14 item behavior specific scale developed for use in the study. This self-efficacy scale is theoretically based on Social Cognitive Theory.

Participants comprising a community-based sample of 74 participants were randomly assigned one of four groups. These groups included a moderate-intensity condition, a moderate-intensity home-based condition, a low-intensity home-based condition and an assessment-only control. At baseline, 6 months, and 1 year intervals, the participants came into a clinic and completed the Self-Motivation Inventory and the behavior specific self-efficacy scale. During these clinic visits, participants were also given a graded exercise test. (Garcia & King 1991)

Pearson correlations were computed between Self-Motivation Inventory scores and exercise adherence and between self-efficacy scores and exercise adherence at the 6 month and 1 year assessment. According to study data, self-efficacy was positively correlated with adherence in both the 6 month ($r = .42$, $p < .001$) and 1 year period ($r = .44$, $p < .001$). A significant relationship was not validated between self-motivation and adherence. Using Steiger's formula to calculate the t for comparing a pair of correlations from dependent samples, a significant difference was found between the correlation of self-motivation with adherence as opposed to self-efficacy with adherence at the 6 month and 1 year. Partial correlation between average adherence over the 12 months and self-efficacy at 1 year, after controlling for self-efficacy at baseline was 0.37 ($p < .01$). These results suggest that individual efficacy beliefs concerning the likelihood of engaging in specific, well-defined behavior are strongly related to the performance of those behaviors. (Garcia & King, 1991)

Because self-efficacy is activity specific and varies across and within individuals, activities, and situations, it is considered a state phenomenon (Bandura, 1986). For example, a person may believe he can perform a walking routine but highly doubt he can survive an aerobic routine. For this reason, very general measures of self-efficacy are incapable of predicting behavior in specific situations (Sonstroem, 1988). For example, a physical self-efficacy scale

generalizable to a wide variety of situations requiring physical skills developed by Ryckman, Robbins, Thornton, and Cantrell (1982) failed to predict performance at four specific gymnastic events.

Results of social cognitive theory based studies by Sallis et. al (1988) supported the premise that self-efficacy is behavior specific. Several studies were designed to describe self-efficacy expectations for health-related eating and exercise habits. Initial research involved the development and testing of a Self-efficacy for Eating Behaviors Scale and a Self-efficacy for Exercise Behaviors Scale. To ensure content validity, only persons actually making behavior changes in the areas of diet and exercise were recruited for participation. Drafts for both scales were developed using data collected during one hour structured interviews with 40 multicultural adults. During the interview, a list of open ended questions was presented. (Sallis et al. 1988)

The initial Self-efficacy for Eating Behaviors Scale consisted of 89 items and the Self-Efficacy for Exercise Behaviors Scale consisted of 49 items. Items were responded to with ratings made on a Likert-type scale. Responses ranged from 'Sure I could not do it' (1) to 'Sure I could do it (5), with a response option for 'does not apply'. The factor analysis solution for the 61 item Self-Efficacy for Eating Behaviors Scale consisted of five factors, accounting for 44% of the variance. All factors had eigenvalues >2.0. Factor analysis solution for the Self Efficacy for Exercise Scale consisted of two factors with eigenvalues > 2.0 and 12 items. (Sallis et al. 1988)

Construct and criterion-related validity of the self-efficacy scales for diet and exercise was assessed using three different techniques. First, the Multidimensional Health Locus of Control (MHLC) scale (Wallston, Wallston & DeVellis, 1978) was chosen because it provides

a global measures of expectancies the self-efficacy scales were designed to assess in specific ways. The hypothesis that self-efficacy would have low to moderate correlations with the scores on the MHLC was supported by the data. Second, a food frequency questionnaire was administered. Participants rated their usual frequency of consumption of 39 food items. Food items were then categorized by a registered dietitian as either 'heart healthy' (low in saturated fat and/or sodium) or 'not heart healthy' (high in saturated fat and/or sodium). The hypothesis that food frequency reports would correlate with self-efficacy for eating behaviors scales scores was supported by the data. Third, self-reports of participation in vigorous physical activity were quantified. The item asked participants if they participated in any physical activity, three times a week, vigorous enough to make you breathe hard and sweat. The hypothesis that scores on the Self-efficacy for Exercise Behaviors Scales would correlate with self-reports of participation was also supported by the data. (Sallis et al. 1988)

The ability of activity specific self-efficacy measures to predict specific behaviors was supported by study findings. Furthermore, study findings were consistent with the social cognitive theory assumption that perceptions of efficacy are activity specific. Scale factors measuring self-efficacy for dietary behaviors were strongly correlated to reported attempts to alter eating habits but were unrelated to exercise habits. Conversely, the self-efficacy for exercise factors were strongly correlated to reported exercise behaviors but were unrelated to reported dietary change attempts. (Sallis et al. 1988) According to McAuley (1992), efficacy beliefs are behavior specific and therefore, subject to change as a function of stimuli. Positive mastery experiences from the first transitional process are likely to facilitate subsequent increases in personal efficacy, whereas failures are likely to result in reduced perceptions of

personal capability. Individuals with a high sense of self-efficacy approach more challenging tasks, put forth more effort, and adhere longer in the face of obstacles, barriers, and aversive or stressful situations (Bandura, 1986).

A link between self-efficacy and walking for exercise was also suggested by Hovell et al. (1989). Zero-order correlations between seven independent variables and the dependent variable (number of minutes of walking for exercise per week) obtained coefficients greater than 0.10. These independent variables included: age (0.23), eating a heart-healthy (low-fat) diet (0.20), self-efficacy (0.19), perceived barriers to exercise (-0.15), vigorous exercise (0.14), family support (0.11), and exercise history (-0.10). Multiple correlations explained an adjusted 20% of the variance in minutes of walking for exercise. Although these magnitudes of associations are small, evidence of important variables which predict participation in walking for exercise routines is suggested.

The three items measuring self-efficacy rated an individual's perceived confidence in the ability to: set aside time for exercise, exercise when feeling sad or under stress, and exercise when family or social demands are great. Consistent with the NHEM, these items evaluated self-efficacy as an activity specific phenomenon. These three items are also consistent with the two factors of exercise self-efficacy described on the Self-Efficacy for Exercise Behaviors Scales (Sallis et al. 1988). Factor 1 is resisting relapse and factor 2 is making time for exercise.

It was concluded by Hovell et al. (1989) that powerful correlates of walking for exercise have yet to be determined. Although the items assessing self-efficacy demonstrated face validity, they did not specifically address an activity (ie. walking routine or moderate intensity exercise). According to the NHEM theory base, activity-specific measures are more powerful

predictors of behavior than generalized measures. Specific self-efficacy for walking adherence instruments are needed to accurately assess the relationship between self-efficacy and walking adherence.

Social Support

Social support is defined as the perception that others are available and capable of rendering assistance to facilitate the performance of a specific behavior. Sallis et al. (1987) suggested that the perception of social support is a determinant of exercise and diet adherence when conceptualized as an activity specific variable. According to this premise, the perception of social support for exercise adherence increases the likelihood of continued exercise participation but is unrelated to behavioral
outcomes in other areas such as diet.

Cumulative research data suggests that perceptions of social support may be related to successful behavior change. Unfortunately, this relationship has been inconsistently demonstrated. Inconsistent findings can partially be attributed to the fact that much of the social support research has been atheoretical. This atheoretical approach to research has resulted in diverse conceptualization and operationalization of the social support concept (Cohen & Wills, 1985). Additionally, it has become clear that social support is not a single concept but rather, a term with multiple and often inconsistent meanings (Sarason, Sarason & Pierce, 1990). Efforts to combine findings from these atheoretical studies to build a body of social support knowledge have often been met with frustration and inconclusive results. For this reason it is critical that a clear definition of the social support variable be provided in study frameworks.

Most of the measures of social support can be classified as one of the following: social integration measures, enacted support measures, received support measures or perceived support measures (Sarason, Sarason & Pierce, 1990). Berkman and Syme's (1979) single scale measure of social integration assesses four types of social ties for presence and extent. These types of social ties include: marriage, contacts with extended family and friends, church membership, and other formal or informal group memberships (Syme, 1979: cited in Sarason, Sarason & Pierce, 1990). A theoretical problem with this measure is the assumption that because relationships exist they are viewed as supportive by the recipient.

Measures of enacted support focus on the actions performed by others to assist a given person. Measures of received support focus on the recipient's report of other's helpful or intending to be helpful behaviors. Studies comparing support provided as reported by the caregiver and support received as reported by the recipient have found only about 50 to 60 percent agreement, indicating conceptual differences (Antonucci & Israel, 1986). Researchers investigating a comparison of the social support enacted with the social support received measures noted that it was not unusual for care-giver's and recipient's responses to differ. They attributed this difference in responses to care-givers' reports that they provided more support than the recipients reported as received (Ingersoll-Dayton & Antonucci, 1983: cited in Sarason, Sarason & Pierce, 1990). Additionally, it is interesting to note that recipient's reports of received support differed from their perceptions of support that might be available should they wish or need it in the future (Sarason, Sarason & Pierce, 1990).

It is suggested that individual perceptions are antecedents of behavior (Janis & Mann, 1977; Bandura, 1986). Perceived social support measures ask the recipient to describe both the received support provided and their perception of whether or not the actions actually provided

support. The inclusion of their perception of actually provided support makes this conceptualization different form the received support measure discussed previously. The emphasis on individual perceptions is consistent with cognitive appraisal frameworks. In the process of decision-making, Janis & Mann (1977) focused on individuals perceptions of personal risk. Their analysis of the decision-making process suggested that individuals' subsequent behavior is a product of their perceptions of risk and vulnerability. It is therefore not surprising that of the measures of social support described, perceived social support measures have been most consistently linked with health behaviors and outcomes. The conceptual definition of social support used in this study is consistent with the perception of social support construct described above. (Janis & Mann, 1977)

Relationships between favorable health outcomes associated with regime adherence and social support have been suggested by studies involving participants diagnosed with diabetes (Edelstein & Linn, 1984), coronary heart disease (Davidson & Shumaker, 1987), and pain (Hudgens, 1979). Other studies have suggested links between social support and successful smoking cessation (Mermelstein, McIntyre, & Lichtenstein, 1983), weight-loss (Rosenthal, Allen & Winter, 1980; Murphy, Williamson, Buxton, Moody, Absher & Warner, 1982; Dubbert & Wilson, 1984) and adherence to exercise regimens (Dishman, Sallis & Orenstein, 1985; Martin & Dubbert, 1982).

In many studies, social support has been measured as a global construct. Two instruments frequently used include the Social Support Questionnaire (SSQ) which measures perceived available support (Sarason, Levine, Basham, & Sarason, 1983) and the Interpersonal Support Evaluation List (ISEL) which measures four separate types of support measures (Cohen, Mermelstein, Kamarch, & Hoberman, 1985). Instruments assessing social support as a

general construct measure the overall perception of support and then infer activity specific outcomes. Both the SSQ and the ISEL have been used in attempts to link the concept of social support with behavioral outcomes with inconsistent results.

Results from two theoretically based studies designed to evaluate the relationship between activity specific measures of social support and health related behaviors supports the premise that social support is behavior specific. First, an interview format was used by Sallis et al. (1987) to collect data from individuals with impending health behavior changes. Data gathered from interviews was used to formulate the Social Support and Eating Habits Survey and the Social Support and Exercise Survey. Second, data was collected using three measures of social support including: The Social Support and Eating Habits Survey, The Social Support and Exercise Survey and The Social Support Questionnaire (SSQ). Significant correlations between the positive comments ($p < .01$) and family encouragement ($p < .001$) factors found on the Social Support and Eating Habits Survey and the healthy dietary index were noted. Scores on the Social Support and Exercise Survey significantly correlated with vigorous exercise ($p < .001$) however, the SSQ data did not significantly correlate with reported dietary or exercise behaviors. This suggests that specific social support measures, but not measures of general support were related to the reported behaviors. Correlations between the specific diet and exercise scales and the SSQ were low and nonsignificant suggesting that the specific and general measures for social support are conceptually different. (Sallis et al. 1987)

Testing of the relationship between scores on the Social Support and Exercise Survey and the ISEL, another general measure of social support is needed. Although the ISEL and SSQ

are both general measures for social support, conceptual differences make it likely that they are measuring different but probably related phenomenon.

The SSQ was designed to measure perceived available support and is composed of two scales. SSQN represents the number of perceived available supports on which a person can rely in times of need. SSQS represents the perceived satisfaction with the perceived available support. (Newcomb, M. 1990)

The ISEL consists of four subscales each measuring a type of perceived support. The first scale measures tangible support in the form of material aid. The second scale measures appraisal support in the form of advice and discussion. The third scale measures self-esteem support in the form of favorable comparisons with others. The forth scale measures belonging support in the form of identification with a social network. (Newcomb, M. 1990)

Because of conceptual differences in the instruments, generalizing the findings obtained from using the SSQ as a measure of general support to all measures of general support is premature. Replicating study findings with other general measures of social support will strengthen the premise that behavior specific measures of social support are better predictors of behavior than general measures.

As previously noted, activity-specific measures of social support are more powerful predictors of behavior than generalized measures. Consistent with this premise, a social support for walking adherence instrument is needed. Social support for walking adherence instrument development is a prerequisite to the accurate assessment of the relationship between social support and walking for exercise adherence.

Benefits and barriers

Since the early 1950's, researchers have studied the relationship between perceptions of benefits/barriers and health-related behavior. The Health Belief Model (Rosenstock, 1974) was designed to predict disease prevention behaviors and the Health Promotion Model (Pender, 1987) was designed to predict behaviors performed for the purpose of enhanced health and well being. Both the Health Belief Model and the Health Promotion Model include perception of benefits and perception of barriers as significant variables in the prediction of health related behaviors.

Pender (1987) suggests that the determinants of health-related behaviors are influenced by individual perceptions. Walking for exercise can be motivated by either a disease prevention or a health promotion benefit. Individuals who walk to reduce blood pressure, decrease the likelihood of another myocardial infarction, or lose weight may likely have disease prevention in mind when initiating participation. Individuals who walk to improve their quality of life may be focusing on health promotion. Although both disease prevention and health promotion frameworks have supported significant links between perception of benefits and perception of barriers and exercise behaviors, this support is not without challenge.

According to Rosenstock's (Rosenstock, Strecher & Becker, 1988) Health Belief Model (HBM), health-related behaviors are preceded by three factors. The first factor is the existence of a health concern. This concern makes the health issue personally relevant. The second factor is the perception of susceptibility to the health problem. This factor is termed perceived threat. The third and final factor is the perception that following a health recommendation would be beneficial in reducing the previously noted threat, at a subjectively-acceptable cost. The phrase, subjectively-acceptable cost, refers to perceived barriers that

must be overcome in order to follow the health recommendation. Cost as empirically operationalized by Melnyk (1990) includes the following five categories: provider-consumer relationships, fiscal cost, site-related factors, fear, and inconvenience. (Rosenstock et al. 1988)

Pender (1987) notes that not all health-related behaviors are motivated by perceptions of threat. Some health-related behaviors are motivated by a desire to increase a level of wellness. These health promoting behaviors are generally activities that persons perform routinely. According to the Health Promotion Model (Pender, 1987), cognitive-perceptual factors, modifying factors and cues to action combine to influence the likelihood of engaging in health-promoting behaviors. Cognitive-perceptual factors include: importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health status, perceived benefits of health-promoting behaviors and perceived barriers to health-promoting behaviors. Modifying factors include: demographic characteristics, biologic characteristics, interpersonal influences, situational factors and behavioral factors.

The following review focuses on the relationship between perceptions of benefits/barriers and exercise adherence. Although the populations described in the literature often differ from the proposed study population, rationale for measuring the perception of benefits and perception of barriers variables is supported.

Although a variety of physical, psychological and social benefits have been identified in the literature as potential outcomes of regular participation in exercise routines, the perception of potential benefits has been inconsistently correlated with exercise adherence. Reasons for this inconsistency may include: use of an inappropriate framework for determining anticipated exercise outcomes (health promotion versus health protection); a lack of reliable and valid

instruments operationalized at a behavior-specific level (Sechrist, Noble Walker & Pender, 1987); failure to separately analyze data for long term and short term benefits (Brunner, 1969); and the fact that role of benefits in predicting behavior may be mediated by other personal variables (Sallis, Hovell & Hofstetter, 1992).

In a study of 60 males, long term benefits were a more significant predictor of participation in a physical activity program than short term benefits. Brunner (1969) compared 30 middle-aged males with low-frequency participation with 30 males with high-frequency participation. Marked differences in perceived personal benefits were noted between the two groups. High-frequency participants ranked keeping fit physically as the most important benefit, while low-frequency participants ranked relaxation at the end of the day as the major benefit. The data suggested that the perception of a long term benefit (keeping fit) was a more significant predictor of on-going participation than the perception of a short term benefit (relaxation at the end of the day). (Brunner, 1969)

Robertson and Keller (1992) evaluated exercise behavior in a convenience sample of 51 adults. Criteria for study participation included (1) recent percutaneous transluminal coronary angiography (PTCA) or coronary artery bypass graft (CABG), (2) had undergone PTCA or CABG only once, (3) without recurrent chest pain, and (4) capable of participating in a specific exercise prescription. Most of the study participants were not involved in a cardiac rehabilitation program, nor was their exercise part of a formal program. The majority of the study participants indicated they walked three or more times a week (87%). (Robertson & Keller, 1992)

Although the perception of benefits combined with other variables to explain 31% of the variance in exercise adherence, benefits alone was not significantly explanatory. The variable

contributing the greatest amount of variance in exercise adherence was barriers. The minimal contribution of perception of benefits to the regression equation may be explained by the high correlation between perception of benefits and perception of barriers ($\underline{R}$ = -0.699, $\underline{p}$ = 0.001). Because of the redundancy in the benefits and barriers variables, the remaining unique contribution offered by perception of benefits was small. Further analysis of the data to determine the actual contribution of benefits to the regression equation is warranted. (Robertson & Keller, 1992)

A mailed survey study (n = 2,053) by Sallis et al. (1989) was conducted to evaluate the associations between several social learning theory variables and self-reported vigorous exercise. The study population was divided into four subgroups; men 18-49, men 50+, women 18-49, and women 50+. Each subgroup represented a specific target population in the community for planning intervention strategies. Variable selection was limited to (1) variables with research supported links to physical activity and (2) variables potentially responsive to intervention. Included among the 24 variables selected for were: benefits, barriers, self-efficacy, friend support, family support, environment, and normative beliefs. The fifteen items designed to measure barriers asked participants to rate the frequency with which factors "prevent you from getting exercise." The ten items designed to measure benefits asked participants to "rate agreement with possible exercise effects, e.g. feel less depressed and/or bored, meet new people, improve heart and lung fitness." (Sallis, et al. 1989)

Consistent with social learning theory, self-efficacy was the variable most highly correlated with vigorous exercise. In an effort to evaluate the relationship between variables that are hypothesized to precede both self-efficacy and vigorous exercise, self-efficacy was next

excluded from the multiple regression analysis. In three of the subgroups, the perceived barriers to exercise variable produced the largest beta (for the subgroup of men 18-49, the diet variable was equally strong.) Using the entire sample, each of the 15 survey items designed to measure the barriers variable correlated with vigorous exercise. The list of perceived barriers correlated with vigorous exercise included: lack of interest in exercise (-0.29), lack of enjoyment from exercise (-0.27), lack of self-discipline (-0.23), lack of company (-0.21), lack of knowledge on how to exercise (-0.19), lack of skills (-0.17), discouragement (-0.14), lack of equipment (-0.13), self-conscious about my looks when I exercise (-0.11), fear of injury (-0.11), lack of energy (-0.10), lack of facilities (-0.09), lack of good weather (0.08), lack of time (-0.05), lack of good health (-0.01). (Sallis et al., 1989)

Hovell et al. (1989) analyzed the responses from the Sallis et al. (1989) mailed survey to identify the correlates of walking for exercise. Zero-order correlations between each of the independent variables and the number of minutes of walking for exercise per week were calculated. Of the 24 independent variables measured, only seven obtained coefficients greater than 0.10. The strongest reported correlations were age (0.23), eating a low-fat diet (0.20), self-efficacy (0.19), perceived barriers to exercise (-0.15), vigorous exercise (0.14), family support (0.11), and exercise history (-0.10). Multiple correlations between the 24 independent variables and minutes of walking for exercise explained no more than an adjusted 20% of the variance in minutes of walking for exercise. Hovell et al. (1989) concluded that powerful correlates of walking have yet to be isolated.

A study designed by Sallis, Hovell & Hofstetter (1992) evaluated predictors of adoption and maintenance of vigorous physical activity in men and women ($\underline{N}$ = 1719). Study data suggested that the perception of benefits significantly predicted change in vigorous physical

activity over a 24 month period for sedentary and active men. In this study, the perception of benefits was not a significant predictor of exercise behaviors for women. Sallis et al. (1992) concluded that the predictive power of the benefits variable was mediated by gender.

Barriers were also reported by Sonstroem (1982) in a study of high and low attenders in a faculty fitness program. These barriers included: "take too much time," "require too much discipline," "make me feel too tired," and "be unpleasant." Although it is likely that moderate intensity exercisers share similar barriers to ongoing participation, validation of this assumption is needed.

Most of the studies evaluating the benefit/barriers factor have used vigorous exercise adherence as the dependent variable. Only one study evaluating the predictors of walking for exercise could be found. Because it is likely that predictors of exercise adherence are influenced by intensity, generalization of to vigorous exercise study findings to walkers is not appropriate. Using the NHWEM, the current study assessed the relationship between perceptions of benefit, perceptions of barriers and walking for exercise adherence.

Perceived health status

The relationship between health status and exercise participation has been investigated, however study results are inconclusive. Dishman et al. (1985) reported that circulatory disability was not a reliable predictor of adherence to a clinical exercise program. Oldridge (1982) and Dishman (1981) suggested that men in cardiac rehabilitation programs are more likely to adhere if they have documented heart disease or angina or have had one myocardial infarction. Links between health status and moderate intensity exercise adherence need to be assessed.

The reported decreased adherence for persons in a cardiac rehabilitation programs without a documented cardiac health problem may be related to a decreased perception of threat. In the conflict-theory model of decision-making (Janis & Mann, 1977, p. 71), mediating processes are anchored in observable antecedent conditions. For example if the observable antecedent condition is a health problem such as hypertension, the mediating process might include the question, "Are the risks serious if I don't persist with my exercise routine?" Risks would include phenomena such as heart attacks, strokes, permanent disability and/or death.

The extent to which the condition is observable to the individual may influence participation in exercise. If the individual has experience with disease-related symptoms, the perception of danger may be greater. According to Janis & Mann (1977), increased perceptions of danger associated with a specific diseases (threat) may result in initiatives to lessen risk. If it is believed that exercise will control the disease induced danger, adherence to a regular program of activity may be heightened.

Specific evaluation of the relationship between perception of health and exercise adherence is warranted. This relationship will be assessed using the NHWEM framework. The perception of health factor will be combined with other significant personal and environmental factors to predict walking for exercise adherence.

Normative beliefs

According to the Theory of Reasoned Action (Fishbein & Ajzen 1975), the direct determinant of any behavior is intention. The theory furthermore proposes that if an individual's intentions regarding physical activity participation were known, health providers would be able to predict future behavior.

Intentions are the product of two independent antecedents: attitude toward the behavior and the subjective norm. Attitude is a cognitive factor that refers to the individual's positive or negative evaluation of the behavior. In addition to attitude, intentions are influenced by perceived social pressure. The Theory of Reasoned action refers to this pressure as subjective norm. The subjective norm is formed from an individual's beliefs about the expectations of important individuals or referent groups regarding the performance of the action the tendency to comply with those beliefs. The Theory of Reasoned Action seeks to quantify the influence of persons identified as important on the behavior being studied. (Fishbein & Ajzen, 1975)

Theory of Reasoned Action revisions by Ajzen (1985) resulted in the Theory of Planned Behavior. According to the Theory of Planned Behavior, intention is not an exclusive predictor of behavior. When situations interfere with an individual's control over the intended activity, another construct is necessary for strong prediction. This additional construct is perceived behavioral control. Ajzen and Madden (1986) state that the perceived behavioral control concept is conceptually similar to Bandura's self-efficacy construct.

Research using the Theory of Reasoned Action to predict exercise behaviors has reported inconsistent findings. Study results reported by Dzewaltowski (1989), Godin et al., (1986), and Godin & Shephard (1986) did not support the theory premise that intentions are a strong predictor of physical activity participation. The strength of the relationships between theory variables was also reported to be weak.

The Theory of Reasoned Action was used as the conceptual framework in a study conducted by Pender & Pender (1986) to evaluate the influence of attitudes and subjective norms on intentions to engage in health behaviors. The behaviors studied included: regular exercise, maintain/attain recommended weight, and avoidance of stressful life situations.

Although multiple correlations between the two components of the model (attitudes and subjective norm) and intention to exercise was significant, only 5.5% of the variance in intention was explained. The correlation coefficient for the normative belief component with intention (R = .263) was reported to be higher than for the attitudinal component and intention (R=.177). The addition of the personal factor of weight to the normative belief and attitudinal component more than doubled the amount of explained variance in intention to exercise to 13%. (Pender & Pender, 1986).

Valosi, Desharnais and Godin (1988) tested the ability of the Theory of Reasoned Action to predict (1) the intention to participate regularly in some physical activity during free time and (2) actual exercise behavior. The study population consisted of 166 university employees who completed and returned the survey questionnaire which had been sent to them via internal mail. To assure that the survey accurately represented model concepts, the instrument was developed according to the criteria provided by Ajzen and Fishbein (1980). Perceptions of subjective norm were evaluated with the following item: With reference to the people considered most important, "How strongly do you believe they think you should participate regularly in one or more physical activities during your free time within the next three weeks?" This item was measured on a 7 point semantic differential scale with responses options ranging from unlikely (-3) to likely (+3). (Valosi, Desharnais and Godin, 1988)

According to Valosi, Desharnais and Godin (1988), the Theory of Reasoned Action explained 9% of the variability of the intention. In the regression equation, attitude toward the behavior was the only variable to contribute significantly to the prediction. The subjective norm variable was not a significant contributor to prediction of intention. Thirty-two percent

of the variability of the behavior was explained by intention. (Valosi, Desharnais and Godin, 1988)

Dzewaltowski, Noble & Shaw, (1990) evaluated the Theory of Reasoned Action and Planned Behavior using a population of 254 undergraduates enrolled in a required physical education course. A self-administered 7-day recall questionnaire was used to document physical activity participation. To assess the relationship between theory variables and activity participation, participants also responded to behavior specific survey items designed to assess intention, attitude and normative beliefs. Consistent with the Reasoned Action framework, intention predicted physical activity participation. Although attitudes predicted physical activity intention, subjective norm did not significantly contribute to attitude's predication of physical activity intention. (Dzewaltowski, Noble & Shaw, 1990)

A review of the studies using the Theory of Reasoned Action to predict exercise behaviors suggests that theory variables contribute to the prediction of intent and subsequent behavior. However, it must be noted that variables in Fishbein and Ajzen's (1975) theory do not account for all variations in exercise intent or participation. Pender and Pender (1986) noted that the addition of a body weight variable to the attitudes and subjective norm equation more than doubled the amount of explained variance for intention to exercise. Godin & Shephard (1987) added the "habit of exercise" as a new variable and significantly improved prediction accuracy for exercise behaviors. Work by Ajzen and Madden (1986) support the addition of a perceived behavior control variable. Based on the achievement of increased explained variance, it is concluded that efforts to develop models with greater efficacy to predict exercise behaviors are being rewarded.

The substantial increases in explained variance achieved by pairing Theory of Reasoned Action (Planned Behavior) variables with significant demographic variables resulted in the NHWEM inclusion of the normative beliefs cognitive factor. The perceived behavior control variable was not included in the NHWEM because of conceptual similarities with the self-efficacy factor (already included in the NHWEM). Consistent with Pender & Pender's (1986) reports of increased explained variance, significant demographic and environmental factors will be included in the regression equation when evaluating the relationship between normative beliefs and walking for exercise adherence.

Third Transitionary Process: Drop-out to Resumption

Following an appraisal of personal, environmental, and cognitive factors a decision to either repeat the exercise routine or relapse (drop-out) is made. The process of exercise relapse and possible resumption is referred to as the third transitionary phase. A description of this phase follows. A relapse occurs when an individual exercises regularly for at least six months and then stops exercising for at least three months (Sallis, Hovell, Hofstetter, Elder, Faucher, Spry, Barrington & Hackley, 1990). Few studies targeting this transitional phase can be found in the literature and most have two major limitations. The first limitation is that most relapse research has been limited to clinical populations such as participants in adult fitness programs. Determinants of relapse for participants involved in self-care nonsupervised programs have yet to be assessed. The second limitation is that most studies have focused on a singular incident of relapse. Because relapse in the general population is likely a part of a dynamic process, with a succession of minor lapses, total relapses, and recoveries after varying lengths of time, the pattern of the relapse cycle needs to be studied. (Sallis, Hovell, Hofstetter, Elder, Faucher, Spry, Barrington & Hackley, 1990).

Sallis, Hovell Hofstetter, Elder, Faucher, Spry, Barrington & Hackley, (1990) conducted a study to describe lifetime patterns of relapse from exercise. Participants (N = 1,811) were randomly selected residents from the San Diego area. Data was solicited using a mailed survey. The survey directed participants to report the number of times that they had exercised vigorously for at least six months and then stopped exercising for at least three months. Each participant was also asked to report current exercise practices. Participants reporting current involvement in two or more exercise sessions per week of 20 minutes or more in length were classified as exercisers. The remaining participants were classified as nonexercisers. Data summarizing survey responses follow: Twenty one percent (21%) reported three or more relapses, 19.9% reported one or two relapses and 59.1% reported zero relapses. Men and younger subjects had significantly more relapses than women and older subjects. Non-Caucasians had fewer relapses than Caucasians. The reasons for relapse reported by current exercisers (N = 211) included injury (22.4%), work demands (15.6%), lack of interest (11.8%), and lack of time (8.5%). The reasons for relapse reported by participants currently not exercising (N = 308) included injury (22.4%), lack of interest 19.5%), work demands (15.2%), and lack of time (12.7%). Significant correlates of relapse for the nonexercisers accounting for 11% of the variance included age ($p < .001$), injury as an adult ($p < .001$), education ($p < .001$), modeling history ($p < .002$) and home exercise equipment ($p < .020$). Significant correlates of relapse for the current exercisers accounting for 8% of the variance included exercise self-efficacy ($p < .001$), injury as a child ($p < .001$), and education ($p < .010$). (Sallis et al., 1990)

National surveys suggest that less than 20% of the United States adult population are engaging in regular vigorous exercise at any given time (Caspersen, Christenson, & Pollard,

1986). The data form the foundation for the assumption that programs to encourage persons to initiate an exercise routine are needed. Data reported by Sallis et al. (1990) however suggests that a relatively large portion of the population have previously initiated an exercise routine. Because individuals have a tendency to drop out and reinitiate exercise programs over the course of a lifetime, interventions need to focus on decreasing the stop-start time interval. For individuals with a tendency to drop out of exercise programs and remain sedentary, interventions need to focus on preventing drop-out. (Sallis & Hovell, 1990)

In addition to the transitionary process, determinants of adherence to an exercise routine is influenced by at least two other factors. The first factor is exercise intensity. The second factor is level of supervision.

Activity Levels

Activity levels are generally classified as either vigorous or moderate intensity. Activities requiring 60% or more of the maximal cardiorespiratory capacity such as running and aerobic bench exercise are high intensity (Sallis & Hovell, 1990). Activities requiring less than 60% of maximal capacity are referred to as moderate-intensity (Sallis & Hovell, 1990). Walking is a common moderate intensity exercise.

Studies suggest that the personal characteristics and determinants of high intensity and moderate intensity exercisers differ (Dishman, R., Sallis, J., & Orenstein, D. 1985). Despite the differences in determinants, theoretically designed studies of vigorous intensity exercise participation have provided helpful clues and insights for moderate intensity model design. For example, age and physical coordination were statistically linked to vigorous exercise adherence men and age and education were statistically linked to vigorous exercise adherence in women (Sallis, Hovell, & Hofstetter, 1992). Age and education were significant mediators

in studies of moderate intensity exercise adherence, however coordination was not (Hovell et al. 1989).

Level of Supervision

Another variable considered in both NHEM and NHWEM development is supervision. Organized, supervised exercise programs differ from unsupervised activity. Although research specifically comparing the adherence rates for the same exercise activity in supervised and unsupervised settings has not been reported, the assumption that the groups differ seems warranted.

Because of suggested differences related to personal factors, environmental factors, cognitive factors, intensity and level of supervision, models describing adherence need to be activity specific. Development of a model designed to describe adherence to an unsupervised walking routine may suggest potential intervention strategies for improving adherence to this type of exercise routine (Hovell, M., Sallis, J., Hofstetter, C., Spry, V., Faucher, P., & Caspersen, J. 1989; Sallis, J., & Hovell, M., 1990).

CHAPTER 3

METHODOLOGY

Introduction

Chapter three is organized into six sections. In the first section a description of the sample is provided. Protection of human subjects clearance is discussed in the second section. The third section includes a description of the study procedures and design. Instruments and measures comprising the Walking for Exercise Survey and the Walking for Exercise Log Book are described in the fourth section. The fifth section describes the Phase 1 preliminary data analysis procedures. Finally, the chapter concludes with a description of Phase 2 data analysis methods for hypotheses testing.

Sample

In order to determine sample size, a power analysis for multiple regression was completed using the program STAT Power: Statistical Design Analysis System (1991). Ten predictors were used in the equation to account for the addition of significant personal and/or environmental factors to the five cognitive factors. A significance level of .05, a power level of .90, an effect size of 0.3 and 10 predictors were entered into the power analysis equation resulting in a minimum study sample size of 67 participants. Although the power analysis indicated that 67 subjects would be an adequate minimum, Tabachnick & Fidell (1989) note that when using multiple regression, power may be unacceptably low in studies with fewer than 100 cases. This low power is attributed to an increased rate of error when estimating correlation with small samples. Based on the results of the power analysis ($>$ 67 subjects) and Tabachnick & Fidell's (1989) recommendations (minimum of 100 subjects), the desired sample size was set at 100 subjects.

A convenience sample of adults currently participating in a walking for exercise program was solicited for study participation. A total of 357 adults were mailed survey packets containing a Walking for Exercise Survey Booklet, a Walking for Exercise Log Book and an Informed Consent Statement. Names and addresses of potential walkers were obtained from three sources. First, the Silver Striders mailing list with 400 names and addresses was supplied by the Marion County Health Department/Health Promotion Program. The Silver Striders is an organization of healthy older adults sponsored by the Marion County Health Department/Health Promotion Program. The organization does not specify walking routines but does provide incentives for walking based on either time walked or miles walked. After deleting the names of individuals residing in extended care facilities who participate in supervised group walking, study packets were mailed to 338 Silver Striders. Second, a description of the study and a copy of study materials were on display at a table hosted by the Marion County Health Department/Health Promotion Program during the Mall Walkers Challenge. The Mall Walkers Challenge was a one day event held at a large midwestern mall. The event was sponsored by the Silver Striders and consisted of three different walking events, speakers on health and exercise related issues, and participation incentives. Eight (8) walkers provided their names and addresses on a study sign-up sheet and were mailed survey packets. Finally, walkers involved in the study were invited to write the names of fellow walkers who may be interested in study participation on the back of the completed Walking for Exercise Survey. Eleven (11) packets of study materials were sent to walkers whose

names and addresses were provided by study participants. Subject criteria for participation in the current study was as follows:

1) Informed consent
2) Current participation in a walking routine.
3) English speaking adults at least 18 years of age.
4) Ability to respond to a written survey requiring a minimal ability to read and write.
5) Able to be reached by telephone if a 12 week follow up phone call is warranted.

A total of 103 walkers completed the Walking for Exercise Survey Booklet for a survey response rate of 28.5%. Twelve weeks after completing the Survey Booklet, participants were instructed to return the completed Walking for Exercise Log Book. Walking for Exercise Log Books were returned by 66 walkers for a Log Book responses rate of 64%. Of the remaining 37 participants who failed to return their Log Book, 31 were contacted by phone. During the phone interview, these participants were asked to report the frequency and duration (time or miles) of their actual walking for exercise activities over the previous 12 weeks. These participants were also asked if any situation or circumstance caused them to alter their usual walking routine. Information about actual 12 week walking behaviors was obtained from 94% of the individuals who returned the Walking for Exercise Survey booklet (a combination of returned logs and phone interviews).

The survey sample consisted of 103 adults currently participating in a walking for exercise routine. Thirty-four walkers (33.3%) were male and 67 (66.3%) were female. Participants ranged in age from 28 to 79 years with a mean age of 62.94 years. Seventy participants were

married, six had never married, 12 were divorced and 14 were widowed. Most walkers completed their walking for exercise routine in either their own neighborhood (N = 34) or the shopping mall (N = 30). An additional fifteen walkers indicated that they walked in both their own neighborhood and the shopping mall. The educational level of the study participants ranged from completion of grades 1-8 to graduate degrees. Forty-two percent of the study sample reported completing a college degree. Characteristics of the study sample are summarized in Table 1.

Participants were asked to describe the walking routine that they try to follow by responding to the following item. "The walking routine that I try to complete consists of walking: ___days a week for ___ minutes (__miles)." The amount of daily walking was recorded using either minutes or miles as the measure (some participants provided both). The option for recording in miles or minutes was provided at the suggestion of Lori Mabe (Marion County Health Department, Silver Striders coordinator).

The **intended** number of walking for exercise days per week ranged from two to seven (N = 102). The mean number of intended days per week was 4.7 (SD = 1.37). Seventy-four walkers quantified the amount of intended walking per session using minutes as a measure. For these participants, the intended walking for exercise routine duration ranged from 15 to 120 minutes per day (mean = 46.69, SD = 19.93). The median reported duration was 45 minutes (N = 10). Of the 71 walkers who reported their walking routine duration intention in miles, the mean number of intended miles per day was 2.90 (SD = 1.36). The median intended walking distance per exercise day in miles was 3.0 (N = 24). Characteristics of the **intended** walking for exercise routine are summarized in Table 2.

Table 1: Summary Characteristics of Sample

VARIABLE	N	PERCENT	RANGE	M	SD
Gender (N = 102)					
Male	34	33.3%			
Female	68	66.7%			
Age (N = 102)			28-79 years	62.94	9.178
Marital status (N = 101)					
Never married	6	5.9%			
Married	70	69.3%			
Divorced	12	11.9%			
Widowed	13	12.9%			
Walking location (N = 102)	34	33.3%			
My neighborhood	3	2.9%			
Other neighborhood	3	2.9%			
Health club	30	29.4%			
Shopping mall	15	14.7%			
Mall & neighborhood	1	1.0%			
At home (treadmill)	3	2.9%			
Park	13	12.7%			
Other (combination)					
Education (N = 102)					
Completed 1-8	1	1.0%			
Some high school	4	3.9			
Completed 1-12	24	23.5%			
Some Voc ed.	3	2.9%			
Completed Voc ed.	3	2.9%			
Some college	24	23.5%			
Completed college	12	11.8%			
Some graduate ed.	4	3.9%			
Graduate degree	27	26.5%			

*N < 103 indicates missing data or variable only applicable to subset of sample.

Table 2: Summary Characteristics of Intended Walking Routines

Variable	Frequency	Percent	Range	Mean	SD
Days a week (N = 102)			2-7	4.74	1.37
2 days	01	01.0%			
3 days	25	24.3%			
4 days	19	18.4%			
5 days	24	23.3%			
6 days	21	20.4%			
7 days	12	11.7%			
Minutes per day (N = 72)			20-120	47.32	19.88
20	4	05.6%			
25	2	02.8%			
30	17	23.6%			
32	1	01.4%			
40	9	12.5%			
45	10	13.9%			
48	1	01.4%			
50	5	06.9%			
55	1	01.4%			
60	14	19.4%			
65	1	01.4%			
80	1	01.4%			
90	5	06.9%			
120	1	01.4%			
Miles per day (N = 69)			1-10	2.91	1.36
1.0	3	4.3%			
1.5	4	5.8%			
2.0	18	26.1%			
2.2	1	1.4%			
2.3	1	1.4%			
2.5	2	2.9%			
2.8	1	1.4%			
3.0	24	34.8%			
3.2	2	2.9%			
3.7	1	1.4%			
4.0	5	7.2%			
4.8	1	1.4%			
5.0	3	4.3%			
6.0	2	2.9%			
10.0	1	1.4%			

*N < 103 indicates missing data or variable only applicable to subset of sample.

Protection of Human Rights Procedures

Protection of human rights clearance (expedited review) was obtained through the Indiana University Purdue University Indianapolis (IUPUI) Institutional Review Board, Behavioral/Social Sciences Subcommittee (Study #9310-04B, see Appendix: IRB Approval). An informed consent statement was included with study packet materials (Appendix). Participants signed and returned the bottom portion of the informed consent statement with the completed Walking for Exercise Survey booklet.

Following subcommittee approval, a letter of cooperation was obtained from the Marion County Health Department/Health Promotion Program (Appendix). A letter of support was also received from the MCL Cafeteria Corporation (Appendix). The MCL Cafeteria Corporations provided discount coupons which were used as one of the participation incentives.

Study Procedures

Walking for exercise study materials were mailed to adults currently involved in a walking for exercise routine. These materials included a Walking for Exercise Survey (Appendix C), a Walking for Exercise Log Book (Appendix D), an informed consent form (Appendix B), and two postage paid return envelopes. Participants were directed to sign the bottom portion of the informed consent form, complete the Walking for Exercise Survey booklet and return both in one of the provided envelopes. Two weeks after the study materials were mailed, a reminder postcard (Appendix E) was sent to individuals who had received study packets but had not responded to the initial mailing.

The Walking for Exercise Survey Booklet consisted of eight parts. Part 1 of each booklet asked participants to describe their intended routine and part 8 asked participants to provide

demographic information. The cognitive independent variables and perceptions about the walking environment were assessed in parts 2-7 of the survey booklet. On the last page of the survey booklet, participants were instructed to provide a telephone number and note convenient times/days of the week for a potential telephone interview. Three forms of the Walking for Exercise Survey were distributed. The only difference between the forms was the ordering of parts 2-6.

After returning the Walking for Exercise survey and signed informed consent form, participants began recording their actual walking for exercise activities in the Walking for Exercise Log Book. After recording their walking activities for 12 continuous weeks, participants returned the Walking for Exercise Log Book in the remaining postage paid envelope. Approximately three months after the initial mailing of study packets, a second reminder postcard (Appendix F) was mailed to walkers who had returned the Walking for Exercise Survey Booklet but had not returned the log. The postcard thanked participants for their interest and involvement and prompted the walkers to return their logs. Participants who failed to return the Walking for Exercise Log Book were interviewed by phone to assess actual walking for exercise during the past 12 weeks. Participants who returned the completed Walking for Exercise Log received a Walking for Exercise wrist pocket pouch and a discount coupon from MCL Cafeteria.

Study Design

A prospective, non-experimental correlational design guided the current study. Data collection tools included the Walking for Exercise Survey Book, the Walking for Exercise Log and the phone report of exercise sheet. Measurements for each of the NHWEM cognitive, environmental and personal factors were included in the Walking for Exercise

Survey Book. The cognitive independent variables included in the study were perceptions of: the available social support for exercise, walking self-efficacy, normative beliefs, the benefits of walking, the barriers to walking, and health status. Personal factors including age, gender, marital status, education, walking location, and body height/weight in addition to environmental factors were assessed for the purposes of describing the sample and assessing for moderating influences with cognitive variables. Survey information describing the intended walking routine was compared to the actual walking activities (recorded in the Walking for Exercise Log Book or reported during the telephone interview) to compute the walking routine adherence score. The relationship between significant personal and environmental factors and walking adherence was assessed. Finally, the relationship between walking adherence and significant personal, significant environmental and cognitive factors was determined.

Walking for Exercise Survey Instruments and Measures

Social Support and Walking Survey

The Social Support and Walking Survey (SSWS) was used to measure perceptions of social support for adhering to a walking for exercise routine. The SSWS is a behavior specific measure of social support developed for this study and based on the Social Support and Exercise Survey (Sallis et al. 1987). The Social Support and Exercise Survey (SSES) was developed concurrently with a diet specific social support measure, the Social Support and Eating Habits Survey (SSEHS). The following discussion of the instrument development process describes the evolution of both the SSES and SSEHS, with emphasis on the SSES.

The first step in instrument development included structured interviews with 40 participants (75% completed high school and 50% had white-collar occupations) actually making changes

in the areas of dietary and/or exercise behaviors. Current exercise pattern changes were reported by 29 of the participants. The remaining 11 participants reported current pattern changes in dietary behaviors. During the interviews, participants were asked to describe ways in which family and friends had been supportive and nonsupportive of exercise and diet changes. Participants were also asked to describe how they would like to be supported in the future. Interview responses were used to construct items for the SSES and SSEHS.

Draft SSES and SSEHS scales were administered to 171 participants (127 introductory psychology students, 27 undergraduate health psychology students, and 17 staff members of a health-promotion research study). A subsample of 52 of the students repeated the scales 1-2 weeks later. Test-retest reliabilities were within acceptable ranges (range, r=0.55-0.86) and internal consistencies were high (range, alpha = 0.61-0.91). (Sallis et al. 1987)

The SSES instructions directed participants to rate the frequency with which both family and friends had done or said what was described in 13 items during the previous 3 months. Responses were solicited for each item in two columns titled "Family" and "Friends". Family was defined as "members of the household" and friends as "acquaintances, or coworkers." A Likert scale with responses ranging from 1 (none) to 5 (very often) was used to score responses. Participants were directed to score items with an 8 for "does not apply." Items scored by the participants with an 8 were recoded for data analysis with a 1. (Sallis et al. 1987)

The principle components factor analysis with varimax rotation solution for the **Friend** Support for Exercise scale included four factors and accounted for 57% of the variance. Only the "exercising together" factor (5 items) had eigenvalue greater than 2.0. The principle components factor analysis with varimax rotation solution for the **Family** Support for Exercise

scale contained four factors and accounted for 59% of the variance. The "participation and involvement" (12 items) and "rewards and punishments" (3 items) factors had eigenvalues greater than 2.0. (Sallis et al. 1987)

The SSES was scored by summing responses separately for the friends and family scales. The friends scale score was calculated by summing the friend support items. The family scale score was calculated by summing the family support items and the family rewards and punishment items. (Sallis, 1988)

Criterion-related validity was assessed by correlating factor scores on the SSES with exercise behaviors. Participants responded to a self-report item designed to assess for a cardiorespiratory training effect. The self-report item asked participants if they engaged in any physical activity, for at least 20 minutes without stopping, three times a week, vigorous enough to cause heavy breathing and sweat. The "exercising together" factor of the Friend Support for Exercise Scale and both factors of the Family Support for Exercise Scale ("participation and involvement" and "rewards and punishments") significantly correlated with this measure of participation in vigorous exercise. (Sallis et al. 1987)

Criterion-related validity was also assessed using the Social Support Questionnaire (Sarason, Levine, Bashman & Sarason, 1983) as a global measure of social support. Although it was originally hypothesized that the Social Support Questionnaire (SSQ) and the Social Support for Exercise scales measured similar constructs, correlations between the two instruments were weak and nonsignificant. It was also reported that the SSQ measure of global support did not correlate with reported exercise behaviors. Instrument design research suggested that the behavior specific SSES was more predictive of exercise behaviors than the global measure. (Sallis et al. 1987)

Using the SSES as a model, the 39 item Social Support for Walking Survey was developed. Differences between the SSES and the SSWS included: the addition of a "fellow walkers" subscale, semantics changes to make the instrument walking-specific, and a change in the directions. At the suggestion of Dr. Sallis (personal communication, June 1992) an additional "fellow walkers" subscale was included in the SSWS. This inclusion was warranted because walkers often exercise in groups and the influence of group members on perceptions of social support needed to be evaluated. Dr. Sallis (personal communication, April 1993) also suggested making the instrument specific for walkers by substituting the word "walk" for the SSES term "exercise". For example, the SSES item "exercises with me" read "walked with me" in the SSWS. Changes in the SSES directions were also made when developing the SSWS. These changes were necessary to measure perceptions of social support for **future** walking. The directions on the SSES asked participants to "rate how often your (family/friends) have said or done what is described during the last 3 months." Directions on the SSWS read "rate how often you believe (family/friends/fellow walkers) will do what is described in the next 12 weeks."

Walking Confidence Scales

The Walking Confidence Scales (WCS) is a behavior specific (walking) measure of self-efficacy derived from the Self-efficacy for Exercise Behavior Scales (SEBS). The behavior specific approach to instrument development is consistent with Bandura's (1986) premise that self-efficacy must be assessed in relation to specific behavioral referents (Sallis et al. 1988).

The SEBS were developed by Sallis et al. (1988) as exercise specific measures of self-efficacy. The development of the SEBS followed the same format as previously described for SSES development. First, interviews were conducted with the same 40 subjects involved in

the development of the SSES. Survey responses were then used to construct specific items for the SEBS. The draft self-efficacy scales were then administered to the same 171 subjects previously described. A subsample of 52 students repeated the draft self-efficacy scales 1-2 weeks later. (Sallis et al. 1988)

The factor solution for the SEBS contained 11 factors and accounted for 69% of the variance. The two factors with eigenvalues >2.0 were named "resisting relapse" (5 items) and "making time for exercise" (7 items). Instrument reliability assessments included test-retest, Cronbach's alpha and intercorrelation. Factor test-retest reliabilities ($\underline{N}$ = 52) for the SEBS were reported as 0.68 for both of the identified factors. Cronbach's alpha coefficients (n=171) provided an estimate of internal consistency and were reported as: resisting relapse 0.83 and making time for exercise 0.85. Factor overlap was assessed by correlating the two exercise factors. The correlation between the two exercise factors was $\underline{R}$ = 0.55. (Sallis et al. 1988)

Concurrent criterion-related validity was assessed by correlating SEBS scores with reported exercise habits. Exercise habits were assessed with a self-report item used to assess for a cardiorespiratory training effect. Both self-efficacy factors were significantly correlated with participation in vigorous exercise. (Sallis et al. 1988)

Construct validity was assessed using the Multidimensional Health Locus of Control (MHLC) scale. This measure was chosen because it measured, in a general way, expectancies that the self-efficacy scales were designed to measure in more specific ways. The MHLC scale is a measure derived from Rotter's (1966) theory of personality. According to Rotter's personality theory, behavior changes as a function of generalized expectancies and outcomes are determined either by one's behaviors or by external forces beyond one's

control. The MHLC is an 18-item instrument that measures beliefs about direct responsibility for one's health (internal subscale), beliefs about the effect of 'chance on health' (chance subscale) and beliefs about the influence of powerful others on health (external subscale). (Wallston et al. 1978)

According to MHLC data, the study sample was more internal (29) than the reported average for the general population (21). No consistent pattern of interaction between health locus of control and self-efficacy was noted in the sample. The hypothesis that self-efficacy would have low to moderate correlations with the Internal Subscale of the MHLC was supported by the data. Study findings suggested that self-efficacy was correlated with behavior in all subgroups defined by the locus of control subscales, suggesting that the relationship between self-efficacy and behavior was robust in the study population. MHLC measures did not correlate with reported participation in vigorous activity. (Sallis et al. 1988)

Significant revisions in the SEBS were required to design a behavior and exercise phase specific measure of self-efficacy. At the suggestion of Dr. Sallis (personal communication, April 1993) items adapted from the SEBS for WCS inclusion were revised to make the instrument specific to walkers. For example the SEBS item "Stick to your exercise program when your family is demanding more time from you" was changed to read, "Stick to your walking routine when your family is demanding more time from you." Behavior specific WCS revisions also included eliminating the following SEBS sentence from the directions: "We are interested in exercises like running, swimming, brisk walking, bicycle riding, or aerobics classes."

The SEBS directions note that current or previous exercise experience is not needed for completing the items ("Whether you exercise or not, please rate how confident you are that

you could really motivate yourself to do things like these consistently.") Unlike the SEBS, the WCS was designed to be completed by individuals currently in the second-transitionary phase of exercise participation. The adherence-phase specific nature of the WCS was reflected in the following instrument directions, "Below is a list of things people might do while trying to **increase or continue** a walking routine."

Exercise Benefits/Barriers Scale

The Exercise Benefits/Barriers Scale (EBBS) was developed to measure perceptions of benefits and barriers to participating in an exercise routine. Items for the scale were initially based on interviews with one adult in each of 100 randomly selected households in a midwestern community. Interview participants were queried about beliefs concerning positive and negative outcomes of controlling weight, managing stress, and exercising regularly. Responses concerning the positive and negative aspects of exercise were evaluated for inclusion in the EBBS instrument. Additional items were also included based on a review of the literature. (Sechrist, Noble Walker & Pender, 1987)

The EBBS was tested using a convenience sample of 650 exercising and nonexercising adults. Of the 664 returned instruments, 14 were not used because of missing responses to more than three questions. Factor analysis of the 43 item instrument yielded a nine-factor solution with an explained variance of 64.9%. All items loaded at .45 or higher with benefits loading on five factors and barriers loading on 4 factors. Following a principal components extraction with oblique rotation to generate a factor correlation matrix, second order principal components factor analysis with Varimax rotation resulted in the extraction of two factors. One factor was labeled a benefits factor and the other labeled a barriers factor. Test-retest reliability with a sample of 66 healthy adults at two-week intervals was found to be .89 for

the total instrument, .89 for the Benefits Scale and .77 for the Barriers Scale. Cronbach's alpha for the EBBS instrument yielded a standardized alpha of .954. Alpha for the 29 item Benefits Scale was .954 and alpha for the 14 item Barriers Scale was .866. (Sechrist, Noble Walker & Pender, 1987)

The EBBS instrument can be scored with a single total score or separate Benefits Scale and Barriers Scale scores. Participants are directed to respond to the 43 item instrument using a forced choice Likert format with response options ranging from strongly agree to strongly disagree. Benefits are scored from 4 (strongly agree) to 1 (strongly disagree) and barriers are reverse scored. The Barriers Scale consists of items 4, 6, 9, 12, 14, 16, 19, 21, 24, 28, 33, 37, 40, and 42. The remaining 29 items form the Benefits Scale (Sechrist, 1993)

The EBBS scores range is from 172 to 43. Higher scores indicate positive perceptions of exercise benefits. When used alone, the Benefits Scale score range is between 116 and 29. The higher the score the greater the perception of exercise benefits. When the Barriers Scale is used alone there is no need to reverse score the instrument. The Barriers Scale score range is between 14 and 56. The higher the score, the greater the perception of exercise barriers. (Sechrist, 1993)

Perceived Health Status

Perceived health status was evaluated using a three item measure developed by Lyon and May (1993). The first item asks participants to describe their perception of health, the second item asks participants about uncomfortable symptoms, and the third item asks participants to rate their functional ability. Participants rank their responses to each item using a seven point scale ranging from "not at all" (0) to "to a very great extent" (6).

Initial analysis of the perceived health status items was completed using a sample of 217 adults. Half the sample consisted of adults being treated for pulmonary disease. The remaining half consisted of adults randomly sampled from the community. Data analysis yielded a reliability of .74 for the perceived health status items. (Lyon & May, 1993)

Approval/Influence Items

Perceptions of approval and influence (normative beliefs) were assessed using a measure adapted from a study designed to evaluate participation in health-related routines (Champion, 1987-1993). Three items focused on the perception of approval and three items focused on perception of influence. From each three item set, the participant was asked to rate approval/influence received from family, friends and fellow walkers. The approval items were scored on a 6 point scale with response options ranging from "strongly disapprove" (1) to "strongly approve" (5). An option for "neutral" (3) and "no contact" (6) was provided for the approval items. The influence items were scored on a four point scale with response options ranging from "not influence you" (1) to "strongly influence" (4). The six items were used to calculate three subscores: family approval/influence, friend approval/influence, and fellow walkers approval/influenced. Each subscore was calculated by multiplying the approval item score by the influence item score. An Approval/Influence Total score was finally calculated by summing the family, friend and fellow walkers subscores.

Walking Environment

Data was collected to evaluate the mediating influences of enabling and environmental factors. Information concerning the walking environment was assessed using the 5 following questions:

1. I feel safe walking.
2. The place where I usually walk is comfortable.
3. Water fountains and bathroom facilities are convenient for me should I need them during my walking routine.
4. The place where I walk is close to my home.
5. I am often either too hot or too cold when I am walking.

A Likert scale with responses ranging from (1) 'strongly agree' to (5) 'strongly disagree' was used to quantify responses.

Walking for Exercise Log Measure: Seven Day Recall of Exercise Participation

One of the major problems in exercise research is the measurement of adherence. Exercise adherence has been measured with limited success using a variety of data collection methods. Despite the difficulty of measurement, significant associations between physical activity adherence and health have been reported. Data collection methods used to assess ongoing physical activity participation have been grouped into seven major categories: calorimetry, job classification, survey procedures, physiological markers, behavioral observation, mechanical and electronic monitors, and dietary measures (LaPorte, Montoye, & Caspersen, 1985). The type of data collection method(s) used for a given study will depend on the design of the study and the generalizations to be drawn from the data. (LaPorte, Montoye, & Caspersen, 1985; Durnin, 1990)

LaPorte, Montoye & Caspersen (1985) evaluated physical activity assessment procedures using the following four criteria. The instrument must be valid (measure what it intends to measure), reliable (consistently provide the same results under the same circumstances), practical (have acceptable costs to both the investigator and the participant) and nonreactive (must not alter the population or the behavior it seeks to measure). An evaluation of the seven major data collection methods using the above four criteria resulted in the conclusion that no single instrument fulfills the criteria of being valid, reliable, and practical while not affecting behavior (LaPorte, Montoye & Caspersen, 1985).

Investigators who have used physical measures to assess for exercise adherence in past studies have expressed concerns regarding issues of reliability and practicality. Durnin (1988) noted problems associated with the use of physiological phenomena assessments (such as heart rate) to assess activity adherence (especially at levels of or below moderately strenuous activity). In a study by Avons, Garthwaite, Davies, Murgatroyd, & James (1988), the relationship between heart rate and energy expenditure (measured inside the whole-body colorimeter) varied between individuals and activities to the extent that repeated calibration was needed.

It was not the intent of this study to evaluate the physiological responses to exercise experienced by a potentially diverse population, but rather to focus on the cognitive factors contributing to behavior change. For this reason, it was concluded that physiological measures of adherence would not be practical. Because these measures would complicate the study beyond an ability to evaluate the hypotheses in question, they were not used.

For adults of any age, Durnin (1988) recommended the questionnaire or a diary as the method of choice for collecting activity participation data. LaPorte, Montoye & Caspersen

(1985) similarly concluded that survey procedures currently offer the best compromise as measures of physical activity in larger populations. For this study, the diary was selected as the method for reporting participation in a walking routine.

Surveys seeking information from participants about physical activity generally have four components. These components include: a specified time frame for data collection, a specified activity to be recorded, a specified method of data collection, and a summary index. The summary index rank orders participants according to their physical activity participation. (LaPorte, Montoye, & Caspersen, 1985) These components were included in the Walking for Exercise Log and are described below.

Participants completing the Walking for Exercise Log were directed to record their walking activities for the 12 week period following completion of the Walking for Exercise Survey Book. The specific activity recorded in the Log was walking for exercise. Participants reported their actual walking for exercise activities by recording the time or distance for each walking session. The method for collecting adherence data was completion of the Walking for Exercise Survey, return of the survey in a postage paid envelope, completion of the Log and returning the Log in a postage paid envelope. Participants who completed the Walking for Exercise Survey but failed to return the Walking for Exercise Log were contacted by telephone. During the telephone interview, these participants were asked about actual walking for exercise participation for the past 12 weeks. Finally, adherence scores were calculated for all participants who completed the Walking for Exercise Survey and provided a description of walking behaviors for 12 weeks.

The dependent variable, participation in a walking routine, was measured for 12 weeks following initial data collection using a Seven Day Recall of Exercise Participation Survey.

Participants described their actual walking activity by completing a Sunday through Saturday grid each week for a total of 12 weeks. Column 1 of the grid listed the days of the week. In column 2, participants who measured walking distance in miles recorded miles walked. In column 3, participants who measured distance using time recorded minutes walked. An adherence measure was calculated by comparing the ideal routine with actual walking activity over the past 12 weeks. An adherence score was calculated with data received from either the returned 12 week diary or the follow up phone call.

CHAPTER 4

RESULTS AND DISCUSSION

The Results and Discussion chapter is divided into four sections. In Section I, preliminary data analysis results are described. Theoretical hypotheses testing and research question data analysis results are presented in Section II. In Section III, the rationale for three ad hoc data analysis procedures is provided and results are described. Chapter 4 concludes with a discussion of study results in Section IV.

Section I: Preliminary Data Analysis

The organization for the following section is based on the six steps used to evaluate, summarize, and score the data recorded in the Walking for Exercise Survey and Walking for Exercise Log Books. Each of the six subsections corresponds with a preliminary data analysis step. In this section, the data analysis procedures are presented in the order of completion. First, Step 1 activities including initial data screening procedures and results are described. Next, the findings related to cognitive instrument evaluation and scoring procedures are described (Step 2). The environment item scores are presented in the third subsection. The results of the order effect evaluation (Step 4) follow. The adherence scoring method and adherence scores are reported in the fifth subsection. Finally, the preliminary data analysis section concludes by comparing the reported walking behavior recorded in the Walking for Exercise Log with the walking behavior described during telephone interviews (Step 6).

Initial Data Screening: Step 1

The first step of survey data analysis focused on initial data screening and description of the sample. Prior to analysis, accuracy of data entry was confirmed using the SPSS[x] DIFFERENCES program. Data screening proceeded with the search for missing data. Once

the extent of missing data was determined, descriptive statistics were calculated on all variables using SPSS[x] FREQUENCIES program (research question #1). Statistics calculated included frequencies, mean, median, mode, minimum, maximum, and range; variance and standard deviation; percentiles, skewness and kurtosis. The results of the data screening follow.

Overall, participants were thorough in responding to items on the Walking for Exercise Survey. The incidence of missing data for reporting demographic data was < 1%. Missing cases for survey instruments were distributed as follows: Exercise Benefits/Barriers Scale 1%, Environment items 2%, Approval/Influence items 2%, Perceived Health Status items 1%, Walking Confidence Survey 1%, Social Support for Walking (Family 10.7%), and Social Support for Walking (Friends and Fellow Walkers) 16.5%. Because the missing values were minimal and scattered throughout the EBBS, Perceived Health Status items, and the WCS, missing cases for these measures were managed using Tabachnick and Fidell's (1989) recommendation to estimate values by inserting group means for random missing values. (Steps 1 & 4)

Although missing values for the Approval/Influence items averaged only 2%, approximately half of the missing values were associated with the item "Does your family approve or disapprove of your participation in a walking for exercise routine?" Most of the instances of missing values for this item were associated with Form I of the Walking for Exercise Survey. The Form I page layout included the directions for the Approval/Influence items and item 1 on the bottom quarter of page 6 with items 2-6 on page 7 of the Walking for Exercise Survey. Participants may have assumed that item 1 was a continuation of the directions or an example and began providing responses with item 2. Although it seems

likely that the page layout contributed to the higher missing data rates for this item, the possibility that some participants may have found this item to be irrelevant must also be considered. Because of the nonrandom nature of missing values for the Approval/Influence items, cases with missing values were deleted from the analysis. Scoring for the approval/influence item pairs was based on the following number of respondents: Approval/Influence Family (N = 94), Approval/Influence Friends (N = 102), and Approval/Influence Fellow Walkers (N = 101).

Missing cases for SSWS Family Scale averaged 10.7% and ranged from 5 to 9 missing responses per item. Missing cases for the SSWS Friends and Fellow Walkers Scale averaged 16.5% and ranged from 7 to 12 missing responses per item. Because Tabachnick and Fidell (1989) state that the pattern of missing data is more important than the actual amount, missing data pattern characteristics were evaluated. Based on the pattern evaluation, it was concluded that for some participants, the SSWS directions were unclear. The following response patterns for SSWS items support the assumption that unclear directions contributed to the high incidence of missing data: (1) use of a combination of numbers (consistent with the response scale) and check marks (not consistent with directions) as item responses; (2) use of 0 as an item response (not included on the response scale); (3) left an item blank rather than use the response scale #8 for "does not apply" (some respondents indicated with additional comments that certain items were not relevant to their routine but left the item blank.) One participant did not answer any of the items, but wrote next to the code scale, "I am alone"). Incidences of missing data were not distributed equally.

Participants were either thorough in completing the SSWS items or had multiple missing cases. In situations where only a few cases have missing data and these cases seem to be a

random subsample of the whole, Tabachnick and Fidell (1989) recommend case deletion. Consistent with this recommendation, 11 cases with missing values were dropped from the SSWS Family Scale analysis and 17 cases with missing values were dropped from the Friends and Fellow Walkers Scale Analysis.

Instrument Evaluation and Scoring: Step 2

SPSS^X Principle Axis Confirmatory Factor Analysis with Varimax Rotation was used to establish construct validity and to evaluate the WCS subscales for number, structure and independence of factors. The previously reported factor analysis solution for the SEBS was compared to the WCS solution. SPSS^X Principle Axis Confirmatory Factor Analysis with Varimax Rotation was also used to establish construct validity and to evaluate the SSWS subscales for number, structure and independence of factors. The previously reported factor analysis solution for the SSES was compared to the SSWS solution. Factor analysis for the EBBS was not attempted due to the small sample size and an inability to meet a criteria of at least five cases for each item (Tabachnick & Fidell, 1989).

Internal consistency was assessed using the SPSS^X RELIABILITY program. Total instrument and subscale reliabilities were calculated for the WCS (resisting relapse and making time for exercise scales), EBBS (benefits and barriers scales), and the SSWS (social support family, social support friends, social support fellow walkers, family rewards/punishments, and friends rewards/punishments.

Instrument scoring was calculated for the EBBS, WCS and SSWS. Item scoring was also completed for the three Health Perception items, the three Approval/Influence item pairs and the five walking environment items. Mean substitutions were used for missing values when scoring the EBBS, WCS, Health Perception items and the Approval/Influence items. Because

of a higher incidence of missing data associated with the SSWS and an inability to use prior knowledge to estimate values, cases with missing values were deleted when scoring the SSWS.

In the following sections, instrument analysis procedures are described and results reported (preliminary data analysis step 2) for the Walking Confidence Survey, the Social Support and Walking Survey, the Exercise Benefits/Barriers Scale and the Health Perception Scale. Descriptive statistics for the Approval/Influence items are also reported.

Walking Confidence Survey Analysis and Scoring

Adults currently participating in a walking routine responded to the 12 item WCS. Instrument evaluation included calculating an instrument mean score and subscale mean scores (Resisting Relapse and Making Time for Exercise). According to the SPSS^x FREQUENCIES output, incidences of missing data approximated 1 percent. As previously noted, the item means were substituted for incidences of missing data.

SPSS^X Principle Axis Confirmatory Factor Analysis with Varimax Rotation was completed, specifying a criteria of two, three and four factors. For all solutions, only one factor emerged with an eigenvalue >2 (eigenvalues for remaining factors were all <1). Although SEBS scoring is based on two subscales, the WCS was scored as a single scale instrument. Based on the WCS two factor solution, items grouped into the Resisting Relapse and Making Time for Walking Subscales, however the item groupings were not consistent with the SEBS scoring instructions. Although the scoring directions indicated that items, "Read or study less in order to walk more" and "Attend a party only after walking" be scored with the Making time for exercise subscale, they actually loaded on the resisting relapse factor. Directions indicated that the item "Stick to your walking before a long tiring day" should be scored on

the resisting relapse scale, however it loaded on the making time for walking factor. According to the WCS two factor solution, the resisting relapse factor accounted for 47.9 percent of the variance with an eigenvalue of 5.74. The making time for exercise factor accounted for only 7.2 percent of the variance with an eigenvalue of only 0.87. Based on the above analysis, the WCS was scored as a single scale instrument. The results of the WCS two factor solution (as suggested by the SEBS scoring instructions) describing factor loadings, eigenvalues and percentage of variance for the Resisting Relapse and Making Time for Walking factors are reported in Tables 3 and 4.

According to the Correlation Matrix, the item, "Continue to walk with others even though they seem too fast or too slow for you" demonstrated very weak corrected item total correlation with other instrument items ($\underline{R} < 0.28$). For this reason the item was deleted from computing a total WCS score. According to the correlation matrix, redundancy ($\underline{R} = .82$) existed between the item "Stick to your walking routine even when you have excessive demands elsewhere" and Stick to your walking routine even when social obligations are very time consuming." Because the first item is conceptually more global and "excessive demands" can be interpreted as many things in addition to "social obligations," the social obligations item was also omitted from scoring. The remaining 10 items were used to score the WCS. This WCS score will be used in subsequent analyses as the measure of self-efficacy. The single scale WCS (retained ten items) reliability and descriptive statistics are reported in Table 5.

Table 3: Resisting Relapse items and Factor Loadings

Factor 1 Scale Items	Factor loadings
Stick to your walking routine when you have household chores to attend to.	0.90
Stick to your walking routine even when you have excessive demands elsewhere	0.81
Stick to your walking routine even when social obligations are very time consuming.	0.76
Stick to your walking routine when family &/or friends are demanding more time from you.	0.71
Stick to your walking routine when undergoing a stressful life change (e.g., divorce, death in the family, moving).	0.63
Complete your walking routine even though you are feeling depressed.	0.55
Read or study less in order to walk more.	0.54
Attend a party only after walking.	0.47
Continue to walk with others even though they seem too fast or too slow for you.	0.24
Eigenvalue 5.74 Percentage of variance 47.9	

Table 4: Making Time for Walking Items and Factor Loadings

Factor 2 Scale Items	Factor loadings
Get up early, even on weekends, to walk	0.76
Stick to your walking routine before a long, tiring day.	0.73
Set aside at least 30 minutes, 3 times a week to complete a walking routine.	0.68
Eigenvalue 0.87 Percentage of Variance 7.2	

Table 5: Descriptive Sample Statistics for the Walking Confidence Scale

	Range	Mean	S.D.	Cronbach's alpha
Walking Confidence Scale	2.6-5.0	4.28	0.68	0.90

Social Support for Walking Instrument Analysis and Scoring

Adults (N = 103) currently participating in a walking for exercise routine completed the 39 item Social Support for Walking Survey (SSWS). As previously discussed, missing data resulted in the deletion of cases from the analysis. The following analysis is based on 92 cases for the Family Scale and 86 cases for the Friends and Fellow Walkers Scale.

Individual SSWS items were assessed by evaluating the subscale correlation matrices, assessing the item-total correlation, and conceptual content comparison. Scale items with correlations $>.75$ or $<.30$ were examined for possible deletion. Subsequent item deletions resulted in a five item Family Support Scale ($r = .87$), a four item Friend Support Scale ($r = .89$), and a three item Fellow Walkers Support Scale ($r = .89$).

Principle axis factor analysis with Varimax rotation was completed using SPSS^x FACTOR. Family Support emerged as a separate factor, however Friend Support and Fellow Walkers Support items loaded on a single factor. A likely explanation for this may be that the participants considered fellow walkers to be their friends. The two factors (Family and Friends/Fellow Walkers) combined accounted for 36.2% of the variance. Punishment items loaded on a single factor as did the Rewards items. Loadings for the Punishment and Rewards factors were not influenced by the perceived source (family, friends, or fellow

walkers). Family Support, Friend/Fellow Walkers Support, Rewards and Punishment factors combined accounted for 59% of the variance.

SPSS^x Principle Axis Factor Analysis with Varimax Rotation was repeated, specifying a criteria of four factors. Based on the four factor solution, items grouped into the following subscales: Friend/Fellow Walkers Support, Family Support, Punishment for Walking, Rewards for Walking. The item, (family) "Give me rewards for walking" loaded on both the Family Support (0.39) and Rewards (0.33) factors. Although the item was conceptually consistent with both factors, it was placed in the Rewards scale. After adding the family rewards item, the Rewards scale measured perceived rewards for walking from all sources (family, friends and fellow walkers) The items included in each of the four factors, factors loadings, eigenvalues, and percentage of variance are reported in Tables 6-9.

Cronbach's alpha was computed for the Family Support, Friend/Fellow Walkers Support, Punishment, and Rewards subscales. Scale reliability, and descriptive statistics are reported in Table 10. The scores on both the Family Support Scale (5 items) and the Friends/Fellow Walkers Support Scale (7 items) will be used in subsequent data analyses as measures of social support.

The Rewards and Punishment Scales were not included as social support measures for two reasons. First, according to the scoring instructions for the SSES, the Rewards and Punishments scale is optional (Sallis, 1988). Second, the Rewards and Punishments factor solutions obtained from the current study data were conceptually different than the solutions reported by Sallis (1988). This difference suggests the need for further evaluation of these scales with other populations. Although these scales were not included in this study to predict

walking adherence, instrument development data pertaining to the Rewards and Punishment scales is included in the SSWS data described below.

Table 6: Friends/Fellow Walkers Support for Walking Items and Factor Loadings

Factor 1: Scale Item		**Factor Loading**
(Friends)	Walk with me.	0.67
(F. Walkers)	Offer to walk with me.	0.65
(Friends)	Give encouragement to stick with my walking routine.	0.70
(F. Walkers)	Change their schedule so we can walk together.	0.64
(Friends)	Ask me for ideas on how they can get more exercise.	0.58
(Friends)	Talk about how much they like to walk for exercise.	0.69
(F. Walkers)	Talk about how much they like to walk for exercise.	0.63
Eigenvalue 4.49 Percentage of Variance 22.5		

Table 7: Perceived Punishments for Walking Items and Factor Loadings

Factor 2: Perceived Punishments for Walking		**Factor loadings**
(Family)	Criticize me or make fun of me for walking.	0.88
(Friends)	Criticize me or make fun of me for walking.	0.79
(Family)	Complain about the time I spend walking.	0.63
(Friends)	Complain about the time I spend walking.	0.72
(F. Walkers)	Complain about the time I spend walking.	0.83
Eigenvalue 3.34 Percentage of Variance 16.7		

Table 8: Family Support for Walking Items and Factor Loadings

Factor 3: Scale Item		**Factor loading**
(Family)	Give me encouragement to stick with my walking routine.	0.60
(Family)	Change their schedule so we can walk together.	0.65
(Family)	Help plan activities around my walking routine.	0.65
(Family)	Ask me for ideas on how they can get more exercise.	0.58
(Family)	Talk about how much they like to walk for exercise.	0.70
Factor 3: Eigenvalue 2.74 Percentage of Variance 13.7		

Table 9: Rewards for Walking Items and Factor Loadings

Factor 4 Scale Items		**Factor loading**
(Family)	Give me rewards for walking (buy me something or give me something I like).	0.34
(Friends)	Give me rewards for walking (buy me something or give me something I like).	0.73
(F. Walkers)	Give me rewards for walking (buy me something or give me something I like).	0.58
Eigenvalue 1.20 Percentage of Variance 6.0		

Table 10: Social Support and Walking Survey Descriptive Statistics

Scale	No items per scale	Scale Scores			Cronbach's alpha
		Range	Mean	SD	
Friend/Fellow Walkers Support (N = 86*)	7	7-35	16.54	7.65	.89
Family Support (N = 92*)	5	5-25	13.11	6.30	.87

*N < 103 indicates missing data

Exercise Benefits and Barriers Instrument Analysis and Scoring

The EBBS was completed by 103 adults participating in a walking for exercise routine. The Benefits Scale was used to assess the benefits of walking for exercise cognitive factor and the Barriers Scale was used to assess the barriers to walking cognitive factor. Although the EBBS total score was not used as a study measure, it was calculated and reported for instrument validation and testing. The Benefits Scale reliability ($r = 0.94$) was consistent with Sechrist's (1993) findings, however, the total instrument ($r = 0.81$) and Barriers subscale ($r = 0.79$) reliabilities were both less than previously reported. Total EBBS scores ranged from 172 to 104 with a mean score of 143.52. The Benefits subscale scores ranged from 116-63 with a mean of 96.79. The Barriers subscale scores ranged from 14 to 36 with a mean score of 23.27. Based on the above data, the walkers responding to the EBBS perceived higher benefits and lower barriers to walking than previously described by Sechrist (1993). This difference can be explained by differences in the two study samples. The Sechrist (1993) study sample consisted of healthy adults recruited from the community at large. Criteria for participation included: able to read English; capable of engaging in physical activity; and willing to respond to the instrument. Historical and current exercise patterns were not known. Conversely, an important criteria for participation in the walking for exercise study was current participation in a walking for exercise routine. Because persons in the walking for exercise study had first hand experience with exercise and had made a commitment to an ongoing routine, it was anticipated that they would perceive higher benefits and lower barriers to exercise participation than individuals who may not have personal experience with exercise routine involvement. Because of the small sample size (< 10 subjects per item), factor analysis was not attempted. Both the Benefits and Barriers

scores were used in subsequent data analyses as predictors of walking for exercise adherence. Descriptive statistics for the Exercise Benefits/Barriers Scale are reported in Table 11.

Table 11: Descriptive Statistics for the Exercise Benefits/Barriers Scales

Exercise Benefits/Barriers Scales*	Items per scale	Sample Scale Scores			Cronbach's alpha
		Range	Mean	SD	
Exercise Benefit/Barriers Scale	43	104-172	143.38	13.35	.81
Exercise Benefits Scale	29	63-116	96.69	10.23	.94
Exercise Barriers Scale	14	14-36	23.30	4.82	.79

*N = 103

Perceived Health Status Analysis and Scoring

Adults (103) completing the Walking for Exercise Survey responded to the three item Perceived Health Status Scale. As previously reported, missing data was minimal (1%). The convenience sample (N = 103) participating in the Walking for Exercise study population was compared to the healthy random sample described by May (1993) using a Student's t-test. For the healthy subjects (N = 106), May (1993) reported a mean Perceived Health Status score of 4.27 (SD = 1.04). The Perceived Health Status mean score (4.65) for the current study sample was significantly higher ($t = 4.44$; $p < .01$) than the mean scores reported by May. Based on the calculated higher Perceived Health Status mean score for the study population, it was concluded that the walkers in the current study perceived greater health status than the healthy random sample. Descriptive statistics for the Perceived Health Status

measure are reported in Table 12. The Perceived Health Status total score will be used in subsequent analyses as the measure of Perceived Health Status.

Table 12: Perceived Health Status Item and Total Scores

Perceived Health Status Items* (For items 1 & 3, 0=not at all; 6=to a very great extent; item 2 reverse scored)	**Sample Scale Scores**			**Cronbach's alpha**
	Range	Mean	SD	
To what extent do you believe you are healthy?	1.00-6.00	4.68	1.08	
To what extent are you experiencing unpleasant or uncomfortable physical sensations or symptoms?	2.00-6.00	4.45	1.39	
To what extent are you able to function at what you believe is your capability level?	2.0-6.00	4.81	0.91	
Perceived Health Status TOTAL Score	2.33-6.0	4.65	0.90	.67

*N = 103

Approval/Influence Items Analysis and Scoring

As previously noted, a pattern noted in the incidences of missing cases for the Approval/Influence Items resulted in the deletion of nine cases. The following analysis was based on the responses provided by 94 walkers. Overall, study walkers noted only moderate approval/influence from family, friends, and fellow walkers. Based on the scoring for each item pair, it was concluded that participants perceived greatest approval/influence from family members, closely followed by fellow walkers. The item pair scores were summed to calculate the Approval/Influence Total Score. The Approval/Influence Total Score will be used in subsequent data analyses as a predictor of walking for exercise adherence. Descriptive statistics for the Approval/Influence item pairs are reported in Table 13.

Table 13: Descriptive Statistics for the Approval/Influence Items

Approval/Influence Pairs and Total Score	Item Pair Sample Scores		
	Range	Mean	SD
Family Approval/Influence (N = 94*)	2-20	12.03	6.73
Friend Approval/Influence (N = 102*)	1-20	9.68	5.82
Fellow Walkers Approval/Influence (N = 101*)	1-20	11.41	5.99
Approval/Influence TOTAL Scores	7-60	32.20	14.61

* N < 103 indicates missing data

Environment Items Scoring: Step 3

Walkers responded to five questions about the walking environment using the following response scale: strongly agree (1), agree somewhat (2), uncertain (3), disagree somewhat (4), and strongly disagree (5). The most frequently provided response to the items concerning safety (I feel safe walking) and comfort (The place where I usually walk is comfortable) was strongly agree. A median score of 2.0 (agree somewhat) was reported when participants were queried about proximity of the walking environment to home and convenience of water fountains and bathroom facilities during walking. Walkers responded disagree somewhat (median=4) when asked if they felt either too hot or cold during their walking for exercise routine. Descriptive statistics for the environment items are reported in Table 14.

Table 14: Descriptive Statistics for the Environment Items

ENVIRONMENT ITEMS	SCALE SCORES		
	Range	Mean	SD
I feel safe walking.	1.0-5.0	1.33	0.68
The place where I usually walk is comfortable.	1.0-4.0	1.32	0.55
Water fountains and bathroom facilities are convenient for me.	1.0-5.0	2.36	1.57
This shopping mall is close to my home.	1.0-5.0	1.86	1.10
It is often either too hot or too cold in this shopping mall.	1.0-5.0	3.60	1.27

Order Effect Evaluation: Step 4

Three forms of the Walking for Exercise Survey Booklets were used for data collection. The only difference between the forms was the presentation order for the cognitive factor and environment measures. The relationship between the order of presentation and instrument/item scores was evaluated using SPSS[x] ONEWAY. Three forms of the Walking for Exercise Survey were used for data collection. Of the 103 survey booklets analyzed, 28 were form I, 45 were form II, and 30 were form III. Analysis of variance was calculated using SPSS[x] ONEWAY. A significant order effect was not found for any cognitive factor measure included in the Walking for Exercise Survey.

Adherence Scoring: Step 5

Actual walking behaviors were assessed by calculating the means for distance (number of miles or minutes walked per week) and actual days walked per week for each of the 12 weeks. A total mean for distance (miles or minutes) and days walked for the 12 weeks was calculated by determining a mean for the 12 week period. An actual distance measure was

determined by calculating daily mean (miles or minutes) for each week (over the 12 week period) for actual distance (miles or minutes) and dividing by twelve. A distance adherence score was determined by dividing the actual 12 week average daily distance measure by the intended daily distance. A 12 week days walked per week was determined by calculating the average days walked per week mean (over the 12 week period). A days adherence score was determined by dividing the average actual days walked per week by the intended number of days walked per week. A mean was calculated from the distance (miles or minutes) adherence score and the days adherence score to determine the total adherence (miles or minutes) score.

Participants ($\underline{N}$ = 97) reported 12 week walking for exercise information by either completing the Walking for Exercise Log ($\underline{N}$ = 66) or providing information during a brief telephone interview ($\underline{N}$ = 31). Of the 57 participants who reported actual walking using miles, 55 reported a walking intention using miles. Of the 41 participants who reported actual walking using minutes, 40 reported a walking intention using minutes. One participant did not provide the intended number of walking for exercise days per week. Because of missing intention data or a mismatch between reported intention and actual behavior measures, it was not possible to calculate an adherence score on three cases. Using the remaining survey and log data, adherence scores were calculated on 94 participants.

In most instances, participants recorded their walking activities using only one quantity measure. Several participants recorded both miles and minutes walked, however, in all but two of these situations one measure was reported more consistently than the other. When two quantity measures were reported, only the measure most frequently reported was used to calculate an adherence score. In the two instances where both measures were consistently

reported, adherence scores for both miles and minutes measures were calculated and included with the descriptive statistics for minutes and miles walked. Only one measure however was used in calculating the participant's total adherence scores.

The log and telephone interview information was used to calculate two adherence subscores. The **average days walked per week adherence subscore** compared the actual average number of days walked with the intended number of walking for exercise days per week (actual days walked per week/days per week intention). The **average distance walked per exercise session adherence subscore** compared the actual distance (miles or minutes) walked per exercise session with the intended distance (miles or minutes) per exercise session (average miles adherence percent = actual average miles/average intended miles or average minutes adherence percent = actual average minutes/average intended minutes). The **total adherence score** was determined by calculating a mean from the daily adherence subscore and the distance adherence subscore (average days per week adherence subscore + the average distance per session adherence subscore/2). The total adherence score was used in the current study as the dependent variable measure for walking routine adherence.

Variability in adherence was noted for both the days and distance measures. Minimal walking for exercise was reported by two of the study participants who did not walk at all and five additional participants who walked less than one day a week during the 12 week study. Walking for exercise activities meeting or exceeding (N=21) the intended routine were also reported. The average number of days walked per week ranged from 0 to 6.92 with a mean of 3.66 days per week (N=97). The days adherence subscore (actual days walked per week divided by the intended number of walking for exercise days per week) ranged from 0 to 1.61 with a mean of .77. Most of the walkers reported walking distance using either miles or

minutes, however several individuals reported their walking distance with both measures. Miles was used as the distance measure by 58 participants. Actual average miles walked per exercise session ranged from .00 to 8.5 with a reported mean of 2.4 miles. The miles adherence subscore (average miles per day divided by intended number of miles per day) ranged from 0 to 1.73 with a mean of .85. Minutes was used as the distance measure by 41 participants. Actual average minutes walked per exercise session ranged from 0 to 90.35 with a reported mean of 40.86 minutes. The minutes distance adherence subscore (average number of minutes walked per day divided by the intended number of minutes per day) ranged from 0 to 1.75 with a mean of .90. A universal adherence measure (Total Adherence Score) was calculated for the study sample by summing the minutes and miles subscores. Only one subscore per participant was used in determining the Total Adherence Score. Descriptive statistics for the adherence measures are reported in Tables 15 through 17.

Table 15: Average Days Walked per Week Adherence Subscores

AVERAGE DAYS WALKED PER WEEK ADHERENCE SUBSCORE	Descriptive Statistics		
	Range	Mean	SD
Actual average days walked per week (N = 97)	0-6.9	3.66	1.71
Intended average number of days walking per week (N = 102)	2-7	4.74	1.37
Days adherence percent = actual ÷ intention (N = 96)	0-1.61%	0.77%	0.31

Table 16: Average Distance Walked per Exercise Session Adherence Subscore

AVERAGE DISTANCE WALKED PER EXERCISE SESSION ADHERENCE SUBSCORE	Descriptive Statistics		
	Range	Mean	SD
Actual average miles walked per day (N = 58)	0-8.55	2.43	1.43
Intended average miles of walking per day (N = 69)	1-10.0	2.91	1.36
Average miles adherence percent = actual average miles ÷ average intended miles (N = 56)	0-1.73%	0.85%	0.38
Actual average minutes walked per day (N = 41)	0-90.35	40.86	22.29
Intended average minutes of walking per day (N = 72)	20-120	47.32	19.88
Average minutes adherence percent = actual average minutes ÷ average intended minutes (N = 40)	0-1.55%	0.86%	0.30

Table 17: Walking for Exercise Total Adherence Scores

TOTAL ADHERENCE SCORES	Descriptive Statistics		
	Range	Mean	SD
Total adherence scores for persons reporting MILES walked (N = 56)	0-1.54%	0.79%	0.32
Total adherence scores for persons reporting MINUTES walked (N = 40)	0-1.55%	0.86%	0.30
Total Adherence Scores for TOTAL study sample (N = 94)*	0-1.55%	0.83%	0.29

* Two participants were thorough in reporting both miles and minutes of walking for exercise, however, only one measure per participant was included in the combined measure.

Adherence Data Evaluation: Step 6

Adherence scores calculated from the data recorded in completed logs were compared with adherence scores calculated from the telephone interview data using SPSS^x ONEWAY. Significant differences between the groups were noted and rationale for the differences was provided.

According to SPSS^x ONEWAY analysis, participants returning a completed log were significantly more adherent ($F = 26.6, p < .000$) to their intended walking for exercise routine (mean = .92) than individuals who did not return a log but provided information during a telephone interview (mean = .63). Many of the participants who described their routine over the telephone reported walking much less than usual. Because of their reduced walking activities these participants stated they did not return their log. They furthermore expressed the belief that their log would not be of benefit to the study. During the telephone interviews, a common theme expressed by participants was, "I'm sorry that I wasn't able to complete the study." This expression was often followed by a description of a condition or circumstance that contributed to a decrease in walking for exercise activities. When it was explained to these participants that the value of their information was not associated with exercise frequency, they were willing to describe their actual exercise experiences over the past 12 weeks.

Section II: Theoretical Hypotheses Testing and Research Question Data Analysis

The organization for Section II is based on the four steps used for theoretical hypotheses testing and research question data analysis. In the first subsection, Research Question 1 results are presented (Step 1). An evaluation of personal and environmental factors and rationale for inclusion in subsequent analyses (Step 2) is presented in the second subsection.

The third subsection includes hypotheses testing results (Step 3). Finally, Section II concludes with Research Question 2 results (Step 4).

Research Question 1 Results: Step 1

Research Question 1: What demographic characteristics best describe a population of walkers?

Age, gender, marital status and education were evaluated for correlations with walking for exercise adherence. For the total sample age, gender, and marital status significantly correlated with adherence. According to previous research findings, the amount of time an individual spends in physical activity declines with age (Wankel, 1988). Although this relationship between age and exercise adherence may be true for participation in vigorous physical activity (which was the focus of most studies), the relationship between age and adherence to a walking routine was just the opposite. In the current study sample, increased age significantly correlated with increased walking for exercise adherence ($R = .27$, $p = .01$). This exercise-intensity specific current study finding was consistent with the conclusion reached by Hovell et al. (1989) that older individuals reported more walking for exercise than did younger persons.

The relationship between age and walking for exercise adherence found in the current study can be in part attributed to the fact that walking is a relatively safe form of exercise. According to fitness walking experts Seiger & Hesson (1990), walking puts less strain on bones and joints than other types of vigorous exercise and facilitates recovery from different types of injuries. The overall safety of walking may partially account for the popularity of walking for exercise among older adults. In a study of 619 70-year old persons in the city of

Gothenburg, Sweden, walking was the most common physical activity declared (Frandin, Grimby, Mellstrom & Svanborg, 1991).

According to previously described research findings, gender has been reported to influences both the type of exercise selected and the overall rate of participation. Wankel (1988) reported that although men tend to exercise more than women, the gap in the numbers of the two sexes who are active has narrowed considerably in recent years. Consistent with Wankel's findings, males were significantly more adherent than females in the study sample ($\underline{R}$ = 15.25, $\underline{p}$ = .00). Furthermore, all of the 16 participants reporting relapses from walking for exercise of 3 weeks or more were women.

Married participants reported higher walking for exercise adherence rates than nonmarried participants ($\underline{F}$ = 6.05, $\underline{p}$ = .02). Nonmarried participants included persons who were never married, divorced, and widowed. The importance of a spouse was confirmed in notes written in the surveys and logs of participants who mentioned husband or wife as a walking partner.

Although education has been reported to be an important factor in previous exercise adherence studies, (Sallis et al. 1989) correlations with actual walking behaviors were not found in this study sample. A possible explanation for this finding may be that the currently study sample was highly educated. Of 102 participants in the current study reporting their education, 73 reported education beyond high school and 27 received a graduate degree. In the group reporting a 3 week or more relapse from walking ($\underline{N}$ = 16), 10 of the women attended college, and three earned degrees. Because this sample was very well educated, it was not unanticipated that the education factor would be less predictive of exercise adherence than reported in previous studies. Also, it should be noted that the previous studies linking education to adherence focused on vigorous exercise. Because the predictors of exercise

adherence are reported to vary with the level of intensity, the decreased correlation between education and moderate-intensity exercise adherence was not unanticipated.

As previously reported, the environmental factor significantly correlated with walking for exercise was the proximity of the walking environment to home. The following response patterns for the item, "The place where I walk is close to my home" was observed: strongly agree (N = 47), agree somewhat (N = 40), uncertain (N = 1), disagree somewhat (N = 11) and strongly disagree (N = 4). These findings were consistent with conclusions drawn by Sallis et al. (1990) following an evaluation of 2,053 subjects in the San Diego area. Sallis concluded that the density of exercise facilities around one's home was associated with exercise habits. Furthermore, participants in the San Diego study who reported exercising three or more times a week reported a statistically greater number of facilities near their homes than did individuals who reported no exercise sessions.

Overall, participants strongly agreed or agreed that they felt safe (N = 90) and comfortable (N = 90) in their walking environment. Sixty-four (64) participants responded with strongly agree or agree to the item, "Water fountains and bathroom facilities are convenient for me should I need them during my walking routine." Because only 49 walkers indicated an indoor walking location, it was concluded that at least some of the participants walking outdoors have access to facilities.

Temperature was reported to be a problem for 29 of the survey participants who responded to the item, "I am often either too hot or too cold when I am walking." Had the participants responded to this survey item during the exceptionally cold winter months of the diary it is likely that more of the 68 outdoor walkers (participants who indicated that they walked

outdoors) would have responded to this item in an affirmative manner. Some of the participants did make narrative comments in their log books noting their inability to walk on certain days when the weather conditions were prohibitive.

Evaluation of Personal and Environmental Factors: Step 2

Response patterns for age, marital status, education, and walking location were evaluated using SPSS[x] FREQUENCIES. For the marital status and education variables, the distribution of responses across response categories was unequal. Using the FREQUENCIES analysis, some categories were combined for both variable sets resulting in categories with similar response rates. After an evaluation of the FREQUENCIES data, ages were similarly grouped into categories. SPSS[x] ONEWAY ANOVA was then used to assess the relationship between the environmental and the personal factors and adherence to the intended walking routine. Education and walking location failed to correlate significantly with walking routine adherence. Results describing personal variables significantly correlated with walking routine adherence follow.

Age

SPSS[x] PEARSON CORR was used to evaluate the relationship between the personal factor, age and walking routine adherence. The age of the participant was significantly correlated with walking routine adherence ($r = .27$, $p < .01$). Participants were next organized into one of three groups for the age variable. Individuals less than 60 years were placed in the "younger" group. The "middle" group consisted of individuals 60 years or older but less than 70 years. The "older" group consisted of individuals 70 years or older. SPSS[x] ONEWAY ANOVA was then used to assess the relationship between age group and walking routine adherence. According to the data analysis, the age group also had a significant impact on

walking routine adherence. Adherence to the intended walking routine was noted to be increasingly greater with age (Table 18).

Table 18: Significant F Values and Mean Scores for Adherence with the Personal Factor, Age

Combined groups (N = 93)*	Mean	SD	F Value	p
Younger (N = 29)	.69	.31	6.09	.00
Middle (N = 42)	.87	.26		
Older (N = 22)	.94	.27		

*Combined groups N < 94 indicates missing data for the age variable

Marital Status

Marital status was the second personal factor to have a significant impact on adherence to the intended walking routine. Participants were coded into one of two groups for the marital status variable. The first group consisted of adults who were single (never married, divorced, separated or widowed) and the second group consisted of married adults. SPSS[x] ONEWAY ANOVA was then used to assess the relationship between marital status and walking routine adherence. According to the data analysis, married participants were significantly more adherent to their intended walking routine than single participants (Table 19).

Table 19: Significant F Values and Mean Scores for Adherence with the Personal Factor, Marital Status

Combined groups (N = 92)*	Mean	SD	F Value	p
Single (28)	.72	.36	6.24	.01
Married (64)	.88	.25		

*Combined groups N < 94 indicates missing data for the marital status variable

Gender

SPSS[x] ONEWAY ANOVA was then used to assess the relationship between gender and walking routine adherence. Males were significantly more adherent to their intended walking routine than females. The significant F values and mean adherence scores by gender are reported in Table 20.

Table 20: Significant F Values and Mean Scores for Adherence with the Personal Factor, Gender

Combined groups (N = 93)*	Mean	SD	F Value	p
Females (N = 62)	.75	.30	15.25	.00
Males (N = 31)	.99	.19		

*Combined groups < 94 indicates missing data for the gender variable

Proximity of walking environment to home

SPSS[x] ONEWAY ANOVA was next used to assess the relationship between the proximity of the walking environment to home and walking routine adherence. The perception that the walking environment was close to home was the fourth variable to have an impact on adherence to the intended walking routine. For the item, "The place where I walk is close to my home" participants were asked to respond using the following scale: strongly agree (1), agree somewhat (2), uncertain (3), disagree somewhat (4) and strongly disagree (5). Using the SPSS[x] FREQUENCIES, participants were grouped into an agree category if they selected option 1 or 2, or into the uncertain to disagree category if they selected option 3,4 or 5. Participants grouped in the agree category were more adherent to their walking for exercise routine than participants grouped in the uncertain to disagree category ($p = .05$). A summary of the data describing the relationship between walking adherence and the proximity of the walking environment to home is described in Table 21.

Table 21: Significant F Values and Mean Scores for Adherence with the Environmental Factor of Proximity of the Walking Environment to Home

Combined groups (N = 93)*	Mean	SD	F Value	p
Agree (N = 79)	.86	.28	3.95	.05
Uncertain to disagree (N = 14)	.69	.35		

*Combined groups < 94 indicates missing data for the proximity to home variable

In response to the remaining four environment items, the majority of walkers responding to the survey reported feeling safe while walking (strongly agree N = 72; agree N = 18).

Most walkers also noted that their walking environment was comfortable (strongly agree N = 72; agree N = 28). Participants varied in their responses to the "Water fountains and bathroom facilities are convenient for me" and the "I am either too hot or too cold when I am walking" items. Responses for these two items ranged from strongly agree to strongly disagree.

Hypotheses Testing: Step 3

Personal and environmental variables significantly related to walking adherence were included in the multiple regression equation with the cognitive factors measures (SSWS, WCS, EBBS, Perception of Health Scale, and Approval/Influence Item Pairs) to predict adherence to a walking routine. The multiple regression technique provided for the calculation of a prediction equation and hypothesis testing about relationships between/among variables (Volicer, 1984). The predictive power of the individual independent cognitive variables was compared with cognitive variable combinations (hypothesis 1-6)

Hypothesis 1: The combination of Exercise Benefits and Exercise Barriers Scale scores and significant demographic and environmental factors will predict adherence to a walking routine.

Standard regression was employed to determine if Exercise Benefits Scores, Exercise Barriers Scores, age, gender, marital status, and proximity of the walking environment to home predict adherence to a walking for exercise routine. Analysis was performed using SPSS^x REGRESSION. Using forced entry as the equation-building method, factors were simultaneously entered into the regression equation. Equation factors significantly correlating with adherence to a walking routine included: age (r = .275, p = .004), gender (r = .379, p = .000), proximity of the walking environment to home (r = -.199, p = .03), marital status (r = .25, p = .01) and the Exercise Barriers Score (r = -.258, p = .006).

Multicollinearity among equation variables was less than or equal to $\underline{r} = .491$. Only age contributed significant unique variability to the prediction of walking for exercise adherence ($sr^2 = .04$). The six independent variables in combination contributed another .22 in shared variability. Altogether, 26% of the variability in walking for exercise adherence was predicted by the equation variables. Because unique variability was attributed to just age and not a variable combination, Hypothesis 1 was only partially accepted. The results of this regression analysis are reported in Table 22.

Table 22: Walking Adherence Rates Regressed on Benefits to Walking Scores, Barriers to Walking Scores, Age, Gender, Marital Status and Proximity of Walking Environment to Home

Factors	Beta	Squared Semi-partial Correlations ($\underline{sr}^2$ unique)	Simple Correlation	F Value	p
Age	.23	.04	.28	4.84	.03
Marital status	.215	.03	.25	3.65	.06
Barriers to walking	-.195	.03	.26	3.01	.09
Gender	-.184	.02	-.38	2.47	.12
Proximity to home	.109	.01	.20	1.25	.27
Benefits to walking	.015	.00	.07	0.02	.89

$\underline{R}^2 = .26$, $\underline{p} = .0002$;
Significant unique variability = .04; shared variability = .22

Hypothesis 2: The combination of Family Support and Friends/Fellow Walkers Support Scores and significant demographic and environmental factors will predict adherence to a walking routine.

Standard regression was employed to determine if Family Support Scores, Friend/Fellow Walkers Support Scores, age, gender, marital status, and proximity of the walking environment to home predict adherence to a walking for exercise routine. Analysis was performed using SPSS^x REGRESSION. Using forced entry as the equation-building method, factors were simultaneously entered into the regression equation. Equation factors with significant adherence to a walking routine correlations included: age (r = .295, p = .01), gender (r = .389, p = .00), and marital status (r = .199, p = .04). Multicollinearity among equation variables was less than or equal to r = .476. Age (sr^2 = .07) and gender (sr^2 = .05) were the only factors to contribute significant unique variability to the prediction of walking for exercise adherence. The six independent variables in combination contributed an additional .14 in shared variability. Altogether 26% of the variability for exercise adherence was predicted by the regression equation. Because unique variability was attributed to just age and gender and not a combination of multiple variables, Hypothesis 2 was also only partially accepted. The results of this regression analysis are reported in Table 23.

Table 23: Walking Adherence Rates Regressed on Family Support Scores, Friend/Fellow Walker Support Scores, Age, Gender, Marital Status and Proximity of Walking Environment to Home

Factors	Beta	Squared Semi Partial Correlation (sr^2 unique)	Simple Correlation	F Value	p
Age	.30	.07	.30	6.93	.01
Gender	-.29	.05	-.39	4.75	.03
Marital status	.13	.01	.20	.99	.32
Family Support	.11	.01	.13	.91	.34
Friend/Fellow Walker Support	.08	.01	.07	.55	.46
Proximity to home	.08	.00	.08	.46	.50

R^2 = .26; p = .0019
Significant unique variability = .12; shared variability = .14

Hypothesis 3: The combination of Walking Confidence Survey scores and significant demographic and environmental factors will predict adherence to a walking routine.

Standard regression was employed to determine if Walking Confidence Survey Scores, age, gender, marital status, and proximity of the walking environment to home predict adherence to a walking for exercise routine. Analysis was performed using SPSS[x] REGRESSION. Using forced entry as the equation-building method, factors were simultaneously entered into the regression equation. All equation factors were significantly correlated with walking for exercise adherence: age (r = .275, p = .00), gender (r = .379, p = .00), proximity of the walking environment to home (r = -.199, p = .03), marital status (r = .250, p = .01) and

WCS scores (r = .219, p = .02). Multicollinearity among equation variables was less than or equal to r = .476. Only age (sr^2 = .05) contributed significant unique variability to the prediction of walking for exercise adherence. The five independent variables in combination contributed an additional .18 in shared variability. Because unique variability was attributed to just age and not a combination of independent variables, Hypothesis 3 was only partially accepted. The results of this regression analysis are reported in Table 24.

Table 24: Walking Adherence Rates Regressed on Walking Confidence Survey (WCS) Scores, Age, Gender, Marital Status and Proximity of Walking Environment to Home

Factors	Beta	Squared Semi Partial Correlation (sr^2 unique)	Simple Correlation	F Value	p
Age	.24	.05	.28	5.84	.02
Gender	-.19	.02	-.38	2.51	.12
Marital Status	.18	.02	.25	2.45	.12
Proximity to home	.13	.01	.20	1.65	.20
WCS Score	.12	.01	.22	1.56	.22

R^2 = .23; p = .0003
Significant unique variability = .05; shared variability = .18

Hypothesis 4: The combination of the Total Approval/Influence Score and significant demographic and environmental factors will predict adherence to a walking routine.

Standard regression was used to determine if the Total Approval/Influence Score, age, gender, marital status, and proximity of the walking environment to home predict adherence to a walking for exercise routine. Analysis was performed using SPSS^x REGRESSION. Using forced entry as the equation-building method, factors were simultaneously entered into the regression equation. Equation factors with significant correlations to walking for exercise adherence included: age (r = .317, p = .00), gender (r = .373, p = .00), proximity of the walking environment to home (r = -.218, p = .02), and marital status (r = .230, p = .02). Multicollinearity among equation variables was less than or equal to r = .465. Only age (sr^2 = .08) contributed significantly to the prediction of walking for exercise adherence. The five independent variables in combination contributed an additional .16 in shared variability. Altogether 24% of the variability for exercise adherence was predicted by the regression equation. Because unique variability was attributed to just age and not a variable combination, Hypothesis 4 was only partially accepted. The results of this regression analysis are reported in Table 25.

Table 25: Walking Adherence Rates Regressed on Approval/Influence Total Score, Age, Gender, Marital Status and Proximity of Walking Environment to Home

Factors	Beta	Squared Semi Partial Correlation (sr^2 unique)	Simple Correlation	F Value	p
Age	.31	.08	.32	8.69	.00
Marital Status	.19	.03	.23	2.61	.11
Gender	-.19	.02	-.37	2.37	.13
Proximity to home	.13	.01	.22	1.54	.22
Approval/Influence Total Score	-.04	.00	-.08	0.18	.67

R^2 = .24; p = .0004
Significant unique variability = .08; shared variability = .16

Hypothesis 5: The combination of Perceived Health Status scores and significant demographic and environmental factors will predict adherence to a walking routine.

Standard regression was employed to determine if the Perceived Health Status Score, age, gender, marital status, and proximity of the walking environment to home predict adherence to a walking for exercise routine. Analysis was performed using SPSS[x] REGRESSION. . Using forced entry as the equation-building method, factors were simultaneously entered into the regression equation. All equation variables were significantly correlated with adherence to a walking for exercise routine: age (r = .275, p = .00), gender (r = .379, p = .00), proximity of the walking environment to home (r = .199, p = .03), marital status (r = .250, p = .01), and the Perceived Health Status scores (r = .191, p = .03). Multicollinearity among equation variables was less than or equal to r = .476. Only age contributed signifi-

cant unique variability (sr^2 = .05) to the prediction of walking for exercise adherence. The five independent variables in combination contributed an additional .19 in shared variability. Because unique variability was attributed to just age and not a combination of multiple variables, Hypothesis 5 was also only partially accepted. The results of this regression analysis are reported in Table 26.

Table 26: Walking Adherence Rates Regressed on Perceived Health Status Score, Age, Gender, Marital Status and Proximity of Walking Environment to Home

Factors	Beta	Squared Semi Partial Correlation (sr^2 unique)	Simple Correlation	F Value	p
Age	.24	.05	.28	6.03	.02
Marital Status	.20	.03	.25	3.14	.08
Gender	-.20	.03	-.38	2.99	.09
Perceived Health Status Score	.15	.02	.19	2.47	.12
Proximity to home	.10	.01	.20	1.10	.30

R^2 = .24; p = .0002
Significant unique variability = .05; shared variability = .19

Hypothesis 6: The additive influence of Exercise Benefits Scale Scores, Exercise Barriers Scale Scores, Family Support Scores, Friend/Fellow Walkers Support Scores, WCS Scores, Approval/Influence Total Scores and Perceived Health Status Scores in combination with significant demographic and environmental factors will predict adherence to a walking routine.

Standard regression (SPSS^x REGRESSION with forced entry) was used for hypothesis testing. The cognitive factor measures entered into this regression equation included: Exercise Benefits Scale Scores, Exercise Barriers Scale scores, Family Support scores, Friend/Fellow Walkers scores, WCS scores, Approval/Influence Total Scores and Perceived Health Status Scores. The significant demographic and environmental factors entered into the regression included: age, gender, marital status and proximity of the walking for exercise setting to home. Factors significantly correlating with adherence included: age (r = .340, p = .002), gender (r = .389, p = .000), and WCS (r = .213, p = .036). The correlation between walking adherence and the Approval/Influence Total Score approached significance (r = -.190, p = .055). Multicollinearity among equation variables was less than or equal to r = .416. Both age (sr^2 = .07) and the Approval/Influence Total Score (sr^2 = .05) contributed significantly to the prediction of walking for exercise adherence. The 11 independent variables in combination contributed an additional .23 in shared variability. Because unique variability was attributed to just two IVs (age and the Approval/Influence Total Score) and not a combination of multiple variables, Hypothesis 6 was only partially accepted. The results of the regression analysis are reported in Table 27.

Table 27: Walking Adherence Regressed on Exercise Benefits Scale scores, Exercise Barriers Scale scores, Family Support scores, Friend/Fellow Walkers Support scores WCS scores, Approval/Influence Total scores, Perceived Health Status scores, Age, Gender, Marital Status and Proximity of the Walking Environment to Home

Factors	Beta	Squared Semi Partial Correlation (sr^2 unique)	Simple Correlation	F Value	p
Age	.31	.07	.34	6.73	.01
Approval/Influence Total Score	-.27	.05	-.19	4.90	.03
Social Support Family	.24	.04	.13	3.61	.06
Proximity to home	.18	.03	.17	2.45	.12
Gender	-.19	.02	-.39	1.85	.18
WCS Scores	.11	.01	.21	0.69	.41
Marital Status	.10	.01	.16	0.57	.45
Perceived Health Status Score	.09	.01	.16	0.55	.46
Benefits Score	.02	.00	.04	0.04	.85
Social Support Friends/Fellow Walkers	.02	.00	.05	0.02	.88
Barriers Score	.02	.00	-.11	0.02	.90

$R^2 = .35$; $p = .0041$
Significant unique variance = .12; shared variance = .23

Factors Correlated with Relapse: Step 4

Research Question 2: Are factors predictive of walking for exercise adherence and walking for exercise cessation the same?

Participants (N = 16) reporting an exercise lapse of three (3) or more weeks duration were identified as relapses. Although relapse has been defined in the literature as exercise cessation for three or more months following a six month period of regular exercise (Sallis, Hovell et al. 1990), a shorter time frame for relapse was used because of the limited twelve week diary period. Overall, participants identified as relapses reported an average walking routine adherence rate (distance and days adherence) of 37%. Eleven (11) of the relapses reported their walking for exercise activities during a telephone interview because of a failure to return the Walking for Exercise Log. Extenuating circumstances adversely affecting exercise participation were described by 13 of the relapses and included: illness (N = 3), injured (N = 4), weather (N = 3), increased demands at work (N = 1) and a combination of illness and weather (N = 2). According to SPSS^X FREQUENCIES analysis, all the relapses were female and their ages ranged from 37 to 73 (mean = 60.00). The women reporting a relapse in exercise activities reported their marital status as: divorced (N = 3), widowed (N = 6), never married (N = 1) and married (N = 6). A college degree was earned by three (3) of these women.

For the group of walkers reporting three or more weeks of walking cessation, SPSS^X ONEWAY ANOVA was used to evaluate the relationship between the environmental and the personal factors and the total adherence scores. According to the analyses, none of the environmental or personal factors had a significant impact on the reported walking for exercise activities. Next, SPSS^X PEARSON CORRELATIONS were used to assess the

relationship between the cognitive factor measures and total adherence scores. Cognitive factor measures significantly correlated with walking routine relapse included the following scores: Perceived Health Status (r = .53, p = .04), Social Support Family (r = .54, p = .04), and Approval/Influence Total (r = .55, p = .05). Because of the limited number of walkers reporting relapse, the results of these analyses must be interpreted cautiously.

Section III: Ad Hoc Data Analyses

Three additional data analysis procedures were performed to further evaluate the relationship between NHWEM factors and walking for exercise adherence. The first ad hoc data analyses involved the deletion of age and gender from the regression equation. Next, identification of suppressor variables is discussed. Finally, after dividing the sample into two groups by age, the relationship between study factors and adherence was evaluated. A discussion of these three ad hoc data analyses procedures, rationale and subsequent results follow.

Deletion of Age and Gender from the Regression Equation

Age and gender were eliminated from subsequent regression equations for two reasons. First, because the greatest portion of significant unique variability in all the previous regression equations was attributed to age (in four of the six of these regression equations all significant unique variability was attributed to age; in a fifth equation all significant unique variability was attributed to age and gender) hypotheses 1-6 were only partially accepted. Second, because age and gender are unchangeable and this study was designed to focus on alterable factors, it was desirable to assess if the remaining factors could significantly predict walking behaviors.

Standard regression was used to determine if Exercise Benefits Scale Scores, Exercise Barriers Scale scores, Family Support scores, Friend/Fellow Walkers scores, WCS scores,

Approval/Influence Total Scores, Perceived Health Status Scores, marital status and proximity of the walking environment to home predict adherence to a walking for exercise routine. Analysis was performed using SPSS^x REGRESSION. Using forced entry as the equation-building method, factors were simultaneously entered into the regression equation. The WCS score was the only factor in the equation to significantly correlate with adherence ($\underline{r}$ = .213, $\underline{p}$ = .04). Multicollinearity among equation variables was less than or equal to $\underline{r}$ = -.507. Only the Approval/Influence Total Score ($\underline{sr}^2$ = .09) and the proximity of the walking environment to home ($\underline{sr}^2$ = .06) contributed significant unique variability to the prediction of walking for exercise adherence. The 9 independent variables in combination contributed an additional .08 in shared variability. Altogether 23% of the variability for exercise adherence was predicted by the regression equation. As noted in the results of previous regression equations, unique variability with this equation was again attributed to a restricted number of IVs, (and not a combination of multiple variables). The results of the regression analysis are reported in Table 28.

Table 28: Walking Adherence Regressed on Exercise Benefits Scale Scores, Exercise Barriers Scale Scores, Family Support scores, Friend/Fellow Walkers Support Scores WCS Scores, Approval/Influence Total Scores, Perceived Health Status Scores, Marital Status and Proximity of the Walking Environment to Home

Factors	Beta	Squared Semi Partial Correlation (sr_2 unique)	Simple Correlation	F Value	p
Approval/Influence Total Score	-.34	.09	-.19	7.21	.01
Proximity to home	.27	.06	.17	4.92	.03
Social Support Family Scores	.23	.04	.13	3.20	.08
WCS Scores	.15	.02	.21	1.26	.27
Marital Status	.14	.01	.16	1.14	.29
Perceived Health Status Score	.13	.01	.16	1.04	.31
Barriers Scale Scores	-.11	.01	-.11	.55	.46
Benefits Scale Scores	-.05	.00	.04	.17	.68
Social Support Friends and Fellow Walkers Scores	.04	.00	.05	.11	.74

$\underline{R}^2 = .23$; $\underline{p} = .05$
Significant unique variance = .15; shared variance = .08

Identification of Suppressor Variables

According to Tabachnick & Fidell (1989), occasionally an independent variable (IV) is found that is useful in predicting the dependent variable (DV) and increasing the multiple R^2 by virtue of its correlations with other IVs. This IV, called a suppressor variable, suppresses

variance that is irrelevant to prediction of the DV. The presence of suppressor variable(s) was considered because the absolute value of the simple correlation between the Approval/Influence Total Score and walking for exercise adherence (-.19) was smaller than the Approval/Influence Total Score beta weight (-.34). Consistent with Tabachnick & Fidell's recommendation for identifying the suppressor variable(s), IV(s) with congruent regression coefficients and correlations were identified as: Social Support Family Scores, Social Support Friends/Fellow Walkers Scores and Benefits Scores. Systematically, each of the above named congruent IVs was left out of the regression equation and the resulting change in the Approval/Influence Total Score regression coefficient was examined. Reductions in the regression coefficients for the Approval/Influence Total Score and equation $\underline{R}^2$ were noted following the omission of the Social Support Family Score (beta = -.24, equation $\underline{R}^2$ = .14) and the omission of the Social Support Friends/Fellow Walkers Score (beta = -.22, $\underline{R}^2$ = .22). The omission of the Benefits Score did not significantly reduce the Approval/Influence Total Score regression coefficient (beta = -.31). Based on the above analysis, the Social Support Family Score and the Social Support Friends/Fellow Walkers Score were identified as suppressor variables, enhancing the importance of the Approval/Influence Total Score.

Division of the Study Sample by Age

The study sample was divided into two groups by age to determine if older participants responded significantly different on the cognitive measures than younger participants. Group one consisted of participants 65 and older ($\underline{N}$ = 45), group 2 consisted of participants less than 65 ($\underline{N}$ = 57). The age for group division was set at 65 to allow for adequate representation in each group and because this age is generally associated with retirement. Data analyses

included SPSS[x] FREQUENCIES, SPSS[x] PEARSON CORRELATIONS, SPSS[x] ONEWAY and t-tests.

Participants less than 65 years of age reported a mean walking for exercise rate of 79%. Four factors significantly correlated with walking for exercise adherence in this group: gender ($p = .00$) with males (99%) more adherent than females (71%); the proximity of the walking environment to home ($p = .04$); age (older participants more adherent than younger participants $p = .00$); and WCS scores ($R = .344$, $p = .01$) Participants 65 years and older reported a mean walking for exercise adherence rate of 88%. The only factor significantly correlated with walking for exercise adherence in the 65 and older group was marital status (married participants reporting higher adherence rates than single participants,($p = .04$).

Differences between group means for adherence and cognitive factor measures were evaluated using t-tests. The significant t-test comparisons are reported in Table 29. The older group was significantly more adherent to their walking for exercise routine than the younger group ($t = 88$, $p < .01$). The older group reported higher Perceived Health Status scores ($t = 133$, $p < .01$), higher Friend and Fellow Walker Support scores ($t = 2.52$, $p < .01$), lower WCS scores ($t = 4$, $p < .01$), lower Benefits scores ($t = 34$, $p < .01$), lower Barriers scores ($t = 15.71$, $p < .01$), and lower Family Support scores ($t = 2.84$, $p < .01$) than the younger group.

Table 29: T-Test Comparisons of Younger than 65 and 65 or Older Group Means for Adherence and Cognitive Factor Measures

Factor	Group Means		T-Test Analyses		
	younger than 65 (N = 57)	65 or older (N = 45)	t	df	p
Walking for exercise adherence	.79	.88	88.0	92	<.01
Perceived Health Status Scores	4.47	4.87	133.0	101	<.01
Friend/Fellow Walker Support	16.38	16.86	2.5	84	<.02
Family Support	13.39	12.85	2.8	90	<.01
WCS	4.30	4.26	4.0	101	<.01
Benefits scores	97.91	95.53	34.0	101	<.01
Barriers scores	23.70	22.60	15.7	101	<.01
Approval/Influence Total Score	31.46	33.36	2.5	92	<.02

Section IV: Discussion

Three discussion subsections follow. First, characteristics of the sample are discussed. In the second subsection, the participant's actual walking routines are evaluated using established guidelines for fitness walking. Relationships between the cognitive factor measures and walking routine adherence are summarized in the third subsection. The discussion section concludes with a discussion of the hypotheses testing results. Limitations are noted in the appropriate sections.

Study Sample

The convenience study sample consisted of adults currently participating in a walking for exercise routine. Because the Silver Strider's mailing list was used to recruit participants, the mean age of study participants may have exceeded the age of the "typical" walker. Addition-

ally, individuals who join organizations promoting "walking for exercise" may share some characteristics not seen in individual walkers who choose not to join groups and organizations. For these reasons, the following conclusions are drawn with caution and should not be applied to all walkers in general.

Persons 65 and older were more adherent to their walking routines than persons younger than 65 years old. Although this finding is consistent with previously described correlates of walking, the older persons in this current study were also likely to be Silver Strider members, whereas the younger persons may not have met the age eligibility requirements. The added influence of Silver Strider membership and the potential relationship between membership and adherence must be considered.

Reported Walking Routine

Exercise must be performed on a regular basis to be effective. According to Seiger & Hesson (1990), the recommended frequency for fitness walking is three to five days a week. Although some persons may benefit from walking six or seven days a week, they are at an increased risk for burnout and injury (Seiger & Hesson). The mean intended number of walking days per week (mean = 4.74) reported by the study sample was consistent with Seiger & Hesson's (1990) recommendation for fitness walking. Although only one participant reported an intention less than the guidelines for fitness walking, 36 reported intentions in excess of the recommended five days per week (6 days, $\underline{N}$ = 21 and 7 days, $\underline{N}$ = 12).

The actual average number of days walked per week reported by study participants ($\underline{N}$ = 97) ranged from 0 to 6.92 (mean = 3.66). Thirty-five participants reported walking an average of less than the recommended 3 days a week and 19 participants reported walking an

average of greater than five days a week. Only 43 of the walkers reported a daily frequency within the recommended guidelines.

The recommended duration for the walking for exercise routine described by Seiger & Hesson is 15 to 60 minutes. The duration reported by the sample subset who used minutes as their duration measure was within the recommended guidelines (47.3 minutes). The shortest duration intention reported was 20 minutes (N = 4). Intentions exceeding the duration guidelines were reported by 8 walkers and ranged from 65 to 120 minutes per exercise session. The actual average minutes duration for each exercise session reported by participants using the minutes measure (N = 41) ranged from 0 to 90.35. Durations less than the recommended 15 minutes were reported by five walkers (0 - 13.61 minutes) and durations exceeding the recommended 60 minutes (64.35 - 90.35 minutes) were reported by 6 walkers.

Cognitive Instruments

The WCS, Social Support Friends scale, Social Support Fellow Walkers scale, Benefits Scale, Barriers Scale, Perceived Health Status scale, and the Approval/Influence Total Score were used as Natural History of Walking for Exercise cognitive factor measures. A discussion of the results obtained from each measure follows.

Walking confidence survey

An evaluation of the mean item WCS scores was completed to describe the efficacy beliefs of the study sample. Overall, the study sample reported high walking routine adherence self-efficacy beliefs (WCS mean = 4.28). Mean item scores of greater than 4.05 (1 = I know I cannot, 5 = I know I can) were computed for all 10 scale items. Additionally for each item, "I know I can" (5) was selected as the response more often than any other option. The greatest number of participants to use the response option "I know I cannot" for any single

item was three (3). Thirty-two (32) participants (equally divided between participants 65 and older and participants younger than 65) used the response option "does not apply" to respond to the item "Attend a party only after walking." Further evaluation of this item with possible deletion from the WCS may be warranted.

Although the SEBS was designed as a two scale instrument (resisting relapse and making time for exercise) the WCS was scored as a single measure. Consistent with the findings reported by Hovell et al. (1989), self-efficacy for the study sample ($N = 94$) was correlated with walking for exercise adherence ($R = .22$, $p = .04$). This correlation was comparable to reported relationships between self-efficacy and adherence to other forms of exercise including aerobics (Dishman, Ickes & Morgan, 1980).

The relationship between self-efficacy and walking for exercise participation was reassessed after dividing the study sample into two groups. One group consisted of participants 65 years of age and older ($N = 42$). A second group consisted of participants younger than 65 years of age ($N = 51$). A significant relationship between WCS scores and adherence to a walking for exercise routine was noted only for participants in the younger than 65 age group ($R = .34$, $p = .01$). A plausible explanation for this finding is that the younger participants had greater daily commitments to work and children than those over the age of 65. Because work and family demands competed with exercise routine participation for time in the "younger than 65" participant's lives, the ability (or inability) to "make time for exercise" influenced exercise frequency. Conversely, when time was more plentiful (as in retirement) the WCS measure failed to predict adherence. Because challenges to the perception of competence vary with progression through developmental stages, researchers should design self-efficacy measures that are both behavior-specific and age-sensitive. It is anticipated that self-

efficacy beliefs will predict walking for exercise adherence in an over 65 population when the developmentally specific challenges are included in the measure.

Social Support Family and Social Support Friends/Fellow Walkers measures

An evaluation of the mean item support scores for both the Family Support and Friends/Fellow Walkers Support Scales was completed to describe the social support perceived by study walkers. Items on the Family Support Scale receiving the highest scores focused on the provision of general encouragement. Items specifying a specific supportive behavior were scored lower. The family scale item with the highest mean ranking (mean = 4.12, 4 = often) was "Give me encouragement to stick with my walking routine." The item with the lowest mean (2.29, 2 = rarely) was "Ask me for ideas on how they can get more exercise. Items on the Friends/Fellow Walkers Support Scale focusing on the perceived support received from fellow walkers were consistently ranked higher than items focusing on the perceived support received from friends. For example, the highest ranked scale item (mean = 3.96, 4 = often) focused on fellow walkers and was "Change their schedule so we can walk together." The lowest ranked scale item (mean = 2.56, 2 = rarely, 3 = a few times) focused on friends and was "Ask me for ideas on how they can get more exercise."

Neither the Family Support score or the Friend/Fellow Walkers Support score significantly correlated with walking routine adherence in the total study sample, however a significant correlation between adherence and the Social Support Family score ($\underline{R}$ = .54, $\underline{p}$ = .036) was noted for individuals reporting a walking routine relapse of three weeks or more. The mean Social Support Family score for relapsed walkers (mean = 11.75) was less than the study sample mean (13.11) indicating that relapsed walkers perceived less family support for walking routine participation than generally reported by the study sample.

The lack of a significant correlation between the social support measures and walking routine adherence may be attributed to the phase of exercise participation targeted for this study. According to the literature (Sallis et al. 1987; Dishman, Sallis & Orenstein, 1985) social support is correlated with the adoption of an exercise routine. Assuming this is true, individuals perceiving minimal support either fail to adopt an exercise routine or discontinue participation soon after the initial exercise experience. Because the present study sample consisted of adults currently participating in an exercise routine, it is likely that the support that facilitated exercise adoption continues to promote ongoing participation.

As previously discussed, the Social Support Family score failed to contribute significant unique variance to the NHWEM regression equation however, deletion of this measure significantly reduced the variance explained by the total regression equation. It was also noted that the Social Support Family score significantly correlated with other cognitive factor measures (Social Support Friends/Fellow Walkers, Benefits score, Approval/Influence Total score, and WCS score) when combined in a regression equation. Although significant correlations between the cognitive measures reduced the amount of unique variance explained by the Social Support Family score, it was concluded that the perception of a supportive family facilitates walking routine adherence.

Exercise Benefits and Exercise Barriers scoring

Participants completing the EBBS reported that the benefits of exercise noted in CHAPTER 1 actually exist. Physiological affects of exercise participation realized by most of the current study walkers (N = 103) included: prevention of high blood pressure (Strongly agree = 26, Agree = 59); increased level of physical fitness, (Strongly agree = 60, Agree = 41); improved muscle tone (Strongly agree = 48, Agree = 53); improved flexibility

(Strongly agree = 50, Agree 48); increased stamina (Strongly agree = 48, Agree = 54); sleep better at night (Strongly agree = 42, Agree = 57); decreased fatigue (Strongly agree = 26, Agree = 66); and improved overall body functioning (Strongly agree = 35, Agree = 66). Additional psychological benefits ascribed to exercise participation by study walkers (N = 103) included: decreased feelings of stress and tension (Strongly agree = 71, Agree = 30); improved mental health (Strongly agree = 65, Agree = 36), improved feelings of well-being (Strongly agree = 53, Agree = 47); improved disposition (Strongly agree = 42, Agree = 54); and improved self-concept (Strongly agree = 41, Agree = 60).

Although the total sample of walkers perceived few barriers to exercise participation, the barriers ranked as most problematic were noted based on the following item responses: "There are too few places for me to exercise" (Strongly agree = 9, Agree = 12); "Exercise is hard work for me" (Strongly agree = 2, Agree = 17); "Exercise facilities do not have convenient schedules for me" (Strongly agree = 2, Agree = 15); and "Exercise takes too much of my time" (Strongly agree = 2, Agree = 14).

Exercise Barriers scores significantly correlated with walking for exercise adherence ($\underline{R}$ = -.25, $\underline{p}$ = .02) in the study sample ($\underline{N}$ = 94). This correlation was consistent with the previously described findings of Sechrist, Noble Walker & Pender (1987). A similar correlation between Exercise Benefits and walking routine adherence however, was not noted. Three explanations for this lack of correlation follow.

First, the absence of a correlation between walking routine adherence and Exercise Benefits Scores may be partially attributed to the fact that all study participants were walkers. It was assumed that belief in the benefits of exercise contributed to the study participants' decisions to initiate their exercise routines. This initial benefits of exercise perception in combination

with current benefit beliefs reported on the Exercise Benefits scale contributed to ongoing walking adherence. Because the study participants personally experienced the benefits of exercise, perceptions of exercise benefit remained constant even when perceptions of increased barriers contributed to diminished adherence rates.

A competing explanation for the lack of correlation between the Exercise Benefits score and walking adherence may be related to the fact that the instrument was not behavior specific for the type of exercise. As previously discussed, according to the NHEM, the predictors of exercise adherence are not the same for different types of exercise. For example, the predictors of adhering to a supervised high impact aerobics routine differ from the predictors of adhering to a walking routine. Consistent with this assumption, it also seems likely that the benefits of participating in a high impact aerobics routine would differ from the benefits of participating in a walking routine. The EBBS used in the current study may have been insufficiently sensitive to the benefits specifically attributed to walking.

Finally, the lack of a correlation between the Exercise Benefits score and walking adherence may be partially attributed to the fact that the instrument was not an adherence phase specific measure. As previously discussed, exercise history influences the predictors of exercise behaviors (for example, the predictors of adoption are not the same as the predictors of adherence, etc.). The EBBS used in the current study may have been insufficiently sensitive to the benefits specifically attributed to the adherence phase of walking participation.

Perceived Health Status

Perceived Health Status item scores were not correlated with walking routine adherence in the total study sample however for the subset of walkers reporting a relapse of three (3) or more weeks, significant correlations were noted ($R = .53$, $p = .04$). Persons reporting

relapse also reported a lower mean perceived health status score (mean = 4.43) than the total sample of walkers (mean = 4.66). This finding was consistent with study results describing physical injury as the most commonly reported reason for relapse from exercise (Sallis, 1990).

Approval/Influence Total

Approval/Influence Total scores were not correlated with walking routine adherence for the total study sample (N = 103), however for the subset of walkers reporting a relapse of three (3) or more weeks (N = 16), significant correlations (R = .55, p = .05) were noted. The response patterns for both groups were evaluated to explain the significant correlation between Approval/Influence scores and individuals reporting relapse. For the approval items, the relapsed walkers reported slightly less approval from family, friends and fellow walkers (mean for approval items = 4.67; 1 = strongly disapprove, 2 = moderately disapprove, 3 = neutral, 4 = moderately approve, 5 = strongly approve) than reported by the total sample (mean for approval items = 4.75) The relapsed walkers also reported being influenced by their family, friends and fellow walkers (mean for influence items = 2.55; 1 = not influence you, 2 = slightly influence you, 3 = moderately influence you, 4 = strongly influence you) more than reported by the total sample (mean for influence items = 2.28). According to this pattern of responses, the heightened perception of being influenced by family, friends and fellow walkers who approved less of the walking for exercise activity contributes to explaining the relapse experienced by this group. A summary of the correlations between cognitive factor measure and adherence in the total sample and subsets of the sample is reported in Table 30.

Table 30: Cognitive Measure and Walking for Exercise Adherence Correlations for the Study Sample, Participants 65 and Older, Participants Younger than 65, and Participants Reporting a 3-Week or Greater Relapse from Walking

Cognitive Measures	Total Sample			65 Years and Older			Younger than 65			Relapse of 3 Weeks or More		
	N	r	p	N	r	p	N	r	p	N	r	p
WCS Score	94	.22	.04*	42	.03	.87	51	.34	.01*	15	.23	.42
Family Support	83	.18	.10	37	.10	.56	45	.27	.07	15	.54	.04*
Friends/Fellow Walkers Support	77	.07	.55	32	.13	.49	44	.03	.85	13	.28	.35
Exercise Benefits	94	.07	.53	42	-.05	.75	51	.20	.17	15	.20	.48
Exercise Barriers	94	-.25	.02*	42	-.27	.09	51	-.23	.10	15	-.30	.29
Perceived Health Status scores	94	.19	.06	42	.13	.41	51	.19	.18	15	.53	.04*
Approval/Influence Total Score	86	-.08	.46	36	-.29	.09	49	.05	.71	13	.55	.05*

* indicates significant correlations

Hypothesis Testing

Hypothesis 1: The combination of Exercise Benefits and Exercise Barriers Scale scores and significant demographic and environmental factors will predict adherence to a walking routine.

Hypothesis 1 was only partially accepted ($R^2 = .26$, $p < .01$) because all of the significant unique variability explained by the equation was attributed to age ($sr^2 = .04$) an unalterable personal factor. The other variables in combination contributed another .22 in shared variability. The only significant relationship noted between the equation independent variables was a correlation between Exercise Benefits and Exercise Barriers scores ($r = -.491$, $p < .01$). The significant correlation between the Exercise Benefits and Exercise Barriers score may partially explain why neither factor contributed unique significant variance to the total regression equation. Cohen & Cohen (1983) note that the partial coefficients of highly correlated IVs analyzed simultaneously are reduced and subsequently claim largely the same portion of the Y variance. In situations where the IVs are highly correlated, interpretation of the partial coefficients may be misleading because they underestimate the contribution of the variable. This may explain why the Exercise Benefits score and the Exercise Barriers scores did not add to the significant unique variance explained by the equation (Cohen & Cohen, 1983).

Hypothesis 2: The combination of Family Support and Friends/Fellow Walkers Support Scores and significant demographic and environmental factors will predict adherence to a walking routine.

Hypothesis 2 was also only partially accepted ($R^2 = .26$, $p < .01$) because only age ($sr^2 = .07$) and gender ($sr^2 = .05$) contributed significant unique variability to this equation. The rest of the explanation provided by this equation was in the form of shared variability (.14). The only significant independent variable correlation noted was between the Family Support score and the Friends/Fellow Walkers score ($R = .233$, $p = .02$). According to this finding, participants perceiving high family support also perceived high friend/fellow walkers support for their exercise activities. Because the correlation between the Family Support score and the Friends/Fellow Walkers Support score was minimal, it is doubtful that this relationship significantly reduced the contribution of either variable to the regression equation. Because the cognitive factors failed to correlate with adherence to a walking routine and failed to explain significant unique variance the value of this equation for guiding the development of nursing interventions is limited.

Hypothesis 3: The combination of Walking Confidence Survey scores and significant demographic and environmental factors will predict adherence to a walking routine.

Hypothesis 3 was also only partially accepted ($R^2 = .23$, $p < .01$) because all of the significant unique variability explained by the equation was attributed to age ($sr^2 = .05$). All the factors entered into the regression equation significantly correlated with walking routine adherence and the five variables in combination contributed .18 in shared variability. Although the WCS score correlated with gender ($R = .217$, $p = .02$), the strength of the relationship was minimal and it is doubtful that this relationship significantly reduced the

contribution of the WCS score variable to the regression equation. The value of this equation for guiding the development of specific nursing intervention is questionable because most of the explained variability was contributed by variable combinations.

Hypothesis 4: The combination of the Total Approval/Influence Score and significant demographic and environmental factors will predict adherence to a walking routine.

Hypothesis 4 was also only partially accepted ($R^2 = .24$, $p < .01$) because only age ($sr^2 = .08$) and gender ($sr^2 = .05$) contributed significant unique variability to this equation. The rest of the explanation provided by this equation was in the form of shared variability (.14). The Approval/Influence score was not significantly correlated with adherence to a walking routine and did not contribute significant unique variance to the regression equation. The value of this equation for guiding the development of specific nursing interventions for enhancing walking routine adherence is very limited.

Hypothesis 5: The combination of Perceived Health Status scores and significant demographic and environmental factors will predict adherence to a walking routine.

Hypothesis 5 was only partially accepted ($R^2 = .24$, $p < .01$) because age was again the single factor to contribute significant unique variability ($sr^2 = .05$). All of the independent variables entered into the regression equation significantly correlated with walking routine adherence, however, the magnitude of the correlations was not large and the R values did not exceed .38. The five independent variables in combination explained an additional 19% of the variability resulting in an R^2 of .24. The value of this equation for guiding the development of specific nursing intervention is questionable because most of the explained variability was contributed by variable combinations.

Hypothesis 6: The additive influence of Exercise Benefits Scale Scores, Exercise Barriers Scale Scores, Family Support Scores, Friend/Fellow Walkers Support Scores, WCS Scores, Approval/Influence Total Scores and Perceived Health Status Scores in combination with significant demographic and environmental factors will predict adherence to a walking routine.

Hypothesis 6 was only partially accepted ($R^2 = .35$, $p < .01$) because only two IVs contributed unique variability to the regression equation. Again, age contributed the largest portion of unique variance ($sr^2 = .07$). Despite an insignificant correlation with the dependent variable, the Approval/Influence Total Score was the only other variable to contribute significant unique variance ($sr^2 = .05$). Omitting age and gender from a subsequent analysis of the regression equation reduced the amount of explained variability from $R^2 = .35$ to $R^2 = .23$ but did not enhance the amount of significant unique variability explained by other cognitive factors. Although the WCS score significantly correlated with walking routine adherence, this self-efficacy measure did not prove to be a strong predictor in either regression equation. Because the WCS measure significantly correlated with six of the independent variables in the equation (gender, Perceived Health Status, Family Support, Friends/Fellow Walkers Support, Benefits Score and Barriers Score) it is likely that the variability explained by the self-efficacy measure was dispersed among the seven correlated variables resulting in minimized unique variability and enhanced shared variability. The presence of suppressor variables as previously noted (Family Support and Friend/Fellow Walkers Support) explained a portion of the unique variability attributed to the Approval/Influence Score. Omission of the Family Support Score variable from the regression equation substantially reduced the R^2 from .23 to .15 indicating the indirect but important contribution of this variable. Omission of the Friend/Fellow Walkers Support Score variable resulted in a less dramatic reduction in

the $\underline{R}^2$ to .22 indicating also an indirect variable contribution. Based on the above findings, the usefulness of the Hypothesis 6 equation for guiding the development of specific nursing intervention is questionable because most of the explained variability was contributed by variable combinations. Furthermore, because the unique variability attributed to the Approval/Influence score was inflated by the presence of suppressor variables, designing interventions based on this cognitive factors unique variability contribution in this equation would be inappropriate.

Research Question 1: What demographic characteristics best describe a population of walkers?

For the total sample age, gender, and marital status significantly correlated with adherence. Age was significantly correlated with walking adherence and contributed significant unique variance in each regression equation. For the participants in the current study, walking routine adherence rates increased with age. Males and married persons were more adherent to their intended routines.

Research Question 2: Are factors predictive of walking for exercise adherence and walking for exercise cessation the same?

Although age was correlated with walking routine adherence and was consistently responsible for contributing the largest portion of unique explained variance when included in regression equations, a similar significant correlation between age and total adherence scores in the group reporting exercise cessation was not found. Similarly, although the WCS score was correlated with the total adherence score in the study sample, similar correlations between the WCS score and the total adherence score in the subset of participants reporting a walking relapse were not found. Conversely, the Perceived Health Status score, the Family Support

score, and the Approval/Influence Total score were not significantly correlated with the total adherence score in the total sample but were significantly correlated with the total adherence score in the subsample reporting relapse. These results are consistent with the assumption that factors correlated with successful walking routine adherence differ from factors correlated with relapse. These findings are furthermore consistent with the NHEM premise which is that the correlates of exercise behavior are transitionary phase specific. A serious limitation associated with this correlational analysis comparing individuals reporting walking for exercise relapse ($\underline{N}$ = 16) with personal, environmental and cognitive factors was the small sample size. Because only a small number of participants reported a three week or more relapse from walking, it was not possible to evaluate the combined influence of the independent variables on the total adherence scores. The cognitive measure and walking for exercise adherence correlations for the study sample, participants 65 and older, participants younger than 65, and participants reporting a 3-week or greater relapse from walking were previously reported in Table 30.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Chapter five is introduced with a summary of the design and findings associated with the current study. Next, the conclusions are presented. In the final part of chapter five, recommendations for future research are provided.

Summary

The physiological and psychological benefits of regular participation in exercise have been well documented in the literature and include disease risk reduction, adjunctive symptom management and enhanced psychosocial well-being. Because the achievement of these benefits depends on regular exercise participation, the purpose of the present study was to test a regression model designed to predict walking for exercise adherence. The framework for this prospective, correlation study was an extension of the second transitionary phase of the Natural History of Exercise Model (NHEM). Because walking was the targeted exercise, the model extension was named the Natural History of Walking for Exercise Model (NHWEM). The NHWEM variables measured in the current study included, personal factors (age, gender, marital status and education); cognitive factors (social support, self-efficacy, normative beliefs, perceived health status and benefits/barriers); and environmental factors (safety, comfort, weather, and the proximity of the walking environment to home).

According to the NHWEM, the predictors of exercise behaviors are activity and transitionary phase specific. The specific activity selected for study was the moderate intensity exercise of walking. The phase of exercise participation was adherence (second-transitionary phase).

A total of 357 adults currently participating in a walking routine were mailed study packets which included a Walking for Exercise Survey booklet, a Walking for Exercise Log Book and

an informed consent form. The Walking for Exercise Survey Book was completed by 103 walkers who consented to participate in the study. After completing and returning the Walking for Exercise Survey Book, participants were directed to record their actual walking for exercise activities in the Walking for Exercise Log. Sixty-six of the 103 participants returned their completed logs. Of the 37 participants who failed to return their Log, 31 provided information about their walking for exercise activities during a telephone interview. The participants completing the Walking for Exercise survey ages ranged from 28 to 79 years (mean = 62.94). There were twice as many women as men. As noted in previous exercise studies, the walkers were highly educated with 42% of the sample earning a college degree.

Responses to items in the survey booklet in addition to the recorded and reported descriptions of actual 12 week walking activities were analyzed using six Phase I: Preliminary Data Analysis Steps. The first step included data screening procedures. Because incidences of missing cases for the self-efficacy measure (Walking Confidence Scale), the perceived health status measure (Perceived Health Status Scale) and the benefits/barriers measures (Exercise Benefits Scale and Exercise Barriers Scale), were minimal, group means were inserted for missing cases. A specific pattern of missing cases detected in the normative beliefs measure (Approval/Influence Total Score) resulted in the deletion of nine cases and an increased frequency of random cases detected in the social support measures resulted in the deletion of 11 cases from the Family Support measure and 17 cases from the Friends/Fellow Walkers Support measure.

During the second preliminary data analysis step, cognitive measure responses recorded in the Walking for Exercise Survey booklet were analyzed and scoring. The SPSS[x] RELIABILITY program was used to evaluate internal consistency for the WCS (r = .90), the Exercise

Benefits Scale (r = .94), the Exercise Barriers Scale (r = .79), the Family Support Scale (r = .87), the Friend/Fellow Walkers Support Scale (r = .89) and the Perceived Health Status Scale (r = .67). Because the Approval/Influence Total measure consisted of only three item pairs, internal consistency was not evaluated. The social support and self-efficacy measures were additionally evaluated for construct validity using SPSS^x Principle Axis Confirmatory Factor Analysis with Varimax Rotation. Based on the data analysis, changes were made in the construction and scoring of the self-efficacy and social support measures. The Perceived Health Status Scale consisting of 3 items and the Approval/Influence measure consisting of 6 items were too brief to be evaluated using factor analysis. The sample size was insufficient to evaluate the EBBS using factor analysis.

Step 3 preliminary data analysis procedures were used to evaluate the responses to the environment items. Overall, walkers noted that they felt safe and comfortable in their walking environment. Walkers also expressed that they felt neither too hot or too cold during their walking for exercise routine.

The possibility of presentation order influencing response was assessed during the fourth preliminary data analysis step. Three forms of the Walking for Exercise Survey Booklet were used for data collection. The only difference between the forms was the presentation order of the cognitive factor measures. Analysis of variance was calculated using SPSS^x ONEWAY. A significant order effect was not detected.

The reported intended walking routine and actual walking behaviors were used during the fifth preliminary data analysis step to calculate walking adherence scores. The intended walking routine was described by participants in the Walking for Exercise Survey and the actual walking behaviors were recorded in the log or reported during a telephone interview.

The option to report distance using either a minutes measure or a miles measure was provided because some walkers note their walking for exercise distance using minutes walked and some note their distance using miles walked.

The intended number of days for walking per week reported by participants ranged from 2 to 7 days (mean = 4.74). This compared with the actual average number of days walked per week which ranged from 0 to 6.92 days (mean 3.62). The intended number of miles walked per exercise session ranged from 1-10 (mean = 2.91). This compared with the actual number of miles walked per session which ranged from 0 to 8.5 (mean = 2.42). Finally, the intended number of minutes walking per exercise session ranged from 20-120 (mean = 47.32). This compared with the actual number of minutes walking per session which ranged from 0 to 90.34 (mean = 40.92). Only 43 of the study participants reported a days per week frequency within the recommended guidelines of 3 to 5 days per week. Thirty-five participants reported walking an average of less than the recommended 3 days per week and 19 participants reported walking an excess of five days per week.

Total adherence was calculated by dividing the actual walking measures (days and distance) by the intended walking measures (days and distance). The mean total adherence scores ranged from 0-1.55% with a calculated mean of 77%.

During the final preliminary data analysis step, adherence scores calculated from the data recorded in returned logs were compared with adherence scores calculated from telephone interview data using SPSS[x] ONEWAY. According to this analysis, participants who returned completed logs were significantly more adherent to their intended walking for exercise routine than individuals who described their walking activities during a telephone interview.

Phase II: Theoretical Hypothesis Testing Data Analysis was completed in three steps. First, SPSS^x ONEWAY ANOVA was used to evaluate the personal and environmental independent variables for significant relationship with the total adherence score. Personal factors significantly linked with adherence included age ($\underline{F} = 6.04$, $\underline{p} < .01$), marital status ($\underline{F} = 6.24$, $\underline{p} = .01$) and gender ($\underline{F} = 15.1$, $\underline{p} < .01$). The only environmental factor significantly related to walking routine adherence was the proximity of the walking environment to home ($\underline{F} = 3.95$, $p = .05$).

During the second step of the theoretical hypothesis testing data analysis, SPSS^x REGRESSION was used to predict walking routine adherence. Independent variables included the previously noted significant personal and environment factors and the cognitive factor measures. Five regression equations were constructed for the purpose of combining the measure(s) if each NHWEM cognitive factor with age, marital status, gender, and proximity of the walking environment to home. The final hypothesis was tested with a single regression equation that included all the cognitive measures, age, marital status, gender, and proximity of the walking environment to home. In each regression equation, the greatest portion of significant unique variance was attributed to age. Additionally, significant unique variability was consistently attributed to only one or two of the equation variables. Because unique variability was attributed to only one or two IVs and not a combination of personal, cognitive and environmental factors, Hypotheses 1 through 6 were only partially accepted. Omitting age and gender from a subsequent analysis reduced the amount of explained variability from $\underline{R}^2 = .35$ to $\underline{R}^2 = .23$ but did not enhance the amount of significant unique variability explained by other cognitive factors.

In the final step of the theoretical hypothesis testing data analysis, 16 participants reporting a relapse of three (3) or more weeks duration were grouped together. SPSS^x ONEWAY ANOVA was used to evaluate the relationship between the environmental, personal factors and the group's calculated total adherence scores. According to this analysis, none of the environmental or personal factors were significantly related to the relapse in walking for exercise activities. SPSS^x PEARSON CORRELATIONS were used to assess the relationship between the cognitive factor measures and relapse. Significant correlations with walking routine adherence were noted with the Perceived Health Status score, (r = .53, p = .04), the Family Support score, (r = .54, p = .04), and the Approval/Influence Total score (r = .55, p = .05). Because of the limited number of walkers reporting relapse, the results of these analyses must be interpreted cautiously.

Because age consistently contributed the greatest significant unique variability when included in the regression equation, an additional evaluation of the data was completed after dividing the sample by age. Group one consisted of participants 65 and older (N = 45) and group 2 consisted of participants less than 65 (N = 57). The age for group division was set at 65 to allow for adequate representation in each group and because this age is generally associated with retirement in this country. Differences between group means for adherence and cognitive factor measures were evaluated using t-tests. The 65 and older group were significantly more adherent to their walking routine than those younger than 65. Additionally, the older group reported higher Perceived Health Status scores (t = 133, p < .01), higher Friend and Fellow Walker Support scores (t = 2.52, p < .01), lower WCS scores (t = 4, p < .01), lower Benefits scores (t = 34, p < .01), lower Barriers scores (t = 15.71, p < .01), and lower Family Support scores (t = 2.84, p < .01) than the younger group.

Conclusions

The following conclusions are based on the previously described findings.

1. The present study findings were consistent with the NHEM assumption that the predictors of exercise activities are transitionary phase specific. The cognitive factor measures significantly correlated with walking behaviors in the group reporting relapse differed considerably from the cognitive factor measures correlated with walking behaviors in the total (and overall adherent sample). Because the sample of adults reporting relapse was small ($\underline{N}$ = 16), the findings attributed to this analysis need to be interpreted cautiously.

2. Next, it was concluded that although only one cognitive factor contributed significant unique variability in the regression equation (Approval/Influence Total Score), PEARSON CORRELATIONS between other cognitive factors and the dependent variable in the total sample and sample subsets were significant. For example significant correlations were noted between walking routine adherence and the Exercise Barriers score and the WCS score. A significant correlation was also observed between the WCS score and walking routine adherence for participants younger than 65. Additionally, in the subset of participants reporting a relapse from walking, significant correlations were observed between walking routine adherence and the following cognitive factor measures: Perceived Health Status score, Family Support Score, and the Approval/Influence Total Score. Because of significant correlations with walking routine adherence it was concluded that the following measures merit further investigation in additional walking adherence studies: Approv-

al/Influence Total Score, Exercise Barriers score, Family Support, Friend/Fellow Walkers Support, and WCS.

3. Although significant correlations between walking routine adherence and the above cognitive measures were noted, the magnitude of these correlations did not exceed $\underline{R} = .71$. It was concluded that these relatively low correlations could have been partially attributed to insufficient instrument sensitivity to relatively small changes in the basically homogeneous study sample of adult walkers. Improving the sensitivity of cognitive factor measures will facilitate further testing of the Natural History of Walking for Exercise Model.

4. Although participants reported a high mean score on the Exercise Benefits scale, correlations between this measure and walking routine adherence were consistently low and insignificant in all groups evaluated. Two explanations for these finding were offered. The first explanation was theoretical in nature, and attributed the low and insignificant correlations to the fact that individuals committed to a routine universally find value and benefit in the activity (if they did not find benefit in the activity, they would not have persisted with the behavior). The second explanation faulted the low and insignificant correlations on the Exercise Benefits measure which was neither activity or transition phase specific. Because a phase specific and exercise activity specific instrument is needed to accurately assess the relationship between adherence and perceived benefits, it was concluded that instrument development must proceed the evaluation of theoretical merits.

5. The fact that some participants provided both a minutes and miles measure created two measurement problems. First, when both measures were recorded, frequently

one measure was reported more consistently than the other. For example, some participants were thorough in reporting both measures week 1 and 2 but then for weeks 3 through 12 had many days where only miles were noted. The two participants who were thorough in reporting both miles and minutes throughout the 12 week period had two total adherence scores, one using miles as the distance measure and one using minutes as the distance measure. Although both total adherence scores were similar, they were not identical. A second problem also related to the use of two distance measures was the fact that in several instances participants recorded their intention in one measure and completed their diary in the other. When participants did not use the same measure to report both the intention and actual walking activities, it was not possible to calculate an adherence score. Because providing participants with two distance measures (miles and minutes) resulted in measurement problems, it was concluded that a single measure should be used for reporting distance walked.

6. Significant correlations between the WCS scores and walking routine adherence were noted for participants younger than 65, however similar correlations were not noted in participants older than 65. This finding may be partially attributed to the fact that the WCS was derived from an efficacy measure which included a "making time for exercise" factor. If "making time" is not a problem for persons over 65, the responses to the WCS would be quite homogeneous in this group, and therefore less predictive of behavior. Based on these finding, it was concluded that age may influence the factors associated with perceptions of self-efficacy. It is likely that factors other than "making time" are included in the older walker's self-efficacy appraisal. Designing different self-efficacy for walking routine adherence measures (that take into account

the age specific appraisal) for persons 65 and older and persons younger than 65 may enhance the sensitivity of the self-efficacy measure.

7. Because most of the study participants were members of the Silver Strider's, the sample may have been more homogenous than a random sample of adult walkers.
8. Finally, it was noted that approximately one third of the study participants intended to walk more than 5 days a week (in excess of the guideline for fitness walking). Based on these reported intentions, it was concluded that individuals participating in an unsupervised walking for exercise routine may not be aware that guidelines exist and/or they may not feel that stated risks of excessive walking (injury and burnout) are personally relevant.

Recommendations

1. That the Approval/Influence item pairs, the WCS, Family Support Scale, Friend/Fellow Walkers Support Scale, and Perceived Health Status items be revised to increase instrument sensitivity to smaller changes in homogenous groups.
2. That a behavior specific and transition phase specific benefits of walking instrument be developed.
3. That a behavior specific and transition phase specific barriers to walking instrument be developed.
4. That the page layout and directions for the Family Support Scale and the Friend/Fellow Walkers Support Scale be revised to maximize clarity and minimize participant confusion.
5. That factors contributing to walking for exercise self-efficacy beliefs be assessed in populations of persons 65 and older.

6. That information concerning the recommended guidelines for fitness walking be made available to the general public.
7. That alterable factors correlated with the unalterable attribute age be described in populations of adults who walk for exercise.
8. That studies be designed to further evaluate the factors correlated with walking routine relapse.
9. That a single measure for reporting distance walked be developed for reporting walking intentions and actual distance walked.
10. That participants for future walking adherence studies be recruited using multiple techniques including public advertising (radio, newspaper etc), mailing lists, and sign up sheets in areas where walkers exercise to decrease the homogenity of the sample.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.) Action control: From cognition to behavior (pp. 11-39). Heidelberg: Springer.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Ajzen I., & Madden, T. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. Journal of experimental social psychology, 22, 453-474. Avons, P., Garthwaite, P., Davies, H., Murgatroyd, P., & James, W. (1988). Approaches to estimating physical activity in the community: Calorimetric validation of actometers and heart rate recording. Europ. J. Clin. Nutr. 42, 185-196.

Antonucci. T., & Israel, B. (1986). Veridicality of social support: A comparison of principal and network members' responses. Journal of consulting and clinical psychology. 54, 186-204.

Avons, P., Garthwaite, P., Davies, H., Murgatroyd, P., & James, W. (1988). Approaches to estimating physical activity in the community: Calorimetric validation of actometers and heart rate monitoring. European Jouranl of Clinical Nutrition, 42, 185-196.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Bandura, A., Adams, N., Hardy, A., Howells, G. (1980). Tests of the generality of self-efficacy theory. Cognitive Ther. Research, 4, 39-66.

Barrera, M., Sandler, I., & Ramsey, T. (1981). Preliminary development of a scale of social support: Studies on college students. American Journal of Community Psychology. 9, 435-447.

Baury Portious (1982-1989). Statistical Design Analysis System: Version 2.00. Microsoft Corp.

Berkman, L., & Syme, L. (1979). Social networks, host resistance, and mortality: A nine-year followup study of Alameda County residents. American Journal of Epideminology, 109, 186-204.

Bouchard, C., Shephard, R., Stephens, T., Sutton, J., & McPherson, B. (1990). Exercise, fitness, and health: The consensus statement. In C. Bouchard, R. shephard, T. Stephens, J. Sutton, & B. McPherson (Eds.), Exercise, fitness, and health: A consensus of current knowledge (pp. 27). Champaign, IL: Human Kinetics Books.

Brookings, J., & Bolton, B. (1988). Confirmatory factor analysis of the Interpersonal Support Evaluation List. American Journal of Community Pyschology. 16, 137-147.

Brownell, K., & Stunkard, A. (1980). Physical activity in the development and control of obesity. In A. Stunkard (Ed.) Obesity (pp. 300-324). Philadelphia: Saunders.

Brunner, B. (1969). Personality and motivational factors influencing adult participation in vigorous physical activity. Research Quarterly, 40, 464-469.

Caspersen, C., Christenson, G., & Pollard, R. (1986). Status of the 1990 Physical Fitness and Exercise objectives-Evidence from the NHIS 1985.Public Health Report.101, 587-592.

Champion, V. (1987-1993). Interventions for breast self-exam in older women. NCNR-NIH PHS ROINR 1843.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed.). Hillsdale NJ: Lawrence Erlbaum Associates, Pub.

Cohen, S. (1987). ISEL. Unpublished manuscript. Department of Psychology, Carnegie-Mellon University, Pittsburgh, Pennsylvania.

Cohen, S., McGowan, J., Fooskas, S., & Rose, S. (1984). Positive life events and social support and the relationship between life stress and psychological disorder. American Journal of Community Psychology. 12, 564-587.

Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. M. (1985). Measuring the functional components of social support. In I. G. Sarason & B. R. Sarason (Eds.), Social Support: Theory, research and applications (pp. 73-94). Dordrecht, The Netherlands: Martinus Nijhoff.

Cohen, S., & Wills, T. (1985). Stress, social support, and the buffering hypothesis. Psychological Bulletin, 98, 310-357.

Costas, R., Garcia-Palmieri, M., Nazario, E. Sorlie, P. (1978). Relation of lipids, weight, and physical activity to incidence of coronary heart disease: The Puerto Rico Heart Study. American Journal of Cardiology. 42, 653-658.

Davidson, D., & Shumaker, S. (1987). Social support and cardiovascular disease. Artherosclerosis, 7, 101-104.

Deyo, R. (1983). Concervative therapy for low back pain: Distinguishing useful from useless therapy. Journal of the American Medical Association. 250, 1057-1062.

DiClemente. C. (1985). Perceived efficacy in smoking cessation. Presented at the annual meeting of the American Association of Advanced Science, Los Angeles.

Dishman, R. (1981). Biologic influences on exercise adherence. Research Quarterly for Exercise and Sport, 52, 143-159.

Dishman, R. K., (1988). Overview. In Dishman RK (ed): Exercise Adherence: Its Impact on Public Health. Champaign, IL: Human Kinetics. pp. 1-9.

Dishman, R. K. & Gettman, L.R. (1980). Psychobiologic influences on exercise adherence. Journal of Sports Psychology, 2, 295-310.

Dishman, R. K., Ickes, W., & Morgan, W. P. (1980). Self-motivation and adherence to habitual physical activity. Journal of Applied Social Psychology, 10, 115-132.

Dishman, R. K., Sallis, J. F., & Orenstein, D. (1985). The determinants of physical activity and exercise. Public Health Report, 100, 158-171.

Dishman, R., & Steinhardt, M. (1988). Reliability and concurrent validity for a 7-day re-call of physical activity in college students. Medicine and Science in Sports and Exercise, 20(1), 14-25.

Dishman, R., & Steinhardt, M. (19). Internal health locus of control predicts free-living, but not supervised, physical activity: A test of exercise-specific control and outcome expectancy hypotheses. Research quarterly for exercise and sport.

Dubbert, P. M., & Wilson, G. T. (1984). Goal-setting and spouse involvement in the treatment of obesity. Behavioral Research Therapy. 22, 227-242.

Dunkel-Schetter, C., & Bennett, T. (1990). Differentiating the cognitive and behavioral aspects of social support. In B. Sarason, I. Sarason & G. Pierce (Eds.), Social Support: An Interactional View (pp. 267-296). New York: Wiley & Sons.

Durnin, J. (1990). Assessment of physical activity during leisure and work. In C. Bouchard, R. Shephard, T. Stephens, J. Sutton & B. McPherson (Eds.) Exercise, fitness and health: A consensus of current knowledge (pp. 63-70). Champaign, IL: Human Kinetics Books.

Dwewaltowski, D. (1989). Toward a model of exercise motivation. Journal of sport & exercise psychology, 11, 251-269.

Dzewaltowski, D., Noble J., & Shaw, J. (1990). Physical activity participation: Social cognitive theory versus the theories of reasoned action and planned behaivor. Journal of sport & and exercise psychology, 12, 388-405.

Edelstein, J., & Linn, M. (1985). The influence of the family on control of diabetes. Social Science and Medicine. 21, 541-545.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Frandin, K., Grimby, G., Mellstrom, D., & Svanborg, A. (1991). Walking habits and health-related factors in a 70-year-old population. Gerontology. 37, 281-288.

Frank, C., Weinblatt, C. Shapiro, S., Sager, R. (1966). Myocardial infarction in men: Role for physical activity and smoking in incidence and mortality. JAMA. 198, 103-107.

Garcia, A., & King, A. (1991). Predicting long-term adherence to aerobic exercise:A comparison of two models. Journal of Sport & Exercise Psychology. 13, 394-410.

Godin, G., Colantonio, A., Davis, G., Shephard, R., & Simard, C. (1986). Prediction of leisure-time exercise behavior among a group of lower-limb disabled adults. Journal of Clinical Psychology, 42, 272-279.

Godin G., & Shephard, R. (1986). Psychosocial factors influencing intentions to exercise of young students from grades 7 to 9. Research quarterly for exercise and sport, 56, 41-52.

Haskell, W. (1984). Cardiovascular benefits and risks of exercise: The scientific evidence. In R. H. Strauss (Ed.), Sports Medicine (pp. 57-75). Philadelphia: W.B. Saunders.

Haskell, W., Montoye, H., & Orenstein, D. (1985). Physical activity and exercise to achieve health-related physical fitness components. Physical Health Reports, 100, 202-212.

Hovell, M., Sallis, J., Hofstetter, C., Spry, V., Faucher, P., & Caspersen, C. (1989). Identifying correlates of walking for exercise: An epidemiologic prerequisite for physical activity promotion. Preventive Medicine, 18, 856-866.

Hudgens, A. (1979). Family-oriented treatment of chronic pain. Journal of Marriage and Family Therapy, 5, 67-78.

Janis, I., & Mann, L. (1977). Decision making: A psychological analysis of conflict, choice, and commitment. NY: The Free Press

Konradi, D. (1993). Walking for exercise: Pilot survey (unpublished)

Krolner, B., & Taft, B. (1983). Vertebral bone loss: An unheeded side effect of therapeutic bed rest. Clinical Science, 64, 537-540.

LaPorte, Montoye, & Caspersen (1985). Assessment of physical activity in epidemiologic research: Problems and prospects. Public Health Report, 100, 131-146.

Long, B., & Haney, C. Enhancing physical activity in sedentary women: Information, locus of control, and attitudes. Journal of Sport Psychology, 8, 9-24.

Lyon B., & May, F. (1993). Differences in health promotion behavior as a function of health conception and presence of chronic illness. Dissertation in progress, Indiana University School of Nursing.

Magnus, K., Matroos, A., Strackee, J. (1979). Walking, cycling, or gardening, with or without seasonal interruption, in relation to acute coronary events. American Journal of Epidemiology. 110, 724-733.

Martin, J., & Dubbert, P. (1982). Exercise applications and promotion in behavioral medicine: Current status and future directions. Journal of Consult. Clinical Psychol. 50, 1004-1017.

Melnyk, K. (1990). Barriers to care: Operationalization of the variable. Nursing Research. 37, 108-112.

McAuley, E. (1992). The role of efficacy cognitions in the prediction of exercise behavior in middle-aged adults. Journal of Behavioral Medicine, 15, 65-88.

McAuley, E., & Gill, D. (1983). Reliability and validity of the physical self-efficacy scale in a competitive sport setting. Journal of Sport Psychology, 5, 410-418.

McLaughlin, F., & Marascuilo, L. (1990). Advanced Nursing and health care research: Quantification approaches. Philadelphia: W.B. Saunders.

Mermelstein, R., McIntyre, K., & Lichtenstein, E. (1983). Partner support and relapse in smoking cessation programs. Journal of Consult. Clinical Psychol. 51, 465-466.

Murphy, J., Williamson, D., Buxton, A., Moody, S., Absher, N. & Warner, M. (1982). The long-term effects of spouse involvement upon weight loss and maintenance. Behavior Ther., 13, 681-693.

Newcomb, M. (1990). What structural equation modeling can tell us about social support. In B. Sarason, I. Sarason & G. Pierce (Eds.) Social support: An interactional view (pp. 26-63). New York: John Wiley & Sons.

Nuefeld, R., & Thomas, P. (1977). Effects of perceived self-efficacy of a prophylactic controlling mechanism on self-control under painful stimulation. Canadian Journal of Behavioral Science. 9, 224-232.

Oldridge, N. (1982). Compliance and exercise in primary and secondary prevention of coronary heart disease: A review. Preventative Medicine. 11, 56-70.

Paffenbarger, R., Wing, A., Hyde, R. (1978). Physical activity as an index of heart attact risk in college alumni. American Journal of Epidemiology. 108, 161-175.

Paffenbarger, R. S., Hyde, R.T., Wing, A. L., & Hsieh, C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. New England Journal of Medicine, 314, 605-613.

Pender, N. (1987). Health promotion in nursing practice (2nd.ed.) Los Altos: CA.

Pender, N., & Pender, A. (1986). Attitudes, subjective norms, and intentions to engage in health behaviors. Nursing Research, 35, 15-18.

Powell, K., Thompson, P., Caspersen, C., & Kendrick, J. (1987). Physical activity and the incidence of coronary heart disease. Annual Review of Public Health, 8, 253-287.

Powell, K., Spain, G., Christenson, G., & Mollenkamp, M. (1986). The status of the 1990 objectives for physical fitness and exercise. Public Health Reports, 101, 17.

Robertson, D., & Keller, C. (1992). Relationship among health beliefs, self-efficacy, and exercise adherence in patients with coronary artery disease. Heart & Lung, 21, 56-63.

Rosenstock, I. (1966). Why people use health care services. Milbank Memorial Fund Quarterly, 44, 92-124.

Rosenstock, I. (1974). Historical origins of the health belief model. Health Education Monographs, 2, 328-335.

Rosenstock, I., Strecher, V., & Becker, M. (1988). Social learning theory and the health belief model. Health Education Quarterly, 15, 175-18.

Rosenthal, B., Allen, B. & Winter, C. (1980). Husband involvement in the behavioral treatment of overweighed women: Initial effects and long-term follow-up. International Journal of Obesity, 4, 165-172.

Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforce ment. Psychological Monographs, 80, (1, Whole No. 609).

Ryckman, R., Robbins, M., Thornton, B., & Cantrell, P. (1982). Development and vali dation of a physical self-efficacy scale. Journal of Personality and Social Psychology, 42, 891-900.

Sallis, J. (1988). Users of Social Support Surveys for Diet and Exercise Behaviors, scoring of scales (memo accompanying the scales).

J. Sallis (personal communication, June 1992)

J. Sallis (personal communication, April 1993)

Sallis, J., Grossman, R., Pinski, R., Patterson, T., & Nader, P. (1987). The development of scales to measure social support for diet and exercise behaviors. Preventative Medi- cine, 16, 825-836.

Sallis, J., Haskell, W., Fortmann, S., Vranizan, K., Taylor, C.,& Solomon, D. (1986). Predictors of adoption and maintenance of physical activity in a community sample. Preventative Medicine. 15, 331-341.

Sallis, J., Haskell, W., Fortmann, S., Wood, P., Vranizan, K. (1986). Moderate-intensity physical activity and cardiovascular risk factors: The Stanford Five-City Project. Preventative Medicine, 15, 561-568.

Sallis, J., Haskell, W., Wood, P., Fortmann, S., Rogers, T., Blair, S., & Paffenbarger, R. (1985). Physical activity assessment methodology in the Five-City Project. American Journal of Epidemiology, 121, 91-106.

Sallis, J., & Hovell, M. (1990). Determinants of exercise behavior. In J. O. Holloszy & K. B. Pandolf (Eds.) Exercise and sport sciences reviews, 18, Chapter 11 (pp 307-330). Baltimore: Williams & Wilkins.

Sallis, J., Hovell, M., & Hofstetter, R. (1992). Predictors of adoption and maintenance of vigorous physical activity in men and women. Preventive Medicine, 21, 237-251.

Sallis, J., Hovell, M., Hofstetter, C., Elder, J., Faucher, P., Spry, V., Barrington, E., & Hackley, M. (1990). Lifetime history of relapse from exercise. Addictive Behaviors, 15, 573-579.

Sallis, J., Hovell, M., Hofstetter, C., Faucher, P., Elder, J., Blanchard, J., Caspersen, C., Powell, K., & Christenson, G. (1989). A multivariate study of determinants of vigorous exercise in a community sample. Preventative Medicine, 18, 20-34.

Sallis, J., Pinski, R., Grossman, R., Patterson, T., & Nader, P. (1988). The development of self-efficacy scales for health-related diet and exercise behaviors. Health Education Research, 3, 283-292.

Sarason, I., Levine, H., Bashman, R., & Sarason, B. (1983). Assessing social support: The Social Support Questionnaire. Journal of Personality and Social Psychology, 44, 127-139.

Sarason, B., Sarason, I., & Pierce (1990). Traditional views of social support and their impact on assessment. In B. Sarason, I. Sarason & G. Pierce (Eds) Social support: An interactional view (pp. 9-25). New York: John Wiley & Sons.

Sarason, B., Sarason, I., & Pierce, G. (1990). Traditional views of social support and their impact on assessment. In B. Sarason, I Sarason, & G. Pierce (Eds.) Social support: An interactional view (pp. 9-21). New York: J. Wiley & Sons.

Schneider J., & Agras, W. (1985). A cognitive behavioral group treatment of bulimia. British Journal of Psychiatry, 146, 66-69.

Sechrist, K. (1993). Exercise Benefits/Barriers Scale: Development and Scoring Data. Received with personal communication, July 1993.

Sechrist, K., Noble Walker, S., & Pender, N. (1987). Development and psychometric evaluation of the exercise benefits/barriers scale. Research in Nursing & Health, 10, 357-365.

Seeman, M., & Anderson, C. (1983). Alienation and alcohol: The role of work, mastery, and community drinking behavior. American Sociological Review, 48, 60-77.

Seiger, L., & Hesson, J. (1990). Walking for Health. Debuque, IA: Wm. C. Brown Publishers.

Sidney, K., & Shephard, R. (1976). Attitudes toward health and physical activity in the elderly: Effects of a physical training program. Medicine and Science in Sports, 8, 246-252.

Simon, H. (1984). The immunology of exercise. Journal of the American Medical Associa tion, 252, 2735-2738.

Siscovick, D., LaPorte, R., & Newman, J. (1985). The disease-specific benefits and risks of physical activity and exercise. Public Health Reports, 311, 874-877.

Sonstroem, R. (1982). Attitudes and beliefs in the prediction of exercise participation. In R. C. Cantu (Ed.), Sports medicine, sports science: Bridging the gap (pp. 3-16). Lexington, MA: Collomore Press.

Sonstroem, R. (1988). Psychological models. In R. Dishman (Ed.), Exercise adherence: Its impact on public health (pp.125-153). Champaign, IL: Human Kinetics Books.

Stephens, T., Jacobs, D. R., & White, C. C. (1985). A descriptive epidemiology of leisure-time physical activity. Public Health Report, 100, 147-158.

Tabachnick, B. G. & Fidell, L. S. (1989). Using Multivariate Statistics. (2nd Ed.), New York: Harper Collins Publishers, Inc.

Taylor, C., Sallis, J., & Needle, R. (1985). The relation of physical activity and exercise to mental health. Public Health Reports, 100, 195-202.

Valois, P., Desharnais, R., & Godin, G. (1988). A comparison of the Fishbein and Ajzen and the Triandis Attitudinal Models for the prediction of exercise intention and behavior. Journal of Behavioral Medicine, 11, 459-472.

Volicer, B. (1984). Multivariate Statistics for Nursing Research. Orlando: Grune & Stratton, Inc.

Wallston, K., Wallston, B., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scales. Health Education Monographs, 6, 160-170.

Wankel, L. M. (1985). Personal and situational factors affecting exercise involvement: The importance of enjoyment. Research Quarterly for Exercise and Sport, 56(3), 275-282.

Wankel, L. M. (1988). Exercise adherence and leisure activity: Patterns of involvement and interventions to facilitate regular activity. In R. K. Dishman (Ed.), Exercise Adherence: Its impact on public health (pp. 369-396). Champaign, IL: Human Kinetics Books.

Wanzel, R. S. (1978). Toward preventing dropouts in industrial and other fitness pro grammes. Recreation Canada, 36(4), 39-42.

Ward, A., & Morgan, W.P. (1984). Adherence patterns of healthy men and women enrolled in an adult exercise program. Journal of Cardiac Rehabilitation, 4, 143-152.

Weinberg, R., Hughes, H., Critelli, J., England, R., & Jackson, A. (1984). Effects of preexisting and manipulated self-efficacy on weight loss in a self-controlled program. Journal of Research in Personality, 18, 352-358.

Weinstein, M. & Stason, W. (1976). Hypertension: A policy perspective. Cambridge: Harvard University Press.

Appendix A: IRB Approval

Project Title: Using Second-Transitionary Phase Factors to Predict Adherence to a Walking Routine

Proposal Title (if different from Project Title): ______

Sponsoring Agency IU School of Nursing

Grant No. ______ Period: ______ From ______ To

Principal Investigator (Must have faculty/staff status):

Brenda L. Lyon DNS, RN/Donna Konradi MS, RN [redacted] ______ August 27, 1993
Typed or Printed Name Date

Campus Address: [redacted]
Department Building/Rm.No. Telephone Number

FOR OFFICE USE ONLY

Expedited Review:

X Accepted

___ Denied [redacted] OCT 21 1993
Date

IRBPAC Rev. 7/93

Appendix B: IUPUI Informed Consent Statement

My name is Donna Konradi. As a registered nurse and doctoral student at Indiana University School of Nursing, I am interested in helping persons integrate exercise into their routines. The purpose of this project is to explain differences between individuals who are regular walkers and those who tend to walk irregularly or quit altogether. From this information, it is hoped that interventions can be designed to help walkers adhere to their exercise routine.

Because you are a walker, I would like to invite you to participate in this project. If you decide to participate, you will be asked to complete the Walking for Exercise Survey and keep a record of your walking for exercise routine for the next 12 weeks. Completing the enclosed Walking for Exercise Survey will take 20 to 30 minutes. Recording you actual walking routine will take less than 3 minutes a week. Twelve weeks after completing the questionnaire, I will phone a limited number of participants to ask a few questions about the walking routine. This phone interview will take about 5 minutes.

If you agree to participate, you will be one of approximately 100 persons who will be participating in this project. Participation is voluntary and you may withdraw from this project at any time. Because your responses will be kept confidential, there is no personal risk involved as a result of participation. **As a thank-you, the first 100 participants to return completed study materials will receive a "Walking for Exercise" wrist pocket pouch for carrying identification, money or credit cards and a discount coupon from MCL Cafeteria.**

The results of this project will be made available to you and to health care professionals interested in assisting persons who walk for exercise. A summary of the results will also be printed in the Silver Striders Newsletter. Results of this study may also be published. Your name will not be used in any report and your responses will be kept confidential.

Should you have any questions or comments, please feel free to call Donna Konradi at [redacted]. Please provide your name and address on the back of your Walking for Exercise Diary if you would like me to mail you a summary of the study results. **If you wish to participate, please sign and return the bottom portion of this Informed Consent Statement as indicated.**

I have been given an opportunity to ask questions about this study; answers to such questions (if any) have been satisfactory. The information in the study records will be kept confidential and will be made available only to persons conducting the study unless I specifically give my permission in writing to do otherwise. If the results of this study are published, I will not be identified.

Participant's Signature_____Date:_____

Witness Signature_____

Appendix C: Walking for Exercise Survey

PART 1: First, we would like you to describe the walking routine that you try to follow. Please fill in the blanks to complete the following sentence about your walking routine.

The walking routine that I try to complete consists of walking:

_____DAYS A WEEK for

_____MINUTES.

(If you use miles as your measure, how many miles do you plan to walk per exercise session?)

_____MILES

PART 2: Next, we would like to ask five questions about your walking environment. (Circle number of your answer)

1. I feel safe walking.
    1. STRONGLY AGREE
    2. AGREE SOMEWHAT
    3. UNCERTAIN
    4. DISAGREE SOMEWHAT
    5. STRONGLY DISAGREE

2. The place where I usually walk is comfortable.
    1. STRONGLY AGREE
    2. AGREE SOMEWHAT
    3. UNCERTAIN
    4. DISAGREE SOMEWHAT
    5. STRONGLY DISAGREE

3. Water fountains and bathroom facilities are convenient for me should I need them during my walking routine.
    1. STRONGLY AGREE
    2. AGREE SOMEWHAT
    3. UNCERTAIN
    4. DISAGREE SOMEWHAT
    5. STRONGLY DISAGREE

4. The place where I walk is close to my home.
    1. STRONGLY AGREE
    2. AGREE SOMEWHAT
    3. UNCERTAIN
    4. DISAGREE SOMEWHAT
    5. STRONGLY DISAGREE

5. I am often either too hot or too cold when I am walking.
    1. STRONGLY AGREE
    2. AGREE SOMEWHAT
    3. UNCERTAIN
    4. DISAGREE SOMEWHAT
    5. STRONGLY DISAGREE

PART 3: In the next section we have listed statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling:

SA....for STRONGLY AGREE
A.....for AGREE
D.....for DISAGREE
SD....for STRONGLY DISAGREE

1. I enjoy exercise. . . . . SA A D SD

2 Exercise decreases feelings of stress and tension for me. . . . . SA A D SD

3. Exercise improves my mental health. . . . . SA A D SD

4. Exercise takes too much of my time. . . . . SA A D SD

5. I will prevent heart attacks by exercising . . . . . SA A D SD

6. Exercise tires me . . . . . SA A D SD

7. Exercise increases my muscle strength . . . . . SA A D SD

8. Exercise gives me a sense of personal accomplishment . . . . . SA A D SD

9. Places for me to exercise are too far away . . . . . SA A D SD

10. Exercising makes me feel relaxed . . . . . SA A D SD

SA....for STRONGLY AGREE
A.....for AGREE
D.....for DISAGREE
SD....for STRONGLY DISAGREE

11. Exercise lets me have contact with friends and persons I enjoy . . . . . SA A D SD

12. I am too embarrassed to exercise . . . . . SA A D SD

13. Exercising will keep me from having high blood pressure . . . . . SA A D SD

14. It costs too much money to exercise . . . . . SA A D SD

15. Exercising increases my level of physical fitness . . . . . SA A D SD

16. Exercise facilities do not have convenient schedules for me . . . . . SA A D SD

17. My muscle tone is improved with exercise . . . . . SA A D SD

18 Exercising improves functioning of my cardiovascular system . . . . . SA A D SD

19. I am fatigued by exercise . . . . . SA A D SD

20. I have improved feeling of well being from exercise . . . . . SA A D SD

21. My spouse (or significant other) does not encourage exercising . . . . . SA A D SD

22. Exercise increases my stamina . . . . . SA A D SD

23. Exercise improves my flexibility . . . . . SA A D SD

24. Exercise takes too much time from family relationships . . . . . SA A D SD

25. My disposition is improved by exercise . . . . . SA A D SD

26. Exercising helps me to sleep better at night . . . . . SA A D SD

SA....for STRONGLY AGREE
A.....for AGREE
D.....for DISAGREE
SD....for STRONGLY DISAGREE

27. I will live longer if I exercise . . . . . SA A D SD

28. I think people in exercise clothes look funny . . . . . SA A D SD

29. Exercise helps me decrease fatigue . . . . . SA A D SD

30. Exercising is a good way for me to meet new people . . . . . SA A D SD

31. My physical endurance is improved by exercising . . . . . SA A D SD

32. Exercising improves my self-concept . . . . . SA A D SD

33. My family members do not encourage me to exercise . . . . . SA A D SD

34. Exercising increases my mental alertness . . . . . SA A D SD

35. Exercise allows me to carry out normal activities without becoming tired . . . . . SA A D SD

36. Exercise improves the quality of my work . . . . . SA A D SD

37. Exercise takes too much time from my family responsibilities . . . . . SA A D SD

38. Exercise is good entertainment for me . . . . . SA A D SD

39. Exercising increases my acceptance by others . . . . . SA A D SD

40. Exercise is hard work for me . . . . . SA A D SD

41. Exercise improves overall body functioning for me . . . . . SA A D SD

42. There are too few places for me to exercise . . . . . SA A D SD

43. Exercise improves the way by body looks . . . . . SA A D SD

PART 4: Below is a list of things people might do while trying to increase or continue a walking routine. Please rate how confident you are that you could really motivate yourself to do things like these **for at least TWELVE WEEKS.**

Please place a check above **one** number for each statement.

HOW SURE ARE YOU THAT YOU CAN DO THESE THINGS

1. Get up early, even on weekends, to walk.

I know I cannot						I know I can	Does not apply
	1	2	3	4	5		8

2. Stick to your walking routine before a long, tiring day.

I know I cannot						I know I can	Does not apply
	1	2	3	4	5		8

3. Complete your walking routine even though you are feeling depressed.

I know I cannot						I know I can	Does not apply
	1	2	3	4	5		8

4. Set aside at least 30 minutes, 3 times a week to complete a walking routine.

I know I cannot						I know I can	Does not apply
	1	2	3	4	5		8

5. Continue to walk with others even though they seem too fast or too slow for you.

I know I cannot						I know I can	Does not apply
	1	2	3	4	5		8

6. Stick to your walking routine when undergoing a stressful life change (e.g., divorce, death in the family, moving).

I know I cannot ____ ____ ____ ____ ____ I know I can Does not apply ____
1 2 3 4 5 8

7. Attend a party only after walking.

I know I cannot ____ ____ ____ ____ ____ I know I can Does not apply ____
1 2 3 4 5 8

8. Stick to your walking routine when family &/or friends are demanding more time from you.

I know I cannot ____ ____ ____ ____ ____ I know I can Does not apply ____
1 2 3 4 5 8

9. Stick to your walking routine when you have household chores to attend to.

I know I cannot ____ ____ ____ ____ ____ I know I can Does not apply ____
1 2 3 4 5 8

10. Stick to your walking routine even when you have excessive demands elsewhere.

I know I cannot ____ ____ ____ ____ ____ I know I can Does not apply ____
1 2 3 4 5 8

11. Stick to your walking routine even when social obligations are very time consuming.

I know I cannot ____ ____ ____ ____ ____ I know I can Does not apply ____
1 2 3 4 5 8

12. Read or study less in order to walk more.

I know I cannot						I know I can	Does not apply
	1	2	3	4	5		8

PART 5: Next we would like to ask you six questions about friends, family members and fellow walkers because sometimes they influence exercising behaviors. Circle your response to the following questions using the scales provided below. If you have no contact with the person listed in items 1-3, circle the 6 (no contact).

1. Does your family approve or disapprove of your participation in a walking for exercise routine?
   1. STRONGLY DISAPPROVE
   2. MODERATELY DISAPPROVE
   3. NEUTRAL
   4. MODERATELY APPROVE
   5. STRONGLY APPROVE
   6. NO CONTACT

2. Do your friends approve or disapprove of your participation in a walking for exercise routine?
   1. STRONGLY DISAPPROVE
   2. MODERATELY DISAPPROVE
   3. NEUTRAL
   4. MODERATELY APPROVE
   5. STRONGLY APPROVE
   6. NO CONTACT

3. Do fellow walkers approve or disapprove of your participation in a walking for exercise routine?
   1. STRONGLY DISAPPROVE
   2. MODERATELY DISAPPROVE
   3. NEUTRAL
   4. MODERATELY APPROVE
   5. STRONGLY APPROVE
   6. NO CONTACT

4. Does your family influence your participation in your walking for exercise routine?
    1. NOT INFLUENCE YOU
    2. SLIGHTLY INFLUENCE YOU
    3. MODERATELY INFLUENCE YOU
    4. STRONGLY INFLUENCE YOU

5. Do your friends influence your participation in your walking for exercise routine?
    1. NOT INFLUENCE YOU
    2. SLIGHTLY INFLUENCE YOU
    3. MODERATELY INFLUENCE YOU
    4. STRONGLY INFLUENCE YOU

6. Do fellow walkers influence your participation in your walking for exercise routine?
    1. NOT INFLUENCE YOU
    2. SLIGHTLY INFLUENCE YOU
    3. MODERATELY INFLUENCE YOU
    4. STRONGLY INFLUENCE YOU

PART 6: The next three questions are about your health. (Place a check above the number of your answer)

1. To what extent do you believe you are healthy?

NOT AT ALL						TO A VERY GREAT EXTENT
0	1	2	3	4	5	6

2. To what extent are you experiencing unpleasant or uncomfortable physical sensations or symptoms?

NOT AT ALL						TO A VERY GREAT EXTENT
0	1	2	3	4	5	6

3. To what extent are you able to function at what you believe is your capability level?

NOT AT ALL						TO A VERY GREAT EXTENT
0	1	2	3	4	5	6

PART 7: Next is a list of things people might do or say to someone who is trying to participate in a walking routine. Please read each question three times. Under **family**, rate how often anyone living in your household might say or do what is described during the next 12 weeks. Under **friends**, rate how often your friends, acquaintances, or coworkers might say or do what is described during the next 12 weeks. Under **fellow walkers**, rate how often follow walkers might say or do what is described during the next 12 weeks.

PLEASE WRITE ONE NUMBER FROM THE FOLLOWING RATING SCALE IN EACH SPACE.

1....NOT AT ALL
2....RARELY
3....A FEW TIMES
4....OFTEN
5....VERY OFTEN
8....DOES NOT APPLY

During the NEXT TWELVE WEEKS, I believe my family (or members of my household), friends, or fellow walkers will:

1. Walk with me.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

2. Offer to walk with me.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

3. Give me helpful reminders to walk ("Are you going to walk tonight?")
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

1....NOT AT ALL
2....RARELY
3....A FEW TIMES
4....OFTEN
5....VERY OFTEN
8....DOES NOT APPLY

4. Give me encouragement to stick with my walking routine.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

5. Change their schedule so we can walk together.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

6. Discuss walking routines with me.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

7. Complain about the time I spend walking.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

8. Criticize me or make fun of me for walking.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

9. Give me rewards for walking (buy me something or give me something I like).
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

10. Plan for walking or recreational outings.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

11. Help plan activities around my walking routine.
   1._____:FAMILY
   2._____:FRIENDS
   3._____:FELLOW WALKERS

1....NOT AT ALL
2....RARELY
3....A FEW TIMES
4....OFTEN
5....VERY OFTEN
8....DOES NOT APPLY

12. Ask me for ideas on how **they** can get more exercise.
    1._____:FAMILY
    2._____:FRIENDS
    3._____:FELLOW WALKERS

13. Talk about how much they like to walk for exercise.
    1._____:FAMILY
    2._____:FRIENDS
    3._____:FELLOW WALKERS

PART 8: You are now just about finished! We would now like to ask some questions about you to help interpret the results.

1. Your present age:_____YEARS

2. Your sex. (Circle number of your answer)
    1. MALE
    2. FEMALE

3. Your present marital status. (Circle number of your answer)
    1. NEVER MARRIED
    2. MARRIED
    3. DIVORCED
    4. SEPARATED
    5. WIDOWED

4. Where do you usually complete your walking routine? (Circle number of your answer)
   1. MY NEIGHBORHOOD
   2. NEIGHBORHOOD OTHER THAN MINE
   3. HEALTH CLUB
   4. SHOPPING MALL
   5. OTHER (PLEASE DESCRIBE)_____

5. Which is the highest level of education that you have completed? (Circle number)
   1. NO FORMAL EDUCATION
   2. SOME GRADE SCHOOL
   3. COMPLETED GRADE SCHOOL
   4. SOME HIGH SCHOOL
   5. COMPLETED HIGH SCHOOL
   6. SOME VOCATIONAL SCHOOL
   7. COMPLETED VOCATIONAL SCHOOL
   8. SOME COLLEGE
   9. COMPLETED COLLEGE
   10. SOME GRADUATE WORK
   11. A GRADUATE DEGREE

6. Your height:_____FEET _____INCHES

7. Your weight:_____POUNDS

8. Please provide your phone number for the 12 week follow up phone call.

   PHONE NUMBER:(__)_____

9. Please check the most convenient time(s) for the researcher to reach you by phone for the 12 week follow up phone call.

	MORNING	AFTERNOON	EVENING
Sunday			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			

This is the end of the Walking for Exercise Survey. Please review the entire survey to make sure you have responded to every statement. Please place the survey in the envelope, seal the envelope and return it. If you have lost the return envelope, you may phone Donna Konradi at [redacted] and request a replacement OR return the survey to:

Donna Konradi
[redacted]

THANK YOU FOR YOUR COOPERATION

Appendix D: Walking for Exercise Log Book

The walking routine that I **TRY** to complete consists of walking:

_____DAYS A WEEK for

_____MINUTES

(If you use miles as your measure, how many miles do you plan to walk per exercise session?)

_____MILES

For the next 12 weeks, please use this log to record your walking activities.
FOR EACH DAY THAT YOU WALK FOR EXERCISE, WRITE THE NUMBER OF MINUTES OR DISTANCE IN MILES WALKED (it is not necessary to include both minutes and miles).
FOR EACH DAY THAT YOU DID NOT WALK FOR EXERCISE, RECORD A ZERO (0).

SAMPLE

	Miles Walked	Minutes Walked
Sunday	**1 MILE**	
Monday	**0**	
Tuesday	**0**	
Wednesday	**1.5 MILES**	
Thursday	**0**	
Friday	**0**	
Saturday	**1 MILE**	

WEEK 1

	Miles Walked	Minutes Walked
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

WEEK 2

	Miles Walked	Minutes Walked
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

(charts for weeks 3-12 the same as above)

Appendix E: Reminder Postcard #1

November 9, 1993
Approximately two weeks ago, materials for the Walking for Exercise project were mailed to you. Your name was included in a select project group because you currently or recently have participated in an exercise walking routine.

If you have already completed and returned the survey to us please accept our sincere thanks. If not, please do so today. Because these materials have been sent to only a limited, but representative, sample of walkers it is extremely important that yours be included in the study. Your participation will help us accurately represent the beliefs and walking patterns of midwestern walkers.

If by some chance you did not receive the survey, or it got misplaced, please call me ([redacted] and I will get another one in the mail to you today.

Sincerely,

Donna Konradi
Project Director

Appendix F: Reminder Postcard #2

February 1, 1994
Thank you for your participation in the Walking for Exercise Project. I received your survey booklet and look forward to receiving your Walking for Exercise Log.

It is important that you complete and return your Walking for Exercise Log Book after recording 12 consecutive weeks of actual walking. If you have misplaced your log book and/or return envelope please call me ([redacted]) and I will get another one in the mail to you. Remember, if you would like a summary of study results, please sign the back of the Logbook. I will also be contacting some of you by phone during the next month. The telephone interview should take 5-10 minutes and I will ask questions about your actual walking routine.

Upon receipt of your logbook, I will be sending you a Walking for Exercise wrist pouch for carrying a drivers license, money or credit cards. In addition to the pouch, I will be sending you a discount coupon for MCL Cafeteria.

Sincerely,

Donna Konradi, Project Director

Appendix G: Thank You Note Enclosed with Incentives

Dear Walking for Exercise Project Participant,

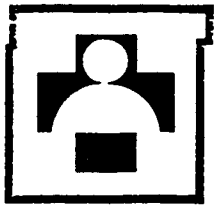
Thank you for your participation in the Walking for Exercise Project. It has been a challenging winter for walking and I applaud your efforts. An evaluation of the information provided in the Walking for Exercise Survey and Log Books is currently underway. Hopefully, this will be completed by mid May. Study results will be sent out as requested when available.

Enclosed find a Walking for Exercise wrist pouch and MCL discount coupon. Again, thank you for your support in this project.

Sincerely,

Donna Konradi MS, RN
Walking for Exercise Project Director

Appendix H: Marion County Health Department Letter of Cooperation



Marion County Health Department

3838 N. Rural Street
Indianapolis, Indiana 46205
(317) 541-2000

Donna Konradi MS, RN
[redacted]

September 28, 1993

To Whom it may concern:

I, Lori Mabe, as the Community Health Promotion Specialist at the Marion County Health Department, Health Promotion Program will cooperate in supplying a list of names and addresses of Silver Striders members to Donna B. Konradi. Persons on the list will be asked to participate in a research study titled, "Using Second-Adherence to Walking Routine." I understand that persons on the list will be sent a questionnaire booklet and walking log. Results of the study will be provided to me.

Sincerely,
[redacted]
Lori Mabe
Community Health Promotion Specialist
Marion County Health Department

Appendix I: MCL Cafeteria Corporation Letter of Support

MCL
CAFETERIA

September 24, 1993

Donna Konradi
I U School of Nursing
R[redacted]

Dear Donna:

Enclosed please find the 125 MCL Cafeteria 10% Discount Cards for use as incentives for the walkers study. I hope your study is very successful and that MCL's contribution will help your response.

Sincerely,

[redacted]
Marketing Assistant
MCL Cafeterias, Inc.

MCL CAFETERIAS, INC.
2730 East 62nd Street • Indianapolis, IN 46220 • (317) 257-5425

Appendix J: Consent to use EBBS

AACN

AMERICAN ASSOCIATION
OF CRITICAL-CARE NURSES

September 10, 1993

Donna Konradi, MS, RN
Doctoral Candidate,
Indiana University School of Nursing
[redacted]

Dear Donna:

Thank you for sending the abstract of your proposed research and the statement of agreement with terms of use of the Exercise Benefits/Barriers Scale. You have our permission to use the instrument in your research.

Best wishes with your study. We will look forward to a report of the results.

Sincerely,

[redacted]

Karen R. Sechrist PhD, RN, FAAN
Director of Research

101 Columbia, Aliso Viejo, CA 92656-1491
714-362-2000
714-362-2050 (Auto Attendant)
FAX 714-362-2020
TLX 296937 AACN UR

VITA

Donna Beth Konradi was born in Chicago, Illinois, on March 18, [redacted] She attended both grade school and high school in Peoria Illinois. In 1972 she entered Northern Illinois University, graduating with a BS in Nursing in 1976. After graduating, she worked as a staff medical-surgical and ICU nurse at Proctor Community Hospital, Peoria, Illinois. In 1978 she assumed her first faculty position at Methodist Medical Center, School of Nursing. One year later, she began her graduate work in nursing at the University of Illinois, Peoria campus. To facilitate thesis data collection, she resumed full time employment at Proctor in the critical care unit. In 1983 she graduated with a MS in nursing with a minor in education. After graduation, she worked as a senior level faculty member at St. Francis School of Nursing. In the summer of 1984, the school of nursing faculty began the process of designing a baccalaureate nursing program. In 1986, she was appointed as a lecturer in the St. Francis College of Nursing and in 1989 she was promoted to assistant professor. Family transfer to Indianapolis in the summer of 1989 was followed by enrollment in the doctoral program at Indiana University School of Nursing. During the completion of course work, she taught clinical courses in the Indiana University School of Nursing Associate Degree Program. In addition to faculty and student responsibilities, she also assumed limited staff development consulting work at St. Vincent Hospital. In 1992, she joined the Indiana University School of Nursing as a full-time visiting lecturer, teaching medical-surgical nursing clinical and theory courses. The requirement for the Doctorate in Nursing Sciences (Major: Nursing Synthesis, Minor: Philosophy) were completed in 1994.