

Increasing Physical Exercise Among Older Adults:  
The Effects of Information, Peer-Modelling,  
Personalized Planning, and Commitment-Making  
by  
Donna M. Yaffe  
Dissertation submitted to the Faculty of the  
Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of  
DOCTOR OF PHILOSOPHY  
in  
Psychology

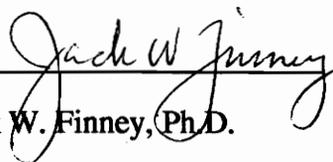
APPROVED:

  
\_\_\_\_\_

Richard A. Winett, Ph.D., Chairman



Eileen Anderson, Ed.D.

  
\_\_\_\_\_

Jack W. Finney, Ph.D.



Douglas R. Southard, Ph.D., M.P.H.

  
\_\_\_\_\_

Robert Stephens, Ph.D.

February, 1996  
Blacksburg, Virginia

Key words: Exercise, Elderly, Tailoring, Behavioral Health

LD  
5655  
V856  
1996  
Y344  
C.2

Increasing Physical Exercise Among Older Adults:  
The Effects of Information, Peer-Modelling,  
Personalized Planning, and Commitment-Making

by

Donna M. Yaffe

Richard A Winett, Ph.D., Chairman

Department of Psychology

ABSTRACT

Increasing physical activity among individuals in the U.S.A. is a primary health concern. Sedentary life-style is a risk factor for a number of diseases. Life expectancy in the U.S. has increased dramatically over the past several decades, yet frequently, few of these additional years remain disease free. It is now known that life-style factors, including exercise, are important determinants of the number of healthy, functionally independent years remaining for older adults. Unfortunately, few older adults exercise regularly. Interventions aimed at ameliorating this problem are clearly needed.

The Exercise and Older Adults study was designed to assess the effectiveness of an intervention to increase exercise among sedentary and lightly exercising adults ages 55 and older. Unlike other studies which typically involve a supervised aerobic program, this intervention involved the creation of individually tailored exercise programs which participants could maintain without the aid of the researchers. Social learning theory and behavioral principles led to the creation of an intervention combining information, peer-modelling, personalized planning, and commitment-making. Subjects came to a single meeting following a three week period of exercise self-monitoring. During the meeting,

experimental group subjects were given an exercise information packet, viewed two videotapes about older adults and exercise, created personal exercise plans involving several participation and relapse prevention strategies, and signed a commitment sheet stating that they would try to follow their new exercise plan. Control group subjects received the information packets only. Subjects continued to self-monitor their exercise for six weeks.

Repeated Measures Analyses of Covariance did not support the hypothesis that the intervention received by the experimental group was more effective in increasing exercise than the minimal intervention received by the control group. Hierarchical Regression Analyses did not support the hypothesis that self-efficacy and outcome expectancy predict exercise changes. However, both groups in this study increased their exercise significantly and mean differences between groups at the three week follow-up point were significant for several exercise outcomes. Possible reasons for the failure to find statistical significance across time between groups is discussed and future research directions are outlined.

## ACKNOWLEDGMENTS

I would like to express thanks to several individuals who have been instrumental in my pursuit of a Ph.D. in clinical psychology. First, my committee chair, Richard Winett has helped me to formulate ideas and define my clinical and research interests within the fields of Health Psychology and Behavioral Medicine. His support and friendship have also been greatly appreciated. My other committee members, Eileen Anderson, Jack Finney, Doug Southard, and Bob Stephens also deserve thanks for their support. My dissertation research would not have been completed were it not for the aid of research assistants Deborah Tate and Tina Russ. Their never-ending enthusiasm and hours of arduous work was appreciated more than they will ever know. As one endures the ups and downs of graduate school training and the labors of dissertation research, the support of good friends becomes essential for "sanity maintenance." My good friend Susan Haggerty is most definitely one-of-a-kind. Her special ability to help me see the light at the end of the tunnel during tough times and find humor in any situation deserves very special thanks. Finally, and most importantly, my family deserves a gold medal for "putting up" with me over the years and being my greatest fans in all of my life endeavors. Their support has and will always be a great source of inspiration.

## Table of Contents

Introduction.....	1
Inactivity Among Older Adults.....	2
Barriers to Exercise.....	6
Barriers to Exercise for Adults of All Ages.....	6
Barriers Prevalent Among Older Adults.....	7
Rationale for a Media Based Approach to Overcoming Barriers.....	10
Social Learning Theory Principles and Exercise.....	10
Stages of Change Model.....	11
Commitment.....	13
Method.....	15
Subjects.....	15
Procedure.....	18
Focus Group and Preliminary Trial.....	18
Physician's Release.....	18
Intervention.....	18
Physician's Release Letter.....	20
Exercise Information/Self-Help Pamphlet.....	20
Area Activities.....	20
Stretching.....	21
Control Group Intervention.....	21
Experimental Group Intervention.....	21
Videotape Viewing.....	22
Personalized Planning.....	22

Intervention Reliability.....	24
Measures.....	24
Stages of Change Scale.....	24
Self-Efficacy Scale.....	26
Outcome Expectancy Scale.....	27
Activity Log.....	27
Exercise Outcome Measures.....	28
Post-Intervention Questionnaire.....	29
Results.....	29
Analyses to Determine Differences between Groups and Changes within	
Groups on Exercise and Cognitive Measures.....	31
Days of Aerobic Activity.....	32
Days of Aerobic Activity for 20 minutes or more.....	32
Total Minutes Engaged in Aerobic Activity.....	33
Total Minutes Engaged in Aerobic Activity for 20 minutes or more.....	33
Number of Days Engaged in Any Activity.....	34
Total Minutes Engaged in Any Activity.....	34
Outcome Expectancy.....	35
Self-Efficacy.....	36
Stages of Change.....	36
Reported and Actual Stage at Baseline.....	36
Stages of Change Movement.....	37
Self-Efficacy and Outcome Expectancy as Predictors of Exercise Behavior.....	38
Predicting Days of Aerobic Activity.....	39

Predicting Days of Aerobic Activity for 20 minutes or more.....	39
Predicting Total Minutes Engaged in Aerobic Activity.....	40
Predicting Total Minutes Engaged in Aerobic Activity for 20 minutes or more...	41
Predicting Number of Days Engaged in Any Activity.....	42
Predicting Total Minutes Engaged in Any Activity.....	43
Personal Plans.....	43
Personal Plan Goal Achievement.....	46
Post-Intervention Questionnaire.....	47
Changes in exercise following the group meeting.....	47
Most helpful part(s) of the meeting.....	48
Least helpful part(s) of the meeting.....	48
Motivation to increase exercise immediately following the meeting.....	49
Motivation to increase or maintain increase in exercise now.....	49
Degree of difficulty completing activity logs.....	49
Helpfulness of the meeting.....	50
Frequency of looking at or thinking about personal plan.....	50
Discussion.....	51
Study Limitations.....	55
Statistical Power/Sample Size.....	55
Self-Monitoring.....	55
Exercise Options.....	56
Study Duration.....	57
Additional Study Issues.....	58
Recruitment.....	58

Stages of Change Scale.....	59
Gradual vs. Extreme Change.....	61
Future Research Directions.....	62
References.....	65
Tables.....	73
Figures.....	96
Appendices.....	109

## List of Tables

Table 1.	Definitions of Stages of Behavior Change.....	73
Table 2.	Summary Statistics for Demographic Information by Group.....	74
Table 3.	Means and Standard Deviations for Dependent Measures at Baseline by Group.....	75
Table 4.	Summary of Paired T-Tests between Baseline Scores and Three and Six Week Follow-Up Points for Dependent Measures by Group.....	76
Table 5.	Repeated Measures ANCOVA for Days Aerobic Activity (AerDays).....	77
Table 6.	Repeated Measures ANCOVA for Days Aerobic Activity for 20 Minutes or More at a Time (AerDays $\geq 20$ ).....	78
Table 7.	Repeated Measures ANCOVA for Total Number of Minutes Aerobic Activity (AerTime).....	79
Table 8.	Repeated Measures ANCOVA for Total Number of Minutes Aerobic Activity for 20 Minutes or More at a Time (AerTime $\geq 20$ ).....	80
Table 9.	Repeated Measures ANCOVA for Days Any Type of Activity (AnyDays)....	81
Table 10.	Repeated Measures ANCOVA for Total Number of Minutes for Any Type of Activity (AnyMins).....	82
Table 11.	Repeated Measures ANCOVA for Outcome Expectancy (OE).....	83
Table 12.	Repeated Measures ANCOVA for Self-Efficacy (SE).....	84
Table 13.	Reported vs. Actual Stage of Change at Baseline.....	85
Table 14.	Frequencies for Stage of Change Movement Across Time for Experimental Group (n=23).....	86
Table 15.	Frequencies for Stage of Change Movement Across Time for Control Group (n=12).....	87

Table 16. Correlations between Outcome Expectancy and Self-Efficacy and Behavioral Dependent Measures at All Time Points for the Experimental Group.....	88
Table 17. Correlations between Outcome Expectancy and Self-Efficacy and Behavioral Dependent Measures at All Time Points for the Control Group.....	89
Table 18. Hierarchical Regression Analyses for Days Aerobic Activity (AerDays).....	90
Table 19. Hierarchical Regression Analyses for Days Aerobic Activity for 20 Minutes or More at a Time (AerDays $\geq$ 20).....	91
Table 20. Hierarchical Regression Analyses for Total Number of Minutes Aerobic Activity (AerTime).....	92
Table 21. Hierarchical Regression Analyses for Total Number of Minutes Aerobic Activity for 20 Minutes or More at a Time (AerTime $\geq$ 20).....	93
Table 22. Hierarchical Regression Analyses for Days Any Type of Activity (AnyDays).....	94
Table 23. Hierarchical Regression Analyses for Total Number of Minutes for Any Type of Activity (AnyMins).....	95

## List of Figures

<b>Figure 1.</b>	<b>Means Across Time by Group for Days Aerobic Activity (AerDays).....</b>	<b>96</b>
<b>Figure 2.</b>	<b>Means Across Time by Group for Days Aerobic Activity for 20 Minutes or More at a Time (AerDays <math>\geq</math>20).....</b>	<b>97</b>
<b>Figure 3.</b>	<b>Means Across Time by Group for Total Number of Minutes Aerobic Activity (AerTime).....</b>	<b>98</b>
<b>Figure 4.</b>	<b>Means Across Time by Group for Total Number of Minutes Aerobic Activity for 20 Minutes or More at a Time (AerTime <math>\geq</math>20).....</b>	<b>99</b>
<b>Figure 5.</b>	<b>Means Across Time by Group for Days Any Type of Activity (AnyDays)..</b>	<b>100</b>
<b>Figure 6.</b>	<b>Means Across Time by Group for Total Number of Minutes Any Type of Activity (AnyMins).....</b>	<b>101</b>
<b>Figure 7.</b>	<b>Means Across Time by Group for Outcome Expectancy (OE).....</b>	<b>102</b>
<b>Figure 8.</b>	<b>Means Across Time by Group for Self-Efficacy (SE).....</b>	<b>103</b>
<b>Figure 9.</b>	<b>Frequencies of Long Term Goals (n=23).....</b>	<b>104</b>
<b>Figure 10.</b>	<b>Frequencies of Chosen Activities (n=23).....</b>	<b>105</b>
<b>Figure 11.</b>	<b>Frequencies of Types of Anticipated Barriers to Exercise (n=23).....</b>	<b>106</b>
<b>Figure 12.</b>	<b>Frequencies of Types of Rewards for Exercise Goal Achievement (n=23).....</b>	<b>107</b>
<b>Figure 13.</b>	<b>Personal Plan Goal Achievement.....</b>	<b>108</b>

Increasing Physical Exercise Among Older Adults:  
The Effects of Information, Peer-Modelling,  
Personalized Planning, and Commitment-Making

Regular physical activity has been associated with the prevention and management of a number of physical ailments including coronary heart disease, hypertension, diabetes, osteoporosis, and obesity (USDHHS, 1991). In addition, regular physical activity may help prevent and/or alleviate mental health problems such as anxiety, tension, and depression (Perri & Templer, 1985; Bouchard, Shepard, Stephens, Sutton, & McPherson, 1990). Lower rates of cancer, stroke, and back injury have been found among physically active people as well as prolonged functional independence and a better overall quality of life. Furthermore, active people usually outlive those who are sedentary (Paffenbarger, Hyde, Wing, & Hsieh, 1986).

Inactivity is an independent risk factor for coronary heart disease (CHD; Powell, Thompson, Caspersen, & Kendrick, 1987; Blair, Kohl, Paffenbarger, Clark, Cooper, & Gibbons, 1989) and is also linked to other risk factors for CHD (e.g., obesity, hypertension). Blair, et al. (1989) found the relative risk estimate (the ratio of the chance of disease in individuals exposed to a risk factor compared to the risk of disease in individuals without exposure; Jeffrey, 1989) for all-cause mortality among individuals in a low fitness category compared to those in a high fitness category to be 3.44 for men and 4.65 for women. The relative risk specifically for CHD among the sedentary (vs. active people who perform light to moderate activity for at least 30 minutes 5 or more days per week) has been estimated to be between 1.5 and 2.4 (Powell, et al., 1987). While relative risk is a useful epidemiological statistic to consider, population attributable risk can

sometimes provide more meaningful information, especially for determining the burden to society and public health priorities.

Population attributable risk is the number of cases of disease in a population attributable to a particular risk factor (Jeffery, 1989). For example, while hang gliding has a high relative risk ratio, its population attributable risk is low because it is an uncommon behavior. Physical activity, on the other hand, has a larger population attributable risk than its' relative risk ratio would initially suggest because a large portion of the U.S. population is inactive. Paffenbarger, et al. (1986) reported a population attributable risk for all-cause mortality for inactivity to be 16%. This is of particular concern since it is estimated that approximately 80% of the American population is sedentary (Blair, 1988). Thus, if a greater number of people were physically active, the incidence of a number of chronic diseases including coronary heart disease (the leading cause of death and disability in the U.S.), would be substantially reduced (Blair, et al., 1989).

#### Inactivity Among Older Adults

While it is important to address the problem of inactivity among *all* individuals, the need to understand the problem as it pertains to various subpopulations is also critical. For example, it is now evident that increasing activity levels among older adults is very important. While people over age 65 constituted only 4% of the American population in 1900, by 1988, 12.4% were 65 or older. By the year 2000, this proportion will increase to 13% and by 2030, it will be 22%. In addition, those 85 years of age and older will see the most rapid population increase during the 1990's (USDHHS, 1991).

People who reach the age of 65 can now expect to live into their 80's. Yet the number of healthy, disease free, and/or functionally independent years remaining for these individuals are often few. While those aged 65 and older have an average of 16.4 years of

life remaining, only about 12 of these years will be healthy ones. Death is typically preceded by 8-10 years of some disability and one year of total dependency (Shepard, 1990). By the year 2000, the number of people 75 years of age and older will increase by 71%. By 2030, over 13% of Americans over age 65 may be 85 years of age or older (King, 1991). Unfortunately, the over 85 years of age group is the most likely to be functionally dependent (e.g., needing assistance in performing activities of daily living such as dressing and bathing).

Approximately 80% of people 65 years of age and older have one or more chronic health condition such as arthritis, hypertension, and diabetes (King, 1991). Ten percent of those over age 70 have clinically diagnosed coronary artery disease (Shepard, 1990). As a result of their physical impairments, many of these individuals have lost a significant amount of functional capacity and autonomy. About 42% of older Americans have limited functional capacity (Katz, 1983) and 10% have severely restricted mobility (King, 1991). As discussed previously, many of these diseases and difficulties typically encountered by the elderly may be prevented and/or ameliorated through regular exercise. In addition, increased physical activity (particularly in the form of weight bearing exercise) enhances bone mineral content and has been associated with improvements of balance, coordination, flexibility, endurance, and strength, all of which may reduce the risk for osteoporotic fractures -- a problem often encountered among elderly people (Smith, Smith, & Gilligan, 1990).

Research has suggested even moderate levels of exercise (e.g., 30-60% maximum oxygen uptake) can improve psychomotor functioning (Duncan, Gordon, & Scott, 1991; King, Haskell, Taylor, Kraemer, & DeBusk, 1991) although gains of physical condition (measured by VO<sub>2</sub> max.) develop more rapidly with a higher-intensity regimen (Shepard,

1990). Those who are most sedentary appear to experience the greatest gains from such lower levels of exercise intensity (Badenhop, Cleary, Schaal, Fox, & Bartels, 1983). Also, intensive resistance exercise has been shown to dramatically improve strength and mobility in frail elderly (Evans, 1990; Fiatarone, Marks, Ryan, Meredith, Lipsitz, & Evans, 1990). Yet, despite the benefits of engaging in any type of physical activity, more than 40% of people over 65 report no leisure time physical activity. Additionally, fewer than one third regularly engage in moderate physical activity (e.g., walking or gardening) and less than 10% regularly participate in more vigorous physical activity (USDHHS, 1991). The 1985 National Health Interview Survey (NHIS) Health Promotion and Disease Prevention Supplement indicated that 72% of people over age 45 do not engage in regular physical activity (3 days per week for 20 or more minutes per time; Thornberry, Wilson, & Golden, 1986). It has been estimated that about 50% of what we currently accept as aging is now understood to be hypokinesia, a disease of "disuse," the degeneration and functional loss of muscle and bone tissue (Bortz, 1984; Drinkwater, 1988; O'Brien & Vertinsky, 1991). Evans & Rosenberg (1991) have termed the disuse syndrome "sarcopenia." "Sarco" in the Greek language refers to the flesh or the body and "penia" means a reduction in amount or need. Thus, the authors are describing an overall weakening of the body caused by a change in body composition in favor of fat and at the expense of muscle. They note that, as individuals slip into a sedentary life-style, muscle mass decreases, fat deposits increase, and the weakening of the body structure and gradual loss of functional capacity makes it likely that a pattern of immobility will occur. An appropriate exercise program can alter the physiologic factors they call "biomarkers;" factors implicated in decreased functional capacity associated with aging (muscle mass, strength, basal metabolic rate, body fat percentage, aerobic capacity, the body's blood-

sugar tolerance, cholesterol/HDL ratio, blood pressure, bone density, and the body's ability to regulate its internal temperature).

The psychological costs of inactivity-related disorders can also be enormous. For the elderly, depression following incapacitation or from medication side-effects is not uncommon. Feelings such as guilt and anxiety, and a poor self-image may result when one becomes dependent on others. Furthermore, the psychological and monetary cost to significant others (e.g., caretakers of the dependent older adult) can be immense (Evans & Rosenberg, 1991). Numerous studies have suggested that exercise among older adults enhances psychological functioning including mood and self-esteem (e.g., Perri & Templer, 1985; Sonstroem & Morgan, 1989).

In addition to the physical and psychological consequences of inactivity among older adults, the economic toll of ill health among the elderly has been devastating to our nation. Although they comprise only 12.4% of the population, Americans aged 65 and older account for approximately 30% of the nation's health care expenditures. A majority of these costs are the result of impaired functioning in the last years of life (King, 1991).

In summary, the sizable independent relative risk for impaired health in sedentary individuals and the large number of people at risk results in a substantial public health burden (Blair, Kohl, Gordon, & Paffenbarger, 1992). For older adults, regular physical activity is particularly important. While many people assume increased inactivity is a result of physiological decline during later years, evidence suggests that the opposite may be true. Inactivity results in decreased muscle mass and bone density as well as increased body fat. A cyclical pattern may develop as these changes make activity more difficult, followed by further physiological decline, more difficulty exercising, etc. Thus, physiological and psychological disorders associated with aging are often long-term consequences of inactive

lifestyles and could be ameliorated and/or prevented through exercise (Evans & Rosenberg, 1991; Bortz, 1984). In addition to the accrued health benefits, an important result of regular physical activity among older adults appears to be prolonged functional independence. The older individual who is ambulatory is more likely to perform those daily activities which most people take for granted such as showering, cooking, and cleaning. The inability to function in this capacity can make daily living extremely difficult for both the elderly individual and those on whom he or she is dependent. Ameliorating the inactivity problem among older adults would therefore be of great social and economic significance.

#### Barriers to Exercise

It is clear that older adults, even those who have been sedentary for years, can benefit from regular physical activity. Because so few seniors adopt a physically active lifestyle, it is important to understand why this occurs and how barriers preventing them from engaging in regular activity can be overcome.

Barriers to Exercise for Adults of All Ages. The 1983 Canada Fitness Survey (CFS) and the 1983 Fitness Ontario survey (FOS) provided information pertaining to exercise barriers. The CFS gathered information from people claiming they wanted to participate more while the OFS asked inactive people why they were sedentary. Lack of time due to work or other leisure activities was the most frequently cited impediment. Wankel (1988) noted this common barrier is likely to be a rationalization rather than reality. Those who exercise regularly typically have no more time than those who do not, but they make exercise a priority. Other barriers found in these studies were lack of interest, motivation, or encouragement, and inadequate facilities.

Barriers Prevalent Among Older Adults. While these barriers may be found among older adults as well as younger individuals, there are several additional barriers which may be particularly prevalent among seniors. These barriers may keep older adults stuck at a point where they are not "ready" to begin an exercise program or increase the amount of exercise they currently do. For sedentary older adults, addressing such barriers may be crucial for a suggested exercise program to be accepted. National surveys suggest that 25-65% of the population segment who are inactive (all ages) do not intend to begin an exercise program in the coming year (Dishman, Sallis, & Orrenstein, 1985). Because regular physical activity declines with age (Wankel, 1988), it is likely many of those not considering initiation of an exercise program are older adults. The following is an overview of some of the frequently cited barriers to exercise among older adults.

Misperceptions. One of the barriers to exercise among seniors discussed in the literature is misconceptions about present exercise levels and exercise needs. Many older adults overestimate how much they exercise already and how fit they presently are (Buskirk, 1990; Eggers, 1988; O'Brien & Ventinsky, 1991). O'Brien & Ventinsky (1991) found that two out of three elderly women say they make more efforts to be healthy than others their age. In addition, many seniors erroneously believe that the need to exercise diminishes with age (Mobily, 1982; Sager, 1983).

A common misperception held by many seniors is that exercise, particularly vigorous exercise, is risky after middle age (Myers & Gonda, 1986; O'Brien & Ventinsky, 1991; Sager, 1983). Health fears mentioned by older women include wearing out the body, injury, and sudden death (O'Brien & Ventinsky, 1991). Such health risks are greatly exaggerated (Shepard, 1978). While appropriate caution should be taken when various conditions exist (e.g., arthritis, cardiovascular disease), regular physical activity

can be a part of all seniors' lives. Choices may be limited due to physical impairment, but they need not relegate an individual to a sedentary life style (Ward, Taylor, & Rippe, 1991).

*Societal Expectations.* Societal expectations may also prevent an older adult from considering an exercise program. The initial fitness boom of the 70's and 80's was unfortunately targeted primarily to the young. While the majority of the American population seems concerned about the health of the elderly, exercise as a means to enhancing senior health is not always condoned. Mobily (1982) suggested the older adult seeking to maintain health through exercise is potentially wrought with approach-avoidance conflict. An elderly man may desire to begin an exercise program at a local senior center but must do it discretely for fear of being chastised by his children or grandchildren with statements such as, "you're too old to exercise," "you're finally retired, just rest" or "you might have a heart attack." Older women, in particular, may have internalized societal expectations from the past. Senior women are of a generation where household responsibility was a top priority for women, constraints were placed on "displays of tomboyism," and initial exercise experiences (typically formalistic calisthenics at school) may have been negative (O'Brien & Ventinsky, 1991). Ventinsky & Auman (1988) found older women viewed exercise as a "male thing" to do and as more important for men than for women. This perception is unfortunate since not only can older women attain the same health benefits from exercise as older men (e.g., Duncan, et al., 1991), but they may benefit in ways that are more important to them than to men. Specifically, women are more prone to bone fractures and have more difficulty carrying things involved in daily activity. Bone density can be improved through weight bearing activity and strength can also be improved (Buskirk, 1990).

*Logistical Factors.* Additional barriers to exercise more likely to be found among older adults than young and middle aged individuals include lack of transportation and the need to stay home to care for an ailing spouse (O'Brien & Ventinsky, 1991). While these barriers may be difficult to overcome, like other barriers discussed, strategies to overcome them (e.g., home-based exercise, ride-sharing) are potentially viable.

*Physical Problems, Self-Efficacy, and Outcome Expectancy.* The extreme deconditioning of older adults who have been sedentary for many years can be a deterrent to exercise initiation. Problems such as low back pain and poor muscle strength can make physical activity seem out of the question (Mobily, 1982). Low self-efficacy (the beliefs or convictions one has in one's capabilities to engage successfully in a course of action sufficient to satisfy the situational demands; Bandura, 1977) due to physical ailments or failed attempts in the past may also prevent an older adult from exercise initiation. Finally, older adults are less likely than the young to believe they can improve their health through exercise. That is, they tend to have low outcome expectancies (Eggers, 1988; O'Brien & Ventinsky, 1991). They may not believe that there is a safe, enjoyable program that can help them achieve their personal goals. The mediating role of outcome expectancy and self-efficacy on exercise enhancement has been well-documented (e.g., Desharnais, Bouillon, & Godin, 1986; McAuley, 1992; McAuley & Courneya, 1993).

In summary, there are a number of reasons older adults might maintain sedentary life-styles or fail to consider increasing their exercise. Many of these barriers may be overcome through strategies implemented by those who work with seniors. Addressing older adults' barriers to exercise initiation or enhancement is critical since any program designed to help a senior achieve his or her goals can only be useful if the individual overcomes initial barriers and anticipates potential ones.

### Rationale for a Media Based Approach (e.g., videotapes) to Overcoming Barriers

Media based approaches to behavior change are potentially useful because they can provide information and modelling, both of which are important for promoting changes in self-efficacy (Bandura, 1986). In addition, media based approaches provide an intervention format which can be easily disseminated for use by many people. Such approaches have been used successfully to influence a variety of behaviors including AIDS-risk reduction (e.g., Winett, Anderson, et al., 1992). Winett, King, and Altman (1989) suggest media based approaches which convey effective messages are those where (a) considerable research has been undertaken to understand personal and environmental inhibitors and facilitators of behavior change, (b) conceptualizations focusing on behavior change (e.g., social learning theory; Bandura, 1986) are the basis for message or program strategies and formats, and (c) the emphasis is on change in simple but key behaviors. A media approach aimed at moving inactive seniors toward exercise adoption which could fulfill these recommendations could also be a powerful technique for ultimately achieving exercise adoption. Several videotapes are presently available which satisfy these criteria. Two of these videotapes, neither of which has been empirically studied for its effectiveness, were used in the present study.

### Social Learning Theory Principles and Exercise

The present study used social learning theory principles because of their applicability to the particular focus of the investigation. As previously discussed, research has suggested that self-efficacy is a critical prerequisite for continued behavior change (Bandura, 1991). One way self-efficacy can be increased is through modelling. Seeing others perform a particular behavior can help enhance one's confidence in his or her ability to perform the same behavior, particularly if the model is somewhat similar to the

individual (e.g., a peer; Bandura, 1986). Another way self-efficacy can be increased is through mastery experiences (performance accomplishments). Mastery experiences are considered to be effective and influential sources of efficacy information (McAuley & Courneya, 1993). For exercise, successful attainments are likely to enhance perceptions of capabilities, while failures are likely to be detrimental to perceived capabilities. Self-efficacy has been associated with physical activity in numerous studies (e.g., Desharnais, Bouillon, & Godin, 1986) but has been understudied in research on the adoption and maintenance of exercise among older adults. Similarly, outcome expectancies (beliefs about the potential benefits and costs of engaging in a behavior) have been minimally addressed with the older adult population, although the belief in the health benefits of physical activity has been associated in some studies with the initial adoption of an exercise program (e.g., Sallis, Haskell, Fortmann, Vranizan, Taylor, & Solomon, 1986).

In the present study, small initial exercise changes (goals perceived to be fairly easy to achieve) were encouraged specifically to enhance the probability of mastery experiences and modelling was incorporated via videotapes. In addition, information which might enhance expectancies regarding the benefits of exercise for older adults was provided. Although information (knowledge) is an important element of behavior change, information alone has been shown to be ineffective (Fisher & Fisher, 1992). Social learning theorists often suggest the use of both information and modelling for enhancing behavior change (e.g., Bandura, 1986). Of particular interest in the present study was their potential influence on increasing exercise among seniors.

### Stages of Change Model

In recent years, investigators in the area of health-related behavior change have studied and discussed the transtheoretical model or "stages of change" model (Prochaska &

DiClemente, 1983). This model asserts that individuals move through a series of stages with respect to the acquisition or cessation of health-related behaviors. These stages include precontemplation (not planning to change behavior anytime within the next six months), contemplation (seriously considering behavior change within the next six months), preparation (intending to take action within the next month and have made some attempt at behavior change), action (the period of 0-six months when behavior modification is occurring), and maintenance (the behavior has been adopted and continued for at least six months). Progression through the stages is not necessarily linear; people often relapse and recycle through the stages before attaining behavior maintenance (Prochaska, DiClemente, & Norcross, 1992). Table 1 provides an overview of the stages of behavior change.

-----  
Insert Table 1 about here.  
-----

In a study on the application of the stages of change model to exercise, Marcus, Rakowski, and Rossi (1992) found that positive and negative orientations toward exercise correspond to reports of current exercise behavior (i.e., stage of change). The perceived benefits of exercise are said to increase as individuals move through the stages while the perceived costs ultimately decrease. This is consistent with research on behavior change in other areas (e.g., AIDS risk-reduction; Fisher & Fisher, 1992) which has shown that motivation (i.e., increased perceived benefits) is a critical component for behavior change.

Researchers have also discussed, and are now beginning to study, how to best match interventions to individuals according to their stage of behavior change (e.g., Marlatt, 1988). Marcus, Banspach, Lefebvre, Rossi, Carleton, & Abrams (1992)

conducted a community trial using the stages of change model to increase adoption of physical activity within the community. Subjects were recruited as part of a community-wide campaign in Rhode Island designed for nonexercisers and occasional exercisers. Self-help materials were mailed to participants based on their response to a stages of exercise adoption question that divided them into three categories of contemplation, preparation, and action. Contemplators received a document which focused on increasing lifestyle activity, costs and benefits of increasing physical activity (including social benefits) and learning how to reward oneself for increasing activity. Those in the preparation stage received a document focusing on costs and benefits, setting long- and short-term goals, rewards for activity, time management, and details on developing a walking program. Participants in action received a document which focused on troubleshooting situations which may lead to exercise relapse, goal setting, rewards for activity, cross training, avoiding exercise injury, and cultivating exercise partners. All participants also received a resource manual describing activity options in the community and weekly "fun walks" and "activity nights" were made available. A six-week follow-up of 236 randomly selected participants found that 62% percent of participants in contemplation reported they became more active (31.4% reportedly moved to preparation and 30.2% to action). Sixty-one percent of participants in preparation reported they also became more active (moving to the action stage). The study therefore provided preliminary support for use of the stages of change model in designing exercise interventions.

### Commitment

While the present study tested the efficacy of an intervention including information, peer modelling (via videotape presentation), and personal planning, it is possible that additional strategies may enhance the hypothesized effect. One such strategy is the use of

commitment. Research on commitment has found that once individuals make a choice or take a stand, they encounter personal and interpersonal pressures to behave consistently with that commitment (Cialdini, 1993). Both negative and positive psychological manifestations of commitment can be present. The negative element is *persistence*. Persistence is characterized by continuing a behavior despite the feeling that it necessitates sacrifice and resisting temptation. The positive psychological manifestation of commitment is *enthusiasm*. Enthusiastic behavior is characterized by enactment without ambivalence about what the behavior may cost -- out of a sense that the behavior itself is meaningful (Brickman, 1987).

In the present study, the initial commitment was a written and verbal agreement to attempt to begin or increase exercise. According to Glidewell (1989), such agreement constitutes the *cognitive* component of commitment; a resolve to perform a specific class of acts as a means to a long-term end. There is also a *behavioral* component to commitment, and this is where persistence and enthusiasm may enter the picture. Whether "persisting" in an activity or engaging in the activity enthusiastically, with each repetition, a class of acts is more likely to be repeated again and the resolve is more likely to be compelling (Glidewell, 1989). In the present study, commitment to an individualized plan was used to encourage individuals to behaviorally enact and repeat the behavior associated with their cognitive commitment, thus increasing the likelihood of strengthening their resolve and developing ways to make exercise part of a routine.

In summary, the present study combined several behavior change techniques to maximize the likelihood of increased exercise among older adults. It was hypothesized that combining information, peer modelling (via videotape), personal planning, and commitment making would increase exercise behavior in this population more than

information alone. Furthermore, it was hypothesized that outcome expectancy and self-efficacy beliefs would predict exercise behavior change.

## Method

### Subjects

Subject recruitment occurred through a variety of methods. The researcher and research assistants attended local senior group events, made announcements at churches and at a retirement community, and placed advertisements in both the general and senior events sections of a local newspaper. Additionally, a local physician provided names and addresses of older patients who he identified as sedentary or minimal exercisers. The physician also endorsed a letter describing the study and informing patients they would be contacted with more information (see Appendix A). Potential subjects were then called to determine if they were interested in participation and if they met criterion for study enrollment.

Recruitment of the 43 subjects who completed the nine week study occurred in the following manner. Approximately 75 seniors were contacted through the physician mentioned above and 15 of them completed the study. Nine subjects recruited through church announcements completed the study (announcements/study descriptions were made at approximately nine church masses varying in congregation size from ten to greater than 100). Eight subjects from a local retirement community completed the study. Announcements made at three senior citizen group events (attendance between 20 and 50 people at each) resulted in eight individuals who completed the study. The final three subjects responded to the newspaper advertisements.

Although 65 is considered retirement age, definitions of "senior" and "older adult" vary considerably. For this study, fifty-five was chosen as the age demarcation point since

it is frequently the age at which individuals are included in senior activities and qualify for "senior" discounts. In addition to the age requirement, subjects were required to endorse the contemplation or preparation stages on an exercise version of the Stages of Change scale (SOC; Marcus, Rakowski, and Rossi, 1992; Appendix B and described in Measures section). Subjects recruited via telephone were asked about their activity level and the recruiters determined their stage on the SOC scale on the basis of these descriptions.

All potential subjects were informed that they may qualify to participate in a study about exercise which would initially require a time commitment of between one and four hours. They were also informed that they would be required to keep a simple activity log for nine weeks but that they were not *required* to exercise by virtue of study participation. They were told they would be asked to complete a brief series of questionnaires periodically throughout the study. Finally, they were informed they would receive discount and free product coupons from various local vendors upon completion of the study. Subjects were asked to read and sign an informed consent form prior to participation (Appendix C).

Eighty subjects agreed to participate and were given or mailed consent forms and activity logs to begin self-monitoring baseline exercise. All eighty subjects were stratified across stage of change and randomly assigned to the control and experimental groups. Married couples participating in the study were assigned to the same experimental condition and to the same intervention group. Of the initial 80 subjects, 14 were unavailable on all possible intervention dates, three reported that illness prevented them from participating, and 16 decided that they did not want to participate for a variety of individual reasons. Thus, 47 subjects completed baseline exercise recording and attended an intervention group. Four subjects attended an intervention meeting but did not complete the study.

Two of these subjects were deemed ineligible due to inadequately completed logs and questionnaires and two did not want to keep track of their activity any longer. In total, forty-three subjects (23 experimental group and 21 control group) completed the study in its entirety (nine weeks). However, eight subjects met "action" stage criteria (3 or more days of aerobic activity per week for at least 20 minutes at a time) as determined by their reported baseline activity logs (although recruited subjects identified themselves as contemplators or preparers, baseline logs were evaluated to objectively verify their stages). These eight individuals were excluded from analyses, resulting in a final subject pool of 35. No differences were found between the eight subjects deleted from analyses and all other subjects on demographic variables.

The sample as a whole was 66% female and 77% of all subjects were married and living with their spouse. Subjects averaged 65 years of age (SD=7.3; range 55 - 82 years) and 88% had a high school degree or better.

Of the 23 experimental group subjects, 61% were female and 87% were married. Average age was 64.2 (SD=7.4; range 55-82 years) and 87% had a high school education or better. Of the 12 control group subjects (all eight of the subjects dropped from analyses due to meeting criteria for action stage had been assigned to the control group), 75% were female and 58% were married. Average age was 67.6 (SD=7.1; range 56 - 82 years) and 92% had a high school education or better. Appropriate statistical tests to determine differences between control and experimental groups on demographic variables were conducted. No statistical differences were found. Demographic information by group can be seen in Table 2.

-----  
Insert Table 2 about here.  
-----

## **Procedure**

**Focus Group and Preliminary Trial.** All aspects of the intervention (described below) were shown to and discussed with two senior male and two senior female women to determine intervention acceptability. Minor modifications were made on the basis of these participants' comments. A shortened pilot version of the intervention (six weeks, including two weeks baseline and two weeks each for first and second follow-ups) was then conducted. The primary purpose of the preliminary trial was to determine if additional modifications should be made to the intervention protocol.

**Physician's Release.** Since the aim of the study was to encourage senior individuals to begin exercising or increase their current amount of exercise, it was necessary to ascertain that all subjects were physically able to do so. Additionally, unlike most other exercise studies, participants would likely engage in unsupervised exercise. Both from a safety point of view, as well as to reassure the subjects that they would not be risking injury if they chose to begin exercising or increase their level of exercise, physician approval was required. All subjects were thus requested to provide the name of their physician upon recruitment. Physicians were immediately sent a letter (Appendix D) explaining the study, asking that he or she approve the patient's participation in the study, and asking him or her to list any considerations or limitations the patient and researcher should be aware of. A copy of this release form was provided to each subject at the group intervention sessions.

**Intervention.** Intervention groups varied in size from two to eight subjects. All subjects kept an activity log (described below in Measures section) for three weeks prior to

attending a group intervention session (log tracking began during the last week of April, 1994). An activity list was provided, specifying activities to be recorded should the subjects engage in them (Appendix E). The list included typical aerobic, strength, and flexibility enhancing activities and were identified according to which of these three areas were most likely to be targeted if the subject participated in the corresponding activity. Household activities, yardwork, and gardening were not included and lawn mowing was only included if the subjects identified pushing the mower consistently (in which case, two hours of lawn mowing was counted as 25% or 30 minutes of walking). Although the excluded activities can be strenuous and result in increased fitness levels, they were not used for three reasons. First, it is very difficult to account for the variability between subjects who report time spent engaged in these activities (for example, two hours of yardwork might be two hours spent outside with very little movement for one person, while it may involve continuously raking and carrying bags of leaves for another). While there is also variability for the activities which were included in the study, these activities are more likely to be done continuously and in a health-enhancing manner. Second, many of these activities are done seasonally and, while some exercise is better than none, the purpose of the present study was to encourage consistent, year-round, health/functional capacity promoting exercise. Third, since older adults typically overestimate their activity levels (e.g., Buskirk, 1990), it was likely that their estimates of gardening, housework, etc. would be exaggerated. Many of the seniors in the present study expressed displeasure with this aspect of the study. In fact, several of the initial 80 recruited subjects who later dropped out implied that not being able to include these activities on their logs was the reason they reneged on their decision to participate. This difficulty will be addressed further in the Discussion section. Upon arrival to the groups, subjects were asked to hand

in their baseline logs, given new logs for the three week period following the group, and given a folder of information containing the following:

Physician's Release Letter. Each subject received a copy of this letter confirming that their physician had approved their participation in the study (noting any considerations or limitations).

Exercise Information/Self-Help Pamphlet. Subjects received an information/self-help packet which combined elements of materials used in the Marcus et.al community study (1992; described previously) aimed at targeting appropriate information to contemplators and preparers. Among the topics reviewed in the pamphlet were increasing lifestyle activity, costs and benefits of increasing physical activity (including social benefits), learning how to reward oneself for increasing activity, setting long- and short-term goals, rewards for activity, time management, how to develop a walking program, troubleshooting situations which may interfere with exercise plans, cross training, avoiding exercise injury, and cultivating exercise partners. Modifications were made to make the materials age-appropriate (e.g., sample scenarios described older adults) and additions such as information about target heart rate were made. This pamphlet was reviewed with both groups to insure that the information was received by all subjects (simply handing out the pamphlet would not adequately account for the usefulness of information in the study since it could not be assumed that subjects would read the information on their own). Reviewing the exercise pamphlet accounted for approximately 12 minutes of each intervention session. The exercise/self-help pamphlet can be seen in Appendix F.

Area Activities. All subjects were provided with a pamphlet called "Physical Activities in the New River Valley Area" (Appendix G). This pamphlet listed various places in the community where subjects could engage in their exercise(s) of choice.

Information was provided about location hours and whether special classes and/or discount fees were available for seniors. Activity information was provided for aerobic classes, water aerobics, swimming, walking clubs, martial arts, dance, golf, weightlifting, fitness machines, and court sports.

Stretching. A handout adapted from Alter (1990) which provides a visual representation of stretches particularly useful for older adults was provided. The handout also listed stretching guidelines such as "warm up prior to stretching" and "hold the stretch and relax." (Appendix H).

Control Group Intervention. Control group subjects attended a group at the Center for Research in Health Behavior at Virginia Polytechnic Institute and State University at which time all of the above information was provided. In addition, they completed the self-efficacy and outcome expectancy measures (described below in the Measures section) immediately prior to and following receipt and review of the information. They were given new activity logs and scheduled to "drop by" any time during a scheduled time period three weeks later to return their second three week log, complete the self-efficacy and outcome expectancy questionnaires, and receive a final log. They repeated this "drop by" procedure again three weeks later (for a combined total of nine weeks of self-monitoring) at which time they received coupons entitling them to free and discount items at various local establishments. They also completed a post-intervention questionnaire (described below).

Experimental Group Intervention. The intervention for the experimental group subjects included all components described for the control group intervention. Thus, upon arrival to the group, experimental group subjects handed in their baseline activity logs, received their physician release form, completed outcome expectancy and self-efficacy questionnaires,

and received and reviewed all written information with the researchers. In addition, the following was included in the experimental group intervention.

Videotape Viewing. Two videotapes about exercise for older adults were shown. "Be Well: Physical Fitness in the Later Years" (Churchill Films, 1983) and "Exercise and the Older Individual" (Milner-Fenwick, Inc., 1986) were chosen because, together, they provided information about aging, the benefits of exercise for older adults, types of activities, and suggestions for getting started on an exercise program. Throughout these videotapes, several older adults speak about exercise in their lives and are shown engaging in a wide variety of activities. Thus, peer modelling was an ongoing element throughout these two videotapes (see Appendix I for videotape content examples). Modelling is a method previously described as one way in which self-efficacy may be enhanced and was thus integrated into the experimental group intervention via the videotapes. In addition, the information provided via the videotapes, particularly the information provided via the models in the videotapes (e.g., their improved health) was hypothesized to enhance participants' outcome expectancies regarding the benefits of exercise.

Personalized Planning. After viewing the videotapes and taking a short break, subjects were told that they would next be developing, with the aid of the researchers, an individualized exercise program. They were reminded once again that the study does not require that they engage in exercise but that they had all indicated they would like to be participating in more exercise and that this plan was aimed at helping them achieve that goal. They were also told that (a) their plan would be a flexible one which could be adjusted if they found the need to do so, (b) they would be anticipating difficulties ahead of time, and (c) they would make decisions regarding how they would adjust their routine when and if difficulties or obstacles arose. A sample and a blank personal planning

worksheet containing several planning elements was provided to each experimental group subject (Appendices J and K). The first element required subjects to write down their reason(s) for wanting to exercise more (long term goal). The second element required that they write activities which would best help them achieve the goal. Next, subjects chose one or more preferred activities they wanted to engage in. For goals which might be achieved through increased aerobic activity, walking was encouraged because of its ease and because it is the activity of choice for most older adults (Perrin,1981). Next, subjects chose and wrote down a short-term minimum goal (frequency and duration of activity which the subject felt would be relatively easy to achieve). Intensity goals were not included because of the unsupervised nature of the intervention and potential limitations due to physical conditions such as heart disease. In fact, as previously discussed, moderate intensity levels were repeatedly recommended throughout the intervention due to these important considerations. Following the establishment of short-term goals, subjects determined days and times of the day when exercise could be scheduled and then chose alternative days and times if something interfered with their planned ones. Subjects were next required to choose alternative activities they would be willing to try if unable to engage in their initial chosen activities. Next, subjects were asked to write down things that may prevent or interfere with exercise (anticipated barriers). They also developed and wrote down strategies to overcome these barriers. Finally, subjects were asked to establish weekly self-reward(s) for increasing exercise. Potential impediments and solution suggestions were discussed with the researchers rather than relying entirely on the individuals' ability to generate problems and solutions. These were based on the literature and included such thoughts as "I'm too tired" and "It's too cold" and respective cognitive and behavioral problem solving strategies such as "I'll remind myself that exercising will

re-energize me" and "I'll really bundle up" or "I'll walk at the mall." Overall, the personalized planning was designed to maximize the probability of success (e.g., small, attainable goals). By reaching even a small goal, participants would be achieving a "mastery experience," previously described as one way in which self-efficacy and continued behavior change might occur.

The researchers guided this individualized planning in a group setting rather than through individual meetings in order to maximize standardization of researcher-participant interaction. Each element of the personalized plan was described to the entire group. Each of the three researchers then helped one third of the group complete that element prior to moving on to the next element.

Following personal planning completion, all experimental group subjects were asked to sign a written commitment to follow their plan to the best of their ability (Appendix L). They then completed the self-efficacy and outcome expectancy questionnaires.

Intervention Reliability. To insure reliability of the intervention across intervention group sessions, the two research assistants were provided with a checklist of all elements of the intervention to be discussed and specific important comments and points to be made (e.g., reminding participants to remain at a "moderate" level of exercise as determined by the Perceived Exertion Scale and target heart rates). Research assistants placed a check next to each element to be reviewed and comments to be made. No element or comment required was omitted during any of the group meetings and therefore reliability was determined to be 1.0.

### Measures

Stages of Change Scale (SOC). The SOC, first developed by McConaughy, Prochaska, and Velicer (1983), has been used to measure stages of change across a variety of health behaviors. It was revised for use with older adults (Barke & Nicholas, 1990), however, this revision did not include measurement of the preparation stage. Several studies have used single question scales to measure stages of change. One such study was conducted by Marcus, Rakowski, and Rossi (1992). In this study, stages of adopting exercise were measured using an 11-point scale in the shape of a ladder. Each rung had a number (0 through 10), and five rungs also had written labels to serve as anchor points. The 0 rung was labeled *I currently do not exercise and I do not intend to start exercising in the next six months* (precontemplation), two was labeled *I currently do not exercise, but I am thinking about starting to exercise in the next six months* (contemplation), five was labeled *I currently exercise some, but not regularly* (preparation), eight was labeled *I currently exercise regularly but I have only begun doing so within the last six months* (action), and 10 was labeled *I currently exercise regularly and have done so for longer than six months* (maintenance). The formal stage of adoption labels, noted in parentheses above, were not placed on the ladder. Respondents picked the rung on the ladder that most accurately described their current exercise behavior. Regular exercise was defined as exercising three or more times per week for at least 20 minutes each time (American College of Sports Medicine, 1990). Respondents could indicate numbers other than those that were labeled, but the labels corresponded to the minimum requirements for membership in a particular stage. Thus, a subject responding with a "four" on the ladder was classified as a contemplator because the minimum requirements for the preparation stage had not been met. Marcus, et al. (1992) reported that almost 80% of respondents in this study selected one of the five labeled response categories and suggested that the stage ladder be shortened

in future studies. In the present study, a shortened version of the ladder (five rungs only; one corresponding to each of the five stages) was used.

Reliability of this shortened stages of exercise adoption measure has been examined with 235 employees of a retail outlet and an industrial manufacturer. Marcus, Selby, Niaura, & Rossi (1992) reported a Kappa index of reliability over a two-week period of .78 (N=20). Concurrent validity for this measure has been demonstrated by its significant association with the Seven Day Recall Physical Activity Questionnaire (Marcus & Simkin, 1993). The Stage of Change Questionnaire can be seen in Appendix B.

Self-Efficacy Scale. Presently, there are few self-efficacy measures aimed specifically at exercise-related beliefs. However, Marcus, Selby, Niaura, and Rossi (1992) developed an exercise self-efficacy questionnaire which differentiated employees according to stage of change. This five-item self-efficacy measure was designed to measure confidence in one's ability to persist with exercising in various situations. Items represent the following areas: negative affect, resisting relapse, and making time for exercise. A seven-point scale was used to rate each item, with 1 indicating "not at all confident" and seven "very confident." Subjects could also endorse 0, "does not apply to me."

Data analysis from 429 employees of a Rhode Island medical center revealed that total scores on the self-efficacy items differentiated employees at different stages,  $F(4,369) = 36.57, p < .001$ . Internal consistency of the five-item self-efficacy measure was .76 (n=388). Test-retest reliability for the self-efficacy scale over a two-week period was .78 (n=20). The self-efficacy scale was scored by summing the circled numbers and dividing by the number of items completed ("0" or "does not apply to me" was not included). Thus, individual self-efficacy questionnaire scores could range from one to seven, with higher scores representing greater self-efficacy. Coefficient alpha for the self-efficacy scale in the

present study was .68 pre-treatment (prior to the group meeting), .71 post-treatment (following the group meeting), .84 at the three week follow-up point, and .83 at the six week follow-up point. The self-efficacy questionnaire can be seen in Appendix M.

Outcome Expectancy Scale. A face valid outcome expectancy measure was created and can be seen in Appendix N. This measure was used to determine subjects' beliefs about the pros and cons of exercising and whether such beliefs predict exercise behavior. The measure was derived from three sources. First, items found to represent positive and negative orientations toward exercise adoption (pros and cons) by Marcus, Rakowski, and Rossi (1992) were used. These items were subjected to a principle-components analysis with a varimax rotation and judged to be salient for a component if there was a component loading of .50 or greater and if the item did not load on another component. Pros, cons, and pros minus cons were significantly associated with stage of exercise behavior change. Second, outcomes discussed or otherwise mentioned in either of the videotapes were included. Third, relevant barriers to exercise for older adults mentioned in the literature were added. The outcome expectancy scale contained 23 items and was scored by summing the individual item responses (seven items were first reverse scored) and dividing by the number of items completed. Thus, individual outcome expectancy scores could range from one to five, with higher scores representing subjects' greater expectation of positive outcome. In the present study, coefficient alpha for the outcome expectancy scale was .85 pre-treatment (prior to the group meeting), .89 post-treatment (following the group meeting), .88 at the three week follow-up point, and .91 at the six week follow-up point.

Activity Log. Each participant completed an activity log throughout the study (Appendix O). The log provided space for participants to write down activities they engaged in, when they did so, and for how long. To increase reliability of self-reported activity, participants

were asked to, whenever possible, obtain a signature from an individual who could confirm the subject's participation in activities. Thirty-four percent of exercise activities were verified in the present study (46.5% during baseline, 31.3% during the three week follow-up, and 28.2% during the six week follow-up). Participants were also asked to indicate their perceived exertion based on an attached Perceived Exertion Scale (PES, see Appendix P) for each activity they engaged in. Since exercise in this study was unsupervised, the PES was used as a safety precaution. Subjects were asked to maintain a level of intensity perceived to be "moderate" (3) or less on this scale. Subjects who returned activity logs with PES entries exceeding three on the scale were verbally reminded during the "drop by" that maintaining a comfortable, moderate level of activity was recommended. Eighty four percent of all reported activities were done at a level of three or less based on PES reports. Subjects were also asked to include only activities listed on an activity list (Appendix E). This was done to increase the likelihood that the subjects were truly exercising when they reported doing so. Although household activities (e.g., vacuuming, cleaning, gardening, mowing the lawn) can truly be strenuous and continuous, the variability with respect to intensity level and actual time participants engaged in such activity was deemed too great to accurately inform the researcher how active participants were. The activity logs provided the information for the calculation of the exercise dependent measures.

Exercise Outcome Measures. Several outcome measures were derived from the activity logs. Exercise levels were determined on the basis of days exercised, time exercised, and type of activity (aerobic activity or any type of activity). The first variable, *AerDays*, represents the number of days the subject engaged in any aerobic type activity (e.g., walking, swimming, bicycling), regardless of time spent engaged in the activity. The second variable, *AerDays*  $\geq 20$ , is the number of days aerobic activity was done for at least

20 minutes at one time. The third variable, *AerTime*, is the total number of minutes the subject engaged in aerobic-type activity. The fourth variable, *AerTime*  $\geq$  20, is the total minutes of aerobic activity, only including sessions lasting at least 20 minutes. The fifth variable, *AnyDays*, represents the number of days the subject engaged in any type of exercise. The sixth variable, *Any Mins*, is the total number of minutes spent engaged in any type of exercise. Finally, a Stage of Change variable was derived based on analysis of the activity logs. Subjects who engaged in activity less than two days over a three week period were contemplators (not precontemplators since they were recruited on the basis of a minimum requirement of desiring to increase their exercise levels). Subjects whose activity logs indicated that they were exercising more than two days per week but less than three days of aerobic activity for 20 or more minutes were preparers. Subjects who met the criterion of three or more days per week of aerobic exercise for 20 or more minutes per session were in the action stage. Thus, for the SOC variable, both self-reported stage and stage as determined by activity logs were obtained.

Post-Intervention Questionnaire. A questionnaire was created to help inform the researcher which aspects of the intervention protocol were perceived to be most useful to participants. This could help drive future research evaluating specific components of the intervention (Appendix Q).

## Results

Means and standard deviations for the two groups for dependent measures at baseline can be seen in Table 3. Means for each measure over time can be viewed in Figures 1-8. The following are results for all dependent measures except for Stages of Change (SOC) which will be discussed later. SOC required use of different statistical analyses because it was not a continuous variable.

-----  
Insert Table 3 and Figures 1-8 about here.  
-----

The first step of analyses was to determine if there were differences between the control and experimental groups at baseline for demographic variables. Appropriate analyses revealed no statistical differences for gender (chi-square=0.70, n.s.), marital status (chi-square=3.66, n.s.), education level (chi-square=1.76, n.s.), or age ( $t=1.30$ , n.s.).

Next, appropriate tests were performed to determine relationships between the dependent measures and these demographic variables. ANOVA's conducted for education level (five category levels of education were used) and the eight dependent measures revealed no significant relationships at any time point. T-tests conducted for marital status, gender, and group for all eight dependent measures at all time points also revealed no significant relationships. However, correlations between age and the various dependent measures revealed several significant relationships at baseline and at the three week follow-up for four of the dependent measures. Specifically, age was positively correlated at baseline with the number of days subjects engaged in aerobic activity regardless of time per session ( $r=.34$ ,  $p<.05$ ) and with the number of days subjects engaged in any type of activity ( $r=.34$ ,  $p<.05$ ). In addition, age was negatively correlated at baseline with days engaged in aerobic activity for 20 or more minutes per session ( $r=-.36$ ,  $p<.05$ ) and minutes engaged in aerobic activity counting only sessions of 20 or more minutes ( $r=-.35$ ,  $p<.05$ ). At the three week follow-up point, age was negatively correlated with days engaged in aerobic activity for 20 or more minutes per session ( $r=-.39$ ,  $p<.05$ ) and minutes engaged in

aerobic activity counting only sessions of 20 or more minutes ( $r=-.35$ ,  $p<.05$ ). As a result of these findings, age was used as a covariate when appropriate in the subsequent analyses.

Analyses to Determine Differences Between Groups and Changes Within Groups on Exercise and Cognitive Measures

To evaluate whether the experimental group increased their exercise level significantly more than the control group, and whether there were significant differences on measures of cognition, eight dependent measures were evaluated using one-way Repeated Measures Analysis of Covariance (RMANCOVA) with group as the between subjects factor. Corresponding baseline scores were used as covariates and age was also used as a covariate in the four analyses noted above. RMANCOVA's were performed for *AerDays* (number of days engaged in aerobic activity regardless of time per session), *AerDays*  $\geq 20$  (number of days engaged in aerobic activity for at least 20 minutes at one time), *AerTime* (total number of minutes engaged in aerobic activity), *AerTime*  $\geq 20$  (total number of minutes engaged in aerobic activity counting only times engaged for at least 20 minutes), *AnyDays* (number of days engaged in any type of exercise), *AnyMins* (total number of minutes engaged in any type of exercise), *OE* (Outcome Expectancy), and *SE* (Self-Efficacy). Time points for the repeated measures analyses were the three week follow-up point (Follow-up 1) and the six week follow-up point (Follow-up 2) for the six activity measures. The two cognitive measures, Outcome Expectancy and Self-Efficacy, were measured at four data points and therefore had an additional time point in the repeated measures analyses at post-intervention (immediately following the group meetings). Least squared means (used to account for the discrepancy between groups in cell size) are reported below in cases where differences between the two groups at any time point were significant. Paired t-tests were also conducted for each group on all dependent measures to

determine if significant changes on the dependent measures occurred between baseline and any later time point. Results of the paired t-tests can be seen in Table 4.

---

Insert Table 4 about here.

---

Days of Aerobic Activity. Using baseline scores and age as covariates (see Table 5), the RMANCOVA revealed no main effect for Group ( $F(1,31)=.09$ , n.s.). Similarly, no significant effects for Time ( $F(1,31)=.04$ , n.s.) or the Time x Group interaction ( $F(1,31)=2.17$ , n.s.) were found. However, paired t-tests revealed that both groups increased the number of days engaged in aerobic activity both from baseline to the three week follow-up time point (experimental group:  $t = 4.16$ ,  $p<.001$ ; control group:  $t = 2.67$ ,  $p<.05$ ) and from baseline to the six week follow-up time point (experimental group:  $t = 2.4$ ,  $p<.05$ ; control group:  $t = 3.09$ ,  $p<.05$ ).

---

Insert Table 5 about here.

---

Days of Aerobic Activity for 20 minutes or more. For AerDays  $\geq 20$ , baseline scores and age were used as covariates (see Table 6), the RMANCOVA revealed no significant main effect for Group ( $F(1,31)=.19$ , n.s.). In addition, no significant effects were found for Time ( $F(1,31)=.69$ , n.s.) or the Time x Group interaction ( $F(1,31)=.53$ , n.s.). Paired t-tests indicated that the experimental group significantly increased on this measure from baseline to the three week follow-up time point ( $t = 3.21$ ,  $p<.01$ ) while the control group did not. Experimental group subjects also significantly increased the number of days they engaged in aerobic activity for 20 minutes or more from baseline to the six

week follow-up time point ( $t = 2.55, p < .05$ ) while a trend toward a significant increase on this measure was found for the control group from baseline to six weeks ( $t = 1.87, p < .10$ ).

-----  
Insert Table 6 about here.  
-----

Total Minutes Engaged in Aerobic Activity. Using only baseline scores as a covariate (see Table 7), no significant effect was found for Group ( $F(1,32)=1.22, n.s.$ ). Also, no significant effect was found for Time ( $F(1,32)=.65, n.s.$ ) while a trend was found for the Time x Group interaction ( $F(1,32)=3.41, p < .08$ ). Least squared means for this variable at Follow-up 1 revealed the experimental group had a 92 minute higher mean than the control group (216 minutes vs. 123.7 minutes, within time-point difference  $p < .10$ ). Paired t-tests indicated that the experimental group significantly increased minutes engaged in aerobic activity as indicated by both the baseline to three week follow-up ( $t = 4.69, p < .001$ ) and baseline to six week follow-up time points ( $t = 3.0, p < .01$ ). The control group did not significantly increase on this measure from baseline to the three week follow-up but significantly increased from baseline to the six week follow-up time point ( $t = 2.22, p < .05$ ).

-----  
Insert Table 7 about here.  
-----

Total Minutes Engaged in Aerobic Activity for 20 minutes or more. Using baseline scores and age as covariates, no significant effects were found for Group ( $F(1,31)=.29, n.s.$ ), Time ( $F(1,31)=.18, n.s.$ ), or the Time x Group interaction ( $F(1,31)=1.14, n.s.$ ) for this variable. Results of paired t-tests indicated that the control group did not significantly

increase over time on this dependent measure. However, the experimental group significantly increased from baseline to the three week follow-up time point ( $t = 3.46$ ,  $p < .01$ ) and from baseline to the six week follow-up ( $t = 2.55$ ,  $p < .05$ ). From baseline to the six week follow-up, a trend was found for the control group ( $t = 1.79$ ,  $p = .10$ ). RMANCOVA results for Aerobic Time  $\geq 20$  can be seen in Table 8.

---

Insert Table 8 about here.

---

Number of Days Engaged in Any Activity. For this dependent measure, baseline scores and age were used as covariates. No significant main effect was found for Group ( $F(1,31) = .47$ , n.s.). Similarly, no significant effect was found for Time ( $F(1,31) = .18$ , n.s.). A trend was found for the Time x Group interaction ( $F(1,31) = 3.19$ ,  $p < .09$ ). Significant increases from baseline to the three week follow-up time point were found for both the experimental and control groups (experimental group:  $t = 3.51$ ,  $p < .01$ ; control group:  $t = 2.87$ ,  $p < .05$ ). From baseline to the six week follow-up time point, the increases were also significant for both groups (experimental group:  $t = 2.62$ ,  $p < .05$ ; control group:  $t = 2.23$ ,  $p < .05$ ). RMANCOVA results for Number of Days Engaged in Any Activity can be seen in Table 9.

---

Insert Table 9 about here.

---

Total Minutes Engaged in Any Activity. Using only baseline scores as a covariate, no significant effects were found for Group ( $F(1,32) = 2.47$ , n.s.) or Time ( $F(1,32) = .85$ , n.s.). A trend was found for the Time x Group interaction ( $F(1,32) = 3.02$ ,  $p < .10$ ). Least

squared means at Follow-up 1 indicated that the experimental group averaged 267.3 minutes of any activity from baseline to the three week follow-up period while the control group engaged in 160.5 minutes (within time-point difference  $p < .05$ ; see Table 10). On this dependent measure, paired t-tests indicated that the experimental group significantly increased from their baseline levels to both the three- and six week follow-up time periods ( $t = 5.62, p < .001$  and  $t = 3.37, p < .01$ , respectively) while the control group did not.

-----  
Insert Table 10 about here.  
-----

Outcome Expectancy. Baseline scores were used as a covariate for the dependent measure Outcome Expectancy. No significant effects were found for Group ( $F(1,30) = .97, n.s.$ ), Time ( $F(2,29) = .95, n.s.$ ), or the Time x Group interaction ( $F(2,29) = 1.3, n.s.$ ). Least squared means indicated the experimental group had a significantly higher mean than the control group immediately following the intervention (OE<sub>post</sub>, 4.28 vs. 4.0, within time-point difference  $p < .001$ ; see Table 11). For the experimental group, increases in Outcome Expectancy from prior to the group meeting to immediately following the group meeting were significant ( $t = 6.46, p < .001$ ) and a trend was found for the increases when comparing Outcome Expectancy prior to the meeting to the three week follow-up ( $t = 1.94, p < .10$ ). No significant changes from baseline level of this variable were found for the control group.

-----  
Insert Table 11 about here.  
-----

Self-Efficacy. For Self-Efficacy, baseline scores were used as a covariate. No significant effect was found for Group ( $F(1,29)=.48$ , n.s.). Similarly, no significant effect was found for Time ( $F(2,28)=.43$ , n.s.). A trend was found for the Time x Group interaction ( $F(2,28)=2.7$ ,  $p<.09$ ) . Least squared means revealed the experimental group had a significantly higher score immediately following the intervention (SEpost, 4.5 vs. 3.7, within time-point difference  $p<.05$ ; see Table 12). Paired t-tests indicated that the experimental group's scores on this variable increased significantly from baseline scores at the post-group time point ( $t = 3.51$ ,  $p<.01$ ) and at the three week follow-up time point ( $t = 2.26$ ,  $p<.05$ ).

-----  
Insert Table 12 about here.  
-----

Stages of Change

Reported and Actual Stage at Baseline. As noted earlier, 43 subjects participating in the study originally identified themselves as either contemplators or preparers with respect to their exercise stage of change. Baseline activity logs were evaluated to assess the reliability of these self-reports and to eliminate action stage individuals from further analyses. The eight individuals whose exercise met criterion for the action stage (three or more times per week of aerobic exercise for 20 or more minutes per exercise session), all control group subjects, were eliminated from analyses. The stages of change for the remaining 35 subjects reported upon recruitment vs. their stages as determined by baseline activity logs can be seen in Table 13. Of the 35 subjects, 22 subjects' stage identification correctly matched their stage determined from their baseline logs. Of the 13 subjects whose logs indicated a stage other than that which they initially reported, seven had identified

themselves as contemplators but were preparers (doing some aerobic activity) according to their logs. Six had identified themselves as preparers but were contemplators (doing virtually no aerobic activity) according to their logs. The implication of these discrepancies will be addressed in the discussion section. Analysis of stage movement across time was conducted objectively, using actual stage as determined by subjects' exercise logs.

-----  
Insert Table 13 about here.  
-----

Stages of Change Movement. Chi-square analyses were initially planned to test for significant differences in stage of change movement between groups. These analyses were deemed inappropriate due to small cell size. However, a breakdown of participants' stage of change movement can be seen in Tables 14 (experimental group) and 15 (control group). To summarize, 11 of the 23 experimental subjects (48%) moved either one or two stages forward from baseline to the six-week follow-up period and seven of the 12 control group subjects (58%) did so. Of the 11 experimental group subjects who moved forward from Baseline to Follow-up 2, three moved two stages (from contemplation to action) while no control group subjects moved forward two stages. Further, no experimental group subjects moved backward (which would indicate less aerobic exercise, placing them in a different stage category), while two control group subjects regressed from preparation to contemplation from Baseline to Follow-up 2. Twelve of the experimental group subjects (52%) remained at the same stage from Baseline to Follow-up 2 while three of the control group subjects (25%) remained at the same stage.

In summary, experimental group subjects who changed stages during the intervention did so in a positive direction (more exercise) and primarily from baseline to the

three week follow-up point. A greater percentage of control group subjects changed stages. However, two of these subjects regressed (engaging in less exercise). Stage movement for control group subjects occurred equally from baseline to the three week follow-up time points and from the three week to six week follow-up time points.

-----  
Insert Tables 14 and 15 about here.  
-----

### Self-Efficacy and Outcome Expectancy as Predictors of Exercise Behavior

The hypothesis that changes in self-efficacy and outcome expectancies regarding exercise predicted exercise behavior was tested using heirarchical regression analyses. Tables 16 and 17 show the correlations between these cognitive variables and the six exercise measures at all time points for both the experimental and control groups.

-----  
Insert Tables 16 and 17 about here.  
-----

The results of the hierarchical regression analyses examining the relative contributions of Self-Efficacy and Outcome Expectancy to the prediction of exercise change at the three week and six week follow-ups can be seen in Tables 18-23. For all six variables analyzed in the regression analyses, baseline scores of the dependent variable were entered into the model first, followed by age for variables where a significant relationship was found between age and the dependent measure of interest. Group was entered next into the model, followed by separate examination of the individual contributions of the post-intervention Outcome Expectancy (OEpost) and post-intervention Self-Efficacy (SEpost) scores.

### Predicting Days of Aerobic Activity

*Three Weeks.* In predicting the number of days subjects engaged in aerobic-type activity (regardless of time spent engaged in the activity per session) at the first follow-up point, baseline scores were entered into the model first, accounting for 30.36% of the variance ( $R^2=.30$ ,  $F(1,33)=14.39$ ,  $p<.001$ ). Group was entered next and did not add significantly to the prediction of AerDays at Follow-up 1 ( $\Delta R^2=.01$ ,  $F(1,32)=.64$ , n.s.). Neither OEpost ( $\Delta R^2=.03$ ,  $F(1,31)=1.52$ , n.s.) nor SEpost ( $\Delta R^2=.01$ ,  $F(1,31)=.46$ , n.s.), added significantly to the prediction of AerDays Follow-up 1.

*Six Weeks.* In predicting the number of days subjects engaged in aerobic-type activity (regardless of time spent in activity per session) at the six week follow-up, baseline scores were entered into the model first, contributing 15.77% to the predictive power of the model ( $R^2=.16$ ,  $F(1,33)=6.18$ ,  $p<.05$ ). Group was entered next and did not add significantly to the prediction model ( $\Delta R^2=.002$ ,  $F(1,32)=.09$ , n.s.). OEpost increased the predictive power of the model by 6.45% ( $\Delta R^2=.06$ ,  $F(1,31)=2.58$ , n.s.) and SEpost increased the predictive power by 2.12% ( $\Delta R^2=.02$ ,  $F(1,31)=.80$ , n.s.). Results of the hierarchical regression analyses for three and six week follow-up can be seen in Table 18.

-----  
Insert Table 18 about here.  
-----

### Predicting Days of Aerobic Activity for 20 minutes or more.

*Three weeks.* In predicting the number of days subjects engaged in aerobic-type activity for at least 20 minutes at a time at the three week follow-up, baseline scores were entered into the model first, accounting for an insignificant portion of the variance ( $R^2=.015$ ,  $F(1,33)=.51$ , n.s.). Age was entered next and contributed significantly to the

prediction of AerDays  $\geq$  20 Follow-up 1 ( $\Delta R^2=.14$ ,  $F(1,32)=5.25$ ,  $p<.05$ ). Group, entered into the model next, did not account for a significant portion of the variance ( $\Delta R^2=.015$ ,  $F(1,31)=.56$ , n.s.). Finally, neither OEpost ( $\Delta R^2=.03$ ,  $F(1,30)=1.12$ , n.s.) nor SEpost ( $\Delta R^2=.03$ ,  $F(1,30)=1.25$ , n.s.) added significantly to the prediction model.

Six weeks. In predicting the number of days subjects engaged in aerobic-type activity for at least 20 minutes at a time at the six week follow-up, baseline scores were entered into the model first, accounting for an insignificant portion of the variance ( $R^2=.00$ ,  $F(1,33)=0.0$ , n.s.). Age was entered next and accounted for a significant 13.9% of the variance ( $\Delta R^2=.14$ ,  $F(1,32)=5.25$ ,  $p<.05$ ). Group, entered next, did not account for a significant portion of the variance ( $\Delta R^2=.002$ ,  $F(2,32)=.08$ , n.s.). Similarly, neither OEpost ( $\Delta R^2=.03$ ,  $F(1,31)=1.07$ , n.s.) nor SEpost ( $\Delta R^2=.08$ ,  $F(1,31)=2.79$ ,  $p<.10$ ) added significantly to the prediction model, although a trend was found for SEpost (see Table 19).

-----  
Insert Table 19 about here.  
-----

Predicting Total Minutes Engaged in Aerobic Activity.

Three weeks. In predicting the total amount of time subjects engaged in aerobic - type activity, regardless of time per session, baseline scores were entered first and accounted for a significant portion of the variance ( $R^2=.20$ ,  $F(1,33)=8.07$ ,  $p<.01$ ). Group was entered into the model next and a trend was found ( $\Delta R^2=.09$ ,  $F(1,32)=3.86$ ,  $p<.10$ ). Neither OEpost ( $\Delta R^2=.03$ ,  $F(1,31)=1.27$ , n.s.) nor SEpost ( $\Delta R^2=.03$ ,  $F(1,31)=1.59$ , n.s.) accounted for a significant portion of the variance .

Six weeks. In predicting the total amount of time subjects engaged in aerobic-type activity, regardless of time per session, baseline scores were entered first and did not account for a statistically significant portion of the variance although they contributed 10.9% to the prediction model ( $R^2=.11$ ,  $F(1,33)=4.04$ ,  $p<.10$ ). Group was entered next and did not add significantly to the predictive power of the model ( $\Delta R^2=.002$ ,  $F(1,32)=.06$ , n.s.). OEpst was entered next and also did not account for a significant portion of the variance ( $\Delta R^2=.001$ ,  $F(1,31)=.04$ , n.s.). Finally, SEpost was entered and added significantly to the prediction model ( $\Delta R^2=.12$ ,  $F(1,31)=5.01$ ,  $p<.05$ ). Heirarchical regression analyses for three and six week follow-up can be seen in Table 20.

-----  
Insert Table 20 about here.  
-----

Predicting Total Minutes Engaged in Aerobic Activity for 20 minutes or more.

Three weeks. In predicting the total amount of time subjects engaged in aerobic - type activity at the 3-week follow-up, counting only times when activity was done for 20 or more minutes, baseline scores were entered first and increased the predictive power of the model by 12.84% ( $R^2=.13$ ,  $F(1,33)=4.86$ ,  $p<.05$ ). Age ( $\Delta R^2=.06$ ,  $F(1,32)=2.30$ , n.s.) and Group ( $\Delta R^2=.03$ ,  $F(1,31)=1.16$ , n.s.) were entered next. Next, OEpst was entered and also did not contribute significantly to the variance ( $\Delta R^2=.05$ ,  $F(1,30)=1.94$ , n.s.). Finally, SEpost was entered and accounted for 2.61% of the variance ( $\Delta R^2=.03$ ,  $F(1,30)=1.03$ , n.s.).

Six weeks. In predicting the total amount of time subjects engaged in aerobic-type activity from the three week to the six week follow-up, including only activity done for 20 or more minutes at a time, baseline scores were entered into the model first, increasing the

predictive power of the model by 10.66% ( $R^2=.11$ ,  $F(1,33)=3.94$ ,  $p<.06$ ). Group was entered next and was not found to contribute significantly to the prediction model ( $\Delta R^2=.00$ ,  $F(1,32)=.02$ , n.s.). OEpost was then entered and also did not contribute significantly to the variance ( $\Delta R^2=.01$ ,  $F(1,31)=.46$ , n.s.). Finally, SEpost was entered and accounted for 10.3% of the variance ( $\Delta R^2=.10$ ,  $F(1,31)=4.06$ ,  $p<.10$ ). See Table 21 for heirarchical regression analysis of Days of Aerobic Activity for 20 minutes or more.

-----  
Insert Table 21 about here.  
-----

#### Predicting Number of Days Engaged in Any Activity

*Three weeks.* In predicting the number of days any type of activity was done, baseline scores were entered first, contributing significantly to the prediction model ( $R^2=.42$ ,  $F(1,33)=24.14$ ,  $p<.001$ ). Group contributed an insignificant 3.4% ( $\Delta R^2=.03$ ,  $F(1,32)=1.99$ , n.s.). Neither OEpost ( $\Delta R^2=.004$ ,  $F(1,31)=.21$ , n.s.) nor SEpost ( $\Delta R^2=.01$ ,  $F(1,31)=.52$ , n.s.) contributed significantly to the predictive power of the model.

*Six weeks.* In predicting the number of days any activity was done at the six week follow-up, baseline scores were entered into first and contributed significantly to the prediction model ( $R^2=.44$ ,  $F(1,33)=26.31$ ,  $p<.001$ ). Group ( $\Delta R^2=.00$ ,  $F(1,32)=.006$ , n.s.) did not contribute significantly . Neither OEpost ( $\Delta R^2=.01$ ,  $F(1,31)=.75$ , n.s.) nor SEpost ( $\Delta R^2=.01$ ,  $F(1,31)=.49$ , n.s.) added significantly to the predictive power of the model . (See Table 22).

-----  
Insert Table 22 about here.  
-----

#### Predicting Total Minutes Engaged in Any Activity

*Three weeks.* In predicting the total number of minutes over the three week time period that subjects engaged in any type of activity, baseline scores were entered first, accounting for a significant portion of the variance of the model ( $R^2=.62$ ,  $F(1,33)=54.06$ ,  $p<.001$ ). Group was entered next and contributed significantly to the model ( $\Delta R^2=.06$ ,  $F(1,32)=6.43$ ,  $p<.05$ ). Neither OEpost ( $\Delta R^2=.007$ ,  $F(1,31)=.73$ , n.s.) nor SEpost ( $\Delta R^2=.002$ ,  $F(1,31)=.22$ , n.s.) accounted for a significant portion of the variance.

*Six weeks.* In predicting minutes engaged in any activity from the three to six week follow-up, baseline scores were entered first, accounting for a significant portion of the variance of the model ( $R^2=.43$ ,  $F(1,33)=25.25$ ,  $p<.001$ ). Group was entered next and did not contribute significantly to the prediction model ( $\Delta R^2=.006$ ,  $F(1,32)=.34$ , n.s.). Similarly, OEpost did not contribute significantly to the prediction model ( $\Delta R^2=.00$ ,  $F(1,31)=.01$ , n.s.). Finally, although not significant, a trend was found for SEpost ( $\Delta R^2=.06$ ,  $F(1,31)=3.53$ ,  $p<.10$ ). (see Table 23).

-----  
Insert Table 23 about here.  
-----

#### Personal Plans

Since the personal activity plans were considered to be an integral element of the intervention, evaluation of these plans was warranted. Personal plans were completed by each of the 23 experimental group subjects.

First, long-term goals, or reasons why subjects wanted to increase their exercise levels, were evaluated. Forty five long-term goals were noted (subjects could write down more than one goal). The mean number of goals identified by subjects was 1.96 (SD=.71, range 1-3). The goal most frequently noted was weight loss (12 subjects, 52%). Five other goals were each mentioned by five subjects (22%). These goals included improving health/fitness in general, increasing energy, improving endurance, increasing flexibility, and increasing strength/muscle tone. Maintaining fitness was noted by four people (17%), improving circulation was mentioned by three people (13%), and decreasing the likelihood of bone loss was noted by one individual (4%). Frequencies of long-term goals can be seen in Figure 9.

-----  
Insert Figure 9 about here.  
-----

Next, subjects were asked to choose at least one activity they would like to use to help them reach their goal(s). The mean number of activities chosen was 1.78 (SD=.79; range 1-3). Ten subjects chose just one activity, eight subjects chose two activities, and five subjects chose three activities. Of the 23 subjects, 21 subjects (91%) chose walking as their choice activity/one of their activities. Eight of the 23 subjects (35%) chose a non-aerobic-type activity (four chose stretching/calisthenics, two chose weights/weighted exercises, and two chose yoga/martial arts). The frequency of identified activities can be seen in Figure 10.

-----  
Insert Figure 10 about here.  
-----

Experimental group subjects were also asked to indicate a minimum number of days per week and a minimum number of minutes per session they felt confident they could accomplish each week over the following three weeks (a "short-term" goal). For minimum days per week, the mean minimum number of days per week chosen was 2.74 (SD=.75; range 2-5 days). Fourteen subjects (61%) chose three days per week or more as a minimum goal while all of the remaining nine subjects (39%) chose 2 days per week. For minimum minutes per exercise session, the mean was 22.61 (SD=7.67; range 10-30 minutes). Sixteen subjects (70%) indicated they would like to begin exercising for 20 or more minutes at a time while seven subjects (30%) chose a goal of less than 20 minutes per session (three subjects chose 10 minutes and four chose 15 minutes per exercise session). Eleven experimental group subjects (48%) combined minutes and days goal equaled or exceeded 3 days/week and 20 or more minutes per session (thus meeting the ACSM guidelines if the activity done for 20 minutes or more is aerobic).

Next, experimental group subjects were asked to identify barriers they thought would be most likely to interfere with their attempts to achieve their exercise goals. The mean number of barriers subjects identified as potentially interfering with their exercise was 2.13 (SD=.81; range 1-4 barriers). The most frequently cited barrier for this group was schedule conflicts/other demands. Seventeen people (74%) anticipated that schedule conflicts or other demands might interfere. Other barriers frequently cited included travel/vacation (seven subjects, 30%), being tired (six subjects, 26%), bad weather (six subjects, 26%), lack of motivation/don't feel like it (3, 13%), boredom (2, 9%), and various other reasons (8, 35%). Frequency of anticipated barriers can be seen in Figure 11.

-----  
Insert Figure 11 about here.  
-----

Following anticipation of barriers, experimental group subjects developed strategies to use when faced with these barriers. The mean number of strategies per potential barrier noted was 1.56 (SD=.75; range=.5-4 strategies). Strategies could be cognitive in nature (e.g., reminding themselves why they want to exercise) or behavioral (e.g., doing an alternative activity, getting an exercise partner).

Finally, subjects developing personal exercise plans chose one or more rewards they would give to themselves for each week that they met their minimum goal. The most frequently chosen type of reward (chosen by nine individuals, 39%) was entertainment (e.g., going to a movie), followed by shopping or buying clothes (six individuals, 26%) and going out to eat or eating a special food (five people, 22%). Self-rewards can be seen in Figure 12.

-----  
Insert Figure 12 about here.  
-----

#### Personal Plan Goal Achievement

Of the 12 subjects whose minimum goal was less than a combined three days per week aerobic activity at 20 or more minutes per session (the ACSM guidelines and necessary for "action" stage inclusion), nine (75%) achieved their goal at Follow-up 1 and four (33%) maintained that goal achievement at Follow-up 2. Of the 11 subjects whose minimum goal was at least three days per week of aerobic activity at a minimum of 20 minutes per session, three (27%) achieved their goal at Follow-up 1 and one (9%)

maintained that goal achievement at Follow-up 2 (one person who did not reach his goal at Follow-up 1 did so at Follow-up 2). Two of the 12 subjects whose goal was less than the ASCM guidelines met the guidelines at Follow-up 2, clearly exceeding their goals. However, of the 11 subjects whose goal met or exceeded the ASCM guidelines, four met the guidelines at Follow-up 1 and only two maintained that change at Follow-up 2 (with the above mentioned individual meeting ASCM guidelines at Follow-up 2 but not at Follow-up 1). It should be noted that some subjects had goals exceeding the 20 minute ASCM criteria (e.g., 30 minutes) and were thus able to meet the guidelines even if they didn't achieve their personal goals. Typically, those who did not meet their aerobic goal or the ASCM guidelines failed to exercise on the necessary number of days per week but were able to exercise for the minimum time indicated per session when they actually engaged in exercise. Personal plan goal achievement can be seen in Figure 13.

-----  
Insert Figure 13 about here.  
-----

### Post-Intervention Questionnaire

Following completion of the intervention (at six week follow-up), all subjects completed a post-intervention questionnaire (experimental group and control group versions) to help determine subjects' perceptions of the intervention (Appendices Q and R). Subjects could remain anonymous when completing the questionnaire, however, their group status (experimental or control) was identified. The following is a summary of selected Likert-Scale item responses.

Changes in exercise following the group meeting. On a scale of 1-5, where 1="much less than before the meeting," 3="about the same," and 5="much more than

before the meeting," 15 of the 23 experimental group subjects (65%) circled a "4" or "5" (10 circled "4" and five circled "5"), indicating they felt they increased their exercise behavior following the group meeting. Five experimental group subjects (22%) circled "3," and three subjects (13%) circled "2." None of the experimental group subjects circled "1." For the control group, five of the 12 subjects (42%) circled "4" or "5" (two subjects circled "4" and three circled "5"), indicating they felt they had increased their exercise behavior since the group meeting. Six subjects (50%) circled "3" and one subject (8%) circled "1." None of the control group subjects circled "2."

Most helpful part(s) of the meeting. Subjects were asked to place a check next to the various components of the meeting they found to be the most helpful (more than one item could be checked). Of the experimental group subjects, 12 (52%) checked "information discussed," 16 (70%) checked "encouragement received," 15 subjects (65%) checked "information received to take home," seven (30%) checked "keeping an activity log," seven (30%) checked "videotapes watched," and eight subjects (35%) checked "personal planning."

For the control group, five people (42%) checked "information discussed," four (33%) checked "encouragement received," seven subjects (58%) checked "information received to take home," and four subjects (33%) checked "keeping an activity log."

Least helpful part(s) of the meeting. For elements of the meeting perceived to be least helpful, two of the experimental group subjects (9%) checked "information discussed," three (13%) checked "encouragement received," two (9%) checked "information received to take home," three (13%) checked "keeping and activity log," eight (35%) checked "videotapes watched," and six (26%) checked "personal planning."

Two of the 12 control group subjects (17%) checked "information discussed," two (17%) checked "encouragement received," three (25%) checked "information received to take home," and one (8%) checked "keeping an activity log."

Motivation to increase exercise immediately following the meeting. Subjects were asked to recall, on a scale of 1-5, how motivated to increase their exercise they were immediately following the group meeting (1="not at all motivated," 3="somewhat motivated," and 5="very motivated"). Of the 23 experimental group subjects, 16 (70%) circled a "4" or "5" (nine circled "4" and seven circled "5"), six subjects (26%) circled "3," one (4%) circled "2," and no subjects circled "1."

Of the 12 control group subjects, four (33%) circled "4" or "5" (two circled "4" and two circled "5"), six (50%) circled "3," one subject (8%) circled "2," and one subject (8%) circled "1."

Motivation to increase or maintain increase in exercise now. Next, subjects were asked how motivated they were to increase or maintain their achieved increase in exercise at the present time (at Follow-up 2). The same scale used for the previous motivation to exercise question was utilized. Fourteen of the 23 experimental group subjects (61%) circled "4" or "5" (eight circled "4" and six circled "5"). Seven subjects (30%) circled "3," two (9%) circled "2," and no subjects circled "1."

Of the control group subjects, five (42%) circled "4" or "5" (three subjects and two subjects, respectively), four (33%) circled "3," and one subject (8%) circled "2." None of the control group subjects circled "1."

Degree of difficulty completing activity logs. Subjects were asked, on a scale of 1-5, how easy or difficult they found completing the activity logs. Fifteen of the experimental group subjects (65%) reported they found log-keeping to be easy or very easy

while eight (35%) subjects found it to be moderately to very difficult (five of the eight circled "3 - a bit difficult"). Five control group subjects (50% of the 10 responding to the item) found log-keeping to be easy or very easy and five (50%) found it to be moderately to very difficult.

Helpfulness of the meeting. Experimental group post-intervention questionnaires included a question asking subjects how helpful they found the three major components of the meeting to be. Likert scale responses from 1-5 (1="not at all helpful," 3="neutral," and 5="very helpful") revealed the following. Twelve of the 22 respondents (55%) indicated that they found the videotapes to be helpful or very helpful (circling "4" or "5"), six (27%) circled "3," and four (18%) circled "2." For the information review, 15 of 22 respondents (68%) circled "4" or "5," six (27%) circled "3," and one (5%) circled "2." Sixteen of the 23 subjects (70%) responding to the helpfulness of the personal planning indicated they that they found this element of the meeting to be helpful or very helpful (circling "4" or "5"), six (26%) were neutral (circling a "3"), and one (4%) circled "2."

Frequency of looking at or thinking about personal plan. Experimental group subjects were also asked to indicate how frequently they thought about or looked at their personal plans following the plan development. A 1-5 Likert scale was utilized where 1="never," 3="occasionally," and 5="every day." Fourteen of the 23 subjects (61%) indicated that they thought about or looked at their plans more than on occasion (circling a "4" or "5"), six (26%) purported occasionally thinking about or looking at it, and three (13%) infrequently or never thought about or looked at their personal plans (circling a "1" or "2").

## Discussion

Results of this study did not support the hypothesis that an intervention combining information, modelling, personal planning, and commitment making is more effective in increasing exercise among older adults than information alone. In addition, outcome expectancy was not found to predict exercise behavior while self-efficacy was found to moderately predict some of the exercise variables at the second follow-up point. Despite the statistically insignificant results found across the majority of analyses performed, closer scrutiny of exercise change found among study participants are encouraging. Most notably, participants in both the control and experimental groups exercised more during the six week time period than they had at baseline. This was supported by several significant paired t-test findings. In general, experimental group subjects increased the frequency and duration of exercise to a greater degree than control group subjects during the first three weeks following the intervention. For example, the mean total number of minutes experimental group subjects engaged in aerobic activity at the three week follow-up was 74% greater than the control group (216 vs. 124 minutes, baseline means equivalent). Also, the mean number of days experimental group subjects engaged in any activity at the three week follow-up was 33% greater than the control group (9.4 vs. 7.5 days, baseline days for experimental group was 5 and for control group was 5.5). This suggests that the intervention received by the experimental group provided more of a "boost" for the experimental group, perhaps resulting in more motivation and intent to increase their exercise immediately following the group meeting. The significant within time point (post-intervention) differences found between the two groups on measures of outcome expectancy and self-efficacy supports this notion. Subjects' responses to the post-intervention question, "How motivated were you to increase your exercise immediately

following the group meeting?" provides additional support for the possibility that the intervention resulted in increased motivation and intent among experimental group subjects. Seventy percent of experimental group subjects responded that they were motivated or very motivated while 33% of the control group subjects responded similarly. This is consistent with the notion that the experimental group intervention was more motivating than the control group intervention.

In addition, the finding that self-efficacy increased significantly pre- to post-group intervention for the experimental group and gradually increased (although not significantly) only following the group intervention for the control group suggests that different mechanisms may have been functioning to enhance self-efficacy and/or increase exercise for participants in the two groups. Perhaps exhortation or persuasion was an important factor for the experimental group (providing the "boost" noted above) while exercise experience was the critical factor for the control group. Although this is conjecture only, the possibility of the interventions resulting in different mechanisms for behavior change is an intriguing notion.

The finding that several of the zero-order correlations between self-efficacy and the various exercise outcome measures were significant is encouraging and consistent with the hypothesis that self-efficacy is predictive of behavior change. However, in the present study, hierarchical regression analyses were unable to support this hypothesis (although a pattern of trends were found). Thus, when participants' previous exercise was controlled for in the analyses, self-efficacy scores were unable to predict future behavior. For outcome expectancy, neither zero-order correlations nor hierarchical regression analyses supported the notion that outcome expectancies predict exercise behavior. These findings differ from other studies which support the relationships between self-efficacy and outcome

expectancy and physical activity (e.g., McAuley & Couneya, 1993; Sallis, Haskell, Fortmann, Vranizan, Taylor, & Soloman, 1986).

Although one possible explanation for the lack of significant findings to support the efficacy-behavior change hypothesis in this study is that self-efficacy and outcome expectancy do not predict exercise behavior change (at least not for older adults), other explanations are possible. For outcome expectancy, baseline scores were high for both groups, suggesting that despite beliefs in the benefits of regular physical activity, many older adults do not exercise regularly. This is consistent with the notion that knowledge may be a necessary but not adequate condition for behavior change (Fisher & Fisher, 1992). It is more difficult to ascertain why, despite significant increases in exercise behavior, self-efficacy scores were not predictive of increased physical activity in this study. One possible explanation is that the self-efficacy questionnaire inadequately assessed exercise self-efficacy beliefs for this population. For example, perhaps the five-item questionnaire was not adequately comprehensive since it does not include additional items particularly pertinent to older adults (e.g., "I believe I can exercise despite aches and pains"). Self-efficacy scales pertinent to and validated with older adults are clearly needed.

An additional explanation for the failure to find a significant relationship between increased self-efficacy and increased physical activity is the possibility of a self-selection bias, discussed in greater detail below, accounting for increased exercise. That is, participants in this study may have been prepared to increase their level of physical activity during the spring months or perhaps due to perceived pressure to change while participating in a study. Such factors may have been more critical than increases in self-efficacy, which may have been high enough for behavior change to occur regardless of an increase in this cognitive domain. In fact, although the lack of a significant relationship

between increases in self-efficacy and increased physical activity seems at odds with the tenets of self-efficacy theory, Bandura's (1986) theoretical postulations may actually explain these findings. This explanation was discussed by McAuley (1991), who found that self-efficacy cognitions predicted the adoption of exercise behavior among middle-aged adults but that previous behavior was the strongest predictor of subsequent exercise participation. He noted that Bandura (1986) would predict that the more difficult the desired behavior, the greater the role of self-efficacy cognitions. Perhaps in the present study, many of the sedentary and lightly exercising older adults needed help to begin their spring time exercise programs, but had a high enough self-efficacy level to begin and quickly moved into the "maintenance" stage once they embarked upon their routines.

Means during the second follow-up suggest that the experimental group exercise activity plateaued, or, on some variables (e.g., total number of minutes engaged in any type of activity) slightly decreased. Control group subjects, on the other hand, tended to continue their moderate increases in exercise, nearing or reaching the level of exercise engaged in by experimental group subjects. Thus, all participants in this study exercised more, suggesting that the control group also received an intervention motivating them to increase their exercise levels. Several factors may account for the increase in exercise found among control group participants. First, control group participants participated in a group meeting in order to control for social and experimenter contact effects. This contact (as well as participants' brief return to the Center for Research in Health Behavior to drop off and receive activity logs) may have been a more powerful intervention element than originally anticipated. In addition, the information packet given to and discussed with control group participants incorporated more than basic information regarding the benefits of exercise. Specifically, information about strategies to begin exercise, overcome barriers,

reward oneself, and various other cognitive and behavioral techniques were included in the packet. As such, one might consider the packet to entail much more than "information" because it provided control participants with the same strategies used to encourage experimental group subjects to exercise more, without the personalized component. The possible effectiveness of the intervention may have been revealed if a greater discrepancy between experimental and control group procedures had been used. Increased exercise found among both groups may have resulted in an inadequate effect size for statistical significance to be found. Finally, self-monitoring may have been an important intervention element. Self-monitoring has been known to result in temporary behavior change in and of itself (Kazdin,1994). Thus, some of the increased exercise found among both groups may, in fact, reflect the effects of tracking and reporting exercise behavior.

#### Study Limitations

Statistical Power/Sample Size. Aggressive recruitment over a three month time period resulted in only 80 participants. Fewer than half of the initial 80 recruited subjects participated in the study, resulting in a small sample size and a particularly small control group (recruitment issues are discussed in greater detail below). This decreased the statistical power of the study. Furthermore, a greater discrepancy between the experimental and control group interventions may have resulted in a larger effect size, thus increasing the likelihood of significant findings.

Self-Monitoring. As noted above, self-monitoring may have been a behavior-change strategy in the present study. In addition, the use of self-monitoring is always subject to reliability problems. In the present study, verification of subject activity was used to increase reliability. Unfortunately, many subjects were unable to have another individual verify their exercise sessions some or all of the time. Furthermore, verification

signatures are subject to the same reliability problems found with participant self-report. Over-reporting exercise sessions and/or minutes may account for some of the increased activity found among one or both of the study groups.

Exercise Options. As previously noted, household activities, gardening, and yardwork involve movement and can often be more strenuous than other more formal exercise. In fact, there has been a recent emphasis on increasing general movement, light exercise, and "lifestyle activity" as a way of enhancing health (e.g., USDHHS, 1993; Duncan, Gordon, & Scott, 1991). Clearly, an ideal study of exercise and older adults would be more inclusive than the present study. However, the aforementioned activities were not included in the present study for several reasons. First, it is difficult to account for the variability between subjects who report time spent engaged in these activities (for example, two hours of yardwork might be two hours spent outside with very little movement for one person, while it may involve continuously raking and carrying bags of leaves for another). Although the exercises included in the present study can also be performed at various intensity levels, they are activities that are likely to be engaged in continuously and in a health-enhancing manner. Second, many of these activities are done seasonally and, while any amount of exercise is better than none, the purpose of the present study was to encourage consistent, year-round, health/functional capacity promoting exercise. Finally, since older adults typically overestimate their activity levels (e.g., Buskirk, 1990), it was considered to be likely that their estimates of gardening, housework, etc. would be exaggerated. Several subjects expressed displeasure with the limitations placed on log entries, repeatedly using the phrase "getting credit" for the activities they perform (e.g., asking why they could not "get credit" or write down on their activity logs when they do housework). Unfortunately, for older people who typically

overestimate their activity levels, self-reports of this type of activity may be misleading. Unless certain they are engaging in these activities in a health-enhancing manner (virtually impossible for the researchers to ascertain), pursuing household activities would not be a feasible goal in a study such as this one. An example in the present study of an erroneous belief about the extent to which a chore constituted "exercise" occurred for a subject who was reportedly exhausted following mowing his lawn outdoors in the hot sun. When probed further, this man had been *sitting* on a motorized lawn mower. He had undoubtedly performed no or little exercise, but had felt exhausted and interpreted his exhaustion as an indication of physical effort. Although an extreme example, other individuals, when probed about their household activities, clearly overestimated their activity levels as well, consistent with the literature on elderly self-evaluation of activity and fitness levels.

Study Duration. A nine week study (including baseline) was conducted due to time constraints as well as to decrease the likelihood of subject drop-out because of difficulty with or dislike of self-monitoring. In addition, a six week follow-up period was deemed adequate to determine exercise adoption and significant change in exercise frequency and duration. However, longer follow-up intervals, as well as a long-term follow-up to determine maintenance effects, would have provided useful information. Exercise maintenance is difficult to achieve and whether subjects who increased their exercise frequency and/or duration maintained these increases is unknown. A longer study duration would have also decreased the likelihood that increased exercise found in the present study was due to seasonal effects. The study was conducted during spring months, a time when many individuals who have been sedentary embark on exercise programs. Individuals who were likely to begin exercising or exercising more during the spring months regardless of

study participation may have agreed to participate, thereby increasing the likelihood of a self-selection factor.

An attempt was made to ascertain maintenance effects via telephone approximately four months following study completion. However, many of the subjects were unable to adequately recall specific exercise habits during the previous seven days. Therefore, information regarding maintenance effects was not obtained. Although this was disappointing, exercise adoption among the elderly should not be undervalued. Clearly, this is a first step for the many older adults who have thought about exercising but require an impetus to begin. Including relapse prevention strategies such as the behavioral ones utilized in this study may encourage them to continue. However, such effects were unable to be determined in this study.

#### Additional Study Issues

Recruitment. Recruitment difficulties encountered in the present study warrant further discussion and have important implications for exercise interventions with older adults. Clearly, a very important subgroup to target for exercise promotion are those older adults who are sedentary and remain primarily in their homes; seniors who do not drive, feel unable to "get around," or simply feel most comfortable remaining in one environment. In fact, it is in part because of these individuals that exercise interventions other than typical structured programs most prevalent in the literature are needed. Unfortunately, this subgroup is also particularly difficult to recruit. The majority of initially recruited participants were contacted through their physician. These seniors were interested in exercising more and expressed a desire to participate in research endorsed by their physician. However, once told of the meeting and follow-up meetings they would be required to attend, many of the potential subjects reneged on their decision to participate.

While conjecture only (based however, on conversations with these individuals), it appeared that "getting out" to attend a group meeting was perceived to be very difficult (despite offers of rides to and from the group meetings and offers to permit subjects to attend a group on a different day if necessary). A potentially useful way to target these individuals might therefore be directly through their physicians. That is, since for many older adults, their sole regular contact person is their physician, a person whom they typically trust and respect, using an abbreviated version of this intervention in the context of an office visit might be a useful way to enhance activity. In fact, physicians are in a better position to follow-up and problem solve with their patients regarding attempts to make lifestyle changes and might therefore enhance maintenance effects. Logistically, physicians could have their senior patients watch videotapes such as the ones used in this study while waiting for their appointments (an inexpensive intervention element since only a television and VCR are required) and invest (or utilize a trained assistant, nurse, etc.) an initial 10-15 minutes developing a personalized exercise plan with the patient. Currently, a multi-city project is underway called Project Pace (Physician-based Assessment and Counseling for Exercise; Patrick, Sallis, Long, Calfas, Wooten, Heath, & Pratt, 1994) testing the efficacy of personalized planning (based on self-reports of stage of change) in the physician's office for increasing activity. Certainly, for the segment of the population most frequently visiting physicians, such physician-based planning seems warranted. Finally, as an increasing number of seniors are residing in retirement communities and nursing homes, aggressive recruitment with the aid of staff at these institutions may be an effective recruitment strategy in future studies.

Stages of Change Scale. The stage of change scale was used for two reasons in the present study. First, it was used as a way to identify those in the contemplation and

preparation stages of exercise behavior change and match the intervention accordingly.

Second, it was used as an outcome measure. However, several difficulties with the use of the measure should be noted.

First, and perhaps most pertinent to the present study, the stages of change scale for exercise is based on the American College of Sports Medicine (1990) guideline of a minimum of 20 minutes of continuous aerobic activity at least three times per week. While this goal is important for cardiovascular fitness, it is only one aspect of fitness. Strength and flexibility are two additional elements of fitness and are important for maintaining the functional capacity lost by so many adults as they age. A deconditioned older adult might increase exercise from two ten minute walks per week to four fifteen minute walks plus daily stretching and three days per week of strength training. According to the stage of change scale criterion, however, this individual would remain in the preparation stage! Clearly, such an individual has made significant changes and is likely to reap several fitness benefits. The stage of change scale, as it has been used for exercise, should thus be noted as only one of several indices of actual behavior change. In the present study, many individuals increased their exercise but did not move into the action stage because of this frequency, duration, and type of activity criteria.

Another problem with the stages of change scale for exercise activity is its validity as a self-report measure (identifying individuals' current stage). Although concurrent validity for the measure was demonstrated by its significant association with the Seven Day Recall Physical Activity Questionnaire (Marcus & Simkin, 1993), it was questionable whether many of the seniors in the present study accurately identified their current stage. First, upon recruitment, many of the seniors initially identified themselves as one stage further along the scale than their described exercise habits would indicate. For example,

several people described themselves as "regular" exercisers (believing that they were in the action stage) because of something done daily (e.g., stretching every morning, walking 15 minutes a few times per week). In addition, several people underestimated their stage (indicating that they did less exercise than their baseline logs indicated). Whether this was a true underestimation or an immediate response to log-keeping is unclear. The significant number of reported vs. actual stage of change discrepancies occurred despite the clear definition of "regular" exercise written on the SOC form and reiterated to study participants. Eight individuals were dropped from analyses because of baseline activity indicating that they were in the action stage. Thus, at least for this population, it can not be assumed that self-identification of stage of change for exercise is an accurate reflection of true stage without additional verification/corroboration.

Gradual vs. Extreme Change. An important issue which warrants discussion pertains to the amount of exercise (in terms of frequency, duration, and intensity) that should be encouraged among sedentary older adults. This is an issue important to consider when planning any behavior change, not only exercise. Specifically, what are the relative advantages and disadvantages of interventions which encourage dramatic initial change vs. those encouraging small, gradual change over time? Are there individuals for whom one of these two approaches is more appropriate than the other and how do we determine this? In the present study, behavior shaping (gradual change) was utilized because of the hypothesized effect that this would have on participant's self-efficacy. However, such gradual change in exercise behavior prolongs the time necessary to reap noticeable physical benefits (i.e., weight loss rate is slower, cardiovascular benefits are not as pronounced and may be minimal with moderate levels of exercise). This could discourage some individuals and result in exercise drop-out. On the other hand, more frequent, intense, and longer

duration exercise may result in noticeable physical change in a shorter period of time but may be difficult for many to tolerate and/or incorporate into their lifestyles. The implications of this dilemma are important in the area of exercise among older adults, particularly since considerations such as medical contraindications and older adults' beliefs about physical risks must be taken into account.

#### Future Research Directions

Although results of the present study do not support the study hypotheses, future research which rectifies the noted methodological limitations is warranted (e.g., larger sample size, longer study duration). In addition, a future study testing the strategies used in this one should increase the discrepancy between experimental and control group treatments to maximize treatment effects. A no treatment control group, rather than a minimal treatment control group, would increase the likelihood that an existing effect would be identified.

The treatment used in the present study combined several behavior change strategies. Thus, the relative effectiveness of each of the treatment elements could not be determined even if the overall treatment "package" had been effective. Thus, if future research suggests that the treatment package increases older adults' exercise levels, an important future direction would be to determine which elements were important and the extent of their importance. For example, if activity log-keeping results in exercise increases, does personal planning enhance the effect, resulting in even more exercise activity? Does personal planning result in exercise maintenance compared to activity log-keeping only? Also, does commitment making add to the effect? If a "package" approach proves to be effective, studies which evaluate the effectiveness of individual elements of the package would be warranted.

An additional future research direction pertains to the notion of goal setting among older adults. Although many of the seniors in the study experimental group identified weight loss, strength, etc. as reasons for desiring to exercise more, an emphasis on more functional goals might further enhance motivation. For example, increased strength might allow a physically weak elderly man to lift his grandchild onto his lap. Encouraging such salient "quality of life" goals which are particularly meaningful to an older individual might enhance the efficacy of an intervention involving exercise goals. While the present study described and showed quality of life benefits via the videotapes and in the information packets, the personal planning section did not emphasize these types of goals. Doing so may have resulted in additional motivation for study participants to adhere to their personal exercise plans.

The feasibility of implementing a strategy such as the one used in this study must be considered. Certainly, older adults who remain primarily at home are difficult to contact and recruit for interventions such as the present one. This was a significant impediment in the present study. Thus, a critical consideration is the use of a strategy which can be easily disseminated with this population. As noted earlier, physicians are typically the individuals (perhaps aside from family members) who intreract most with those older adults remaining primarily at their homes. However, physicians' time is often limited during a patient visit. A future study might test the effectiveness of an intervention such as the one used in this study, maximizing cost and time effectiveness within the context of the office visit. As previously noted, older patients could receive information (written and via videotape) while at the physician's office. An abbreviated version of the personal plan worksheet could be discussed with a trained assistant or initially, with the physician. Advantages of this approach include the likely perceived legitimacy physicians add to the planning and the

natural follow-up contact that occurs when the patient returns for his or her next appointment. Since telephone prompting has been shown to increase exercise adherence (Lombard, Lombard, & Winett, 1995), occasional and brief telephone contact by the physician or an assistant between physician visits might also be useful by providing more frequent contact.

Finally, research which elucidates the relative advantages and disadvantages of gradual vs. more dramatic behavior change, as discussed previously, would be a significant advance in this area of health promotion. Treatment matching can be attempted in numerous ways (e.g., via stage of behavior change, through the use of personal planning) and gradual/intensive programming may be an additional fruitful method of treatment matching.

In summary, while results of the present investigation did not support the stated hypotheses, they were nonetheless quite promising. Overall, seniors involved in this study exercised more. Furthermore, several issues pertinent to the study of exercise among older adults were revealed. Interventions aimed at increasing exercise among older adults are needed and future research may indicate that a modified version of the Exercise and Older Adults program is effective in helping older adults exercise more.

## References

- Alter, Michael (1990). Sport Stretch. Leisure Press.
- American College of Sports Medicine (1990). Position statement on the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. Medicine and Science in Sports and Exercise, 22, 265-274.
- Badenhop, D. T., Cleary, P. A., Schaal, S. F., Fox, E. L., & Bartels, R. (1983). Physiological adjustment to higher- or lower-intensity exercise in elders. Medicine and Science in Sports and Exercise, 15 (6), 496-502.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.
- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, New Jersey: Prentice-Hall.
- Bandura, A. (1991). Self-efficacy mechanism in physiological activation and health-promoting behavior. In J. Madden IV (Ed.), Neurobiology of learning, emotion and affect (pp. 229-269). New York: Raven Press.
- Barke, C. R. & Nicholas, D. R. (1990). Physical activity in older adults: The stages of change. The Journal of Applied Gerontology, 9 (2), 216-223.
- Blair, S. N. (1988). Exercise within a healthy lifestyle. In R. K. Dishman (Ed.), Exercise adherence: Its impact on public health (pp. 75-89). Champaign, IL: Human Kinetics Publishers.
- Blair, S. N., Kohl, H. W., Gordon, N. F., & Paffenbarger, R. S. (1992). How much physical activity is good for health? Annual Review of Public Health, 13, 99-126.

- Blair, S. N., Kohl, H. W., Paffenbarger, R. S., Clark, D. G., Cooper, K. H., & Gibbons, L. W. (1989). Physical fitness and all-cause mortality: A prospective study of healthy men and women. Journal of the American Medical Association, 262 (17), 2395-2401.
- Bortz, W. M. (1984). The disuse syndrome. Western Journal of Medicine, 141, 691-694.
- Bouchard, C., Shepard, R. J., Stephens, T., Sutton, J. R., & McPherson, B. D. (1990). Exercise, fitness, and health: The consensus statement. In C. Bouchard, R. J. Shepard, T. Stephens, J. R. Sutton, & B. D. McPherson (Eds.), Exercise, fitness, and health: A consensus of current knowledge (3-28). Champaign, IL: Human Kinetics Publishers.
- Brickman, P. (1987). Commitment. In C. B. Wortman & R. Sorrentino (Eds.), Commitment, Conflict, and Caring (1-18). Englewood Cliffs, N.J.: Prentice-Hall.
- Buskirk, E. R. (1990). Exercise, fitness, and aging. In C. Bouchard, R. J. Shepard, T. Stephens, J. R. Sutton, & B. D. McPherson (Eds.), Exercise, fitness, and health: A consensus of current knowledge (687-698). Champaign, IL: Human Kinetics Publishers.
- Canada Fitness Survey. (1983). Fitness and lifestyle in Canada. Ottawa, Ontario: Fitness and Amateur Sport, Government of Canada.
- Cialdini, R. B. (1993). Influence: Science and practice. New York: Harper Collins College Publishers.
- Desharnais, R., Bouillon, J., & Godin, G. (1986). Self-efficacy and outcome expectations as determinants of exercise adherence. Psychological Reports, 59, 1155-1159.

- Dishman, R. K., Sallis, J. F., & Orrenstein, D. R. (1985). The determinants of physical activity and exercise. Public Health Reports, 100, 158-171.
- Drinkwater, B. (1988). Exercise and aging: The female masters athlete. In J. L. Puhl & R. O. Voy (Eds.), Sport science perspectives for women (161-169). Champaign, IL: Human Kinetics Publishers.
- Duncan, J. J., Gordon, N. F., & Scott, C. B. (1991). Women walking for health and fitness: How much is enough? Journal of the American Medical Association, 266 (6), 3295-3299.
- Eggers, J. L. (1988). Well-elderly women's entrance and adherence to structured physical fitness programs. Activities, Adaptation & Aging, 11 (1), 21-30.
- Evans, W. & Rosenberg, I. H. (1991). Biomarkers: The 10 determinants of aging you can control. New York: Simon & Schuster.
- Fiatarone, M. A., Marks, E. C., Ryan, N. D., Meredith, C. N., Lipsitz, L. A., & Evans, W. J. (1990). High intensity strength training in nonagenarians: Effects on skeletal muscle. Journal of the American Medical Association, 263 (22), 3029-3034.
- Fisher, J. D. & Fisher, W. A. (1992). Changing AIDS-risk behavior. Psychological Bulletin, 111, 455-474.
- Glidewell, J. C. (1989). Some issues in the study of commitment. Paper presented at the 12th Annual Conference of the Society of Southeastern Social Psychologists, Louisville, Kentucky.
- Fitness Ontario. (1983). Physical Activity Patterns in Ontario-II. Toronto: Ministry of Tourism and Recreation, Government of Ontario.

- Haynes, S.N. (1978). Principles of behavioral assessment. New York, New York: Gardner Press.
- Jeffrey, R. W. (1989). Risk behavior and health: Contrasting individual and population perspectives. American Psychologist, 44, 1194-1202.
- Katz, S. (1983). Assessing self-maintenance: Activities of daily living, mobility, and instrumental activities of daily living. Journal of the American Geriatrics Society, 31, 721-727.
- Kazdin, A. E. (1994). Behavior Modification in Applied Settings. Pacific Grove, CA: Brooks Cole.
- King, A. C. (1991). Physical activity and health enhancement in older adults: Current status and future prospects. Annals of Behavioral Medicine, 13, 87-90.
- King, A. C., Taylor, C. B., Haskell, W. L., & DeBusk, R. F. (1990). Identifying strategies for increasing employee physical activity levels: Findings from the Stanford/Lockheed exercise survey. Health Education Quarterly, 17 (3), 269-285.
- Lombard, D.N., Lombard, T.N., & Winett, R.A. (1995). Walking to meet health guidelines: The effect of prompting frequency and prompt structure. Health Psychology , 14 (2), 164-170.
- Marcus, B. H. & Simkin, L. R. (1993). The stages of exercise behavior. Journal of Sports Medicine and Physical Fitness, 33, 83-88.
- Marcus, B. H., Banspach, S. W., Lefebvre, R. C., Rossi, J. S., Carleton, R. A., & Abrams, D. B. (1992). Using the stages of change model to increase the adoption of physical activity among community participants. American Journal of Health Promotion, 6, 424-429.

- Marcus, B. H., Rakowski, W., & Rossi, J. S. (1992). Assessing motivational readiness and decision making for exercise. Health Psychology, 11, 257-261.
- Marcus, B. H., Selby, V. C, Niauri, R. S., & Rossi, J. S. (1992). Self-efficacy and the stages of exercise behavior change. Research Quarterly for Exercise and Sport, 63, 60-66.
- Marlatt, G. A. (1988). Matching clients to treatment: Treatment models and stages of change. In D. M. Donovan & G. A. Marlatt (Eds.), Assessment of Addictive Behaviors (pp. 474-483). New York: Guilford Press.
- McAuley, E. (1992). The role of efficacy cognitions in the prediction of exercise behavior in middle-aged adults. Journal of Behavioral Medicine, 15 (1), 65-88.
- McAuley, E. & Couneya, K.S. (1993). Adherence to exercise and physical activity as health-promoting behaviors: Attitudinal and self-efficacy influences. Applied and Preventive Psychology, 2, 65-77.
- McConaughy, E. A., Prochaska, J. O., & Velicer, W. F. (1983). Stages of change in psychotherapy: Measurement and sample profiles. Psychotherapy: Theory, Research and Practice, 20, 368-375.
- Mobily, K. E. (1982). Motivational aspects of exercise for the elderly: Barriers and solutions. Physical and Occupational Therapy in Geriatrics, 1 (4), 43-54.
- Myers, A. M. & Gonda, G. (1986). Research on physical activity in the elderly: Practical implications for program planning. Canadian Journal on Aging, 5 (3), 175-187.
- O'Brien, S. J. & Vertinsky, P. A. (1991). Unfit survivors: Exercise as a resource for aging women. The Gerontologist, 31 (3), 347-357.

- 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 (10), 605-613.
- Patrick, K., Sallis, J.F., Long, B., Calfas, K.J., Wooten, W., Heath, G., & Pratt, M. (1994). A new tool for encouraging activity: Project PACE. The Physician and Sportsmedicine, 22 (11), 45-55.
- Perri, S. & Templer, D. I. (1985). The effects of an aerobic exercise program on psychological variables in older adults. International Journal of Aging and Human Development, 20, 167-172.
- Perrin, B. (1981). Physical activity patterns in Ontario. Toronto: Ontario Ministry of Culture and Recreation.
- Powell, K. E., Thompson, P. D., Casperson, C. J., & Kendrick, J. S. (1987). Physical activity and the incidence of coronary heart disease. Annual Review of Public Health, 8, 253-287.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. American Psychologist, 47, 1102-1114.
- Prochaska, J. O. & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. Journal of Consulting and Clinical Psychology, 51, 390-395.
- Sager, K. (1983). Senior fitness: For the health of it. The Physician and Sports Medicine, 11(10), 31-36.
- Sallis, J. F., Haskell, W. L., Fortmann, S. P., Vranizan, K. M., Taylor, C. B., & Solomon, D. S. (1986). Predictors of adoption and maintenance of physical activity in a community sample. Preventive Medicine, 15, 331-341.

- Shepard, R. J. (1990). The scientific basis of exercise prescribing for the very old. Journal of the American Geriatrics Society, 38, 62-70.
- Shepard, R. J. (1978). Physical Activity and Aging. Chicago: Yearbook Medical Publishers.
- Smith, E.L., Smith, K.A., & Gilligan, C. (1990). In C. Bouchard, R. J. Shepard, T. Stephens, J. R. Sutton, & B. D. McPherson (Eds.), Exercise, fitness, and health: A consensus of current knowledge (517-528). Champaign, IL: Human Kinetics Publishers.
- Sonstroem, R.J. & Morgan, W.P. (1989). Exercise and self-esteem: Rationale and model. Medical Science of Sports and Exercise, 21, 329-337.
- Thornberry, O.T., Wilson, R.W., & Golden, P.M. (1986). The 1985 health promotion and disease prevention survey. Public Health Reports, 101, 566-610.
- U.S. Department of Health and Human Services (1993).
- U.S. Department of Health and Human Services (1991). Healthy People 2000: National health promotion and disease prevention objectives.
- Vertinsky, P. & Auman, J. T. (1988). Elderly women's barriers to exercise part I: Perceived risks. Health Values, 12 (4), 13-19.
- 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 Publishers.
- Ward, A., Taylor, P., & Rippe, J. M. (1991). How to tailor and exercise program. The Physician and Sports Medicine, 19 (9), 64-76.

- Winett, R. A., Anderson, E. S., Moore, J. F., Sikkema, K. J., Hook, R. J., Webster, D. A., Taylor, C. D., Dalton, J. E., Ollendick, T. H., & Eisler, R. M. (1992). Family/media approach to HIV prevention: Results with a home-based, parent-teen video program. Health Psychology, 11, 203-206.
- Winett, R. A., King, A. C., & Altman, D. G. (1989). Health psychology and public health: An integrative approach. New York: Pergamon Press.

**Table 1. Definitions of Stages of Behavior Change**

Stage	Definition & Intervention Strateg(ies)
Precontemplation	<p><b>Definition:</b> Individuals are not considering change in target behavior and have no plans to change within the next 6 months: some reasons include being uninformed about the consequences of their behavior, demoralized about their ability to change, and the individual may simply not want to think about change.</p>
	<p><b>Intervention:</b> Information</p>
Contemplation	<p><b>Definition:</b> Individuals are considering change in target behavior and seriously considering change within the next 6 months: Ambivalent about costs and benefits:</p>
	<p><b>Intervention:</b> Open to feedback. Provide more information about problem and how to change. Provide cost and benefit information (stress advantages versus disadvantages)</p>
Preparation	<p><b>Definition:</b> Individuals ready to take action and are seriously planning to change within the next month, such as reducing the frequency of the problem behavior, or trying on a new behavior to see how it fits.</p>
	<p><b>Intervention:</b> Educating small step by step changes and encouraging trying out new behavior: skill building.</p>
Action	<p><b>Definition:</b> individuals actively, overtly modifying their habits or environment (i.e., have condoms available, and are actually using condoms) and lasts up to six months.</p>
	<p><b>Intervention:</b> Manipulating the environment so that there are opportunities to engage in new behavior (example: having condoms available)</p>
Maintenance	<p><b>Definition:</b> Individuals continuing to maintain the target behavior after six months of continuous successful behavior (i.e., always using condoms).</p>
	<p><b>Intervention:</b> Group support, continued education aimed at countering disadvantages of behavior change</p>

**Table 2. Summary Statistics for Demographic Information by Group.**

	Experimental Group (n=23)	Control Group (n=12)	Comparison Test	<i>p</i>
Age				
Mean	64.2	67.6	$t=1.30$	.201
SD	7.4	7.1		
Female	61 %	75 %	$\chi^2=0.70$	.403
Married	87 %	58 %	$\chi^2=3.66$	.060
Minimum of High School Education	87 %	92 %	$\chi^2=1.76$	.623

**Table 3. Means and Standard Deviations for Dependent Measures.**

	<u>Baseline</u>		<u>Follow-up 1</u>		<u>Follow-up 2</u>	
	Experimental	Control	Experimental	Control	Experimental	Control
<b>AerDays</b>						
Mean	3.9	3.1	8.3	6.5	7.3	7.5
SD	5.4	3.5	5.0	6.0	6.2	6.6
<b>AerDays <math>\geq</math> 20</b>						
Mean	1.6	0.9	4.7	2.8	4.2	3.8
SD	2.6	1.2	4.2	4.6	4.1	5.5
<b>AerTime</b>						
Mean	79.2	79.8	215.8	124.0	188.9	174.8
SD	96.5	114.5	151.9	135.6	159.7	188.0
<b>AerTime <math>\geq</math> 20</b>						
Mean	48.0	57.9	159.7	93.3	139.7	138.3
SD	78.6	114.5	157.0	143.7	158.8	197.6
<b>AnyDays</b>						
Mean	5.0	5.5	9.4	7.5	8.1	8.6
SD	6.1	7.6	5.2	7.1	5.8	8.1
<b>AnyMins</b>						
Mean	99.7	160.5	247.1	199.3	214.2	228.9
SD	116.4	249.4	157.7	271.7	157.4	267.6
<b>Outcome Expectancy</b>						
Mean	4.0	3.9	4.2	4.1	4.2	4.0
SD	0.6	0.6	0.6	0.5	0.7	0.6
<b>Self-Efficacy</b>						
Mean	3.7	3.7	4.2	4.1	4.0	4.2
SD	1.1	1.0	1.2	1.6	1.3	1.4

Experimental Group n=23; Control Group n=12

**AerDays** = Days aerobic activity (regardless of time per session); **AerDays $\geq$ 20** = Days aerobic activity (including only sessions of 20 or more minutes); **AerTime** = Total number of minutes aerobic activity; **AerTime $\geq$ 20** = Minutes of aerobic activity (including only sessions of 20 or more minutes); **AnyDays** = Days any type of activity; **AnyMins** = Total number of minutes for any type of activity

**Table 4. Paired t-tests.**

Variable	Experimental Group (n=23 <sup>a</sup> )			Control Group (n=12)		
	Mean Δ	Standard Deviation	t	Mean Δ	Standard Deviation	t
AerDays 1-B <sup>§</sup>	3.13	4.68	3.21**	1.92	4.70	1.41
AerDays 2-B	2.65	5.00	2.55*	2.83	5.25	1.87 <sup>†</sup>
AerDays <sub>≥20</sub> 1-B	4.39	5.06	4.16***	3.42	4.44	2.67*
AerDays <sub>≥20</sub> 2-B	3.39	6.78	2.40*	4.42	4.94	3.09**
AerTime 1-B	136.61	139.84	4.69***	44.17	122.98	1.24
AerTime 2-B	109.65	175.32	3.00**	94.92	148.36	2.22*
AerTime <sub>≥20</sub> 1-B	111.70	154.71	3.46**	35.33	125.09	0.98
AerTime <sub>≥20</sub> 2-B	91.74	172.60	2.55*	80.42	155.26	1.79 <sup>†</sup>
AnyDays 1-B	4.48	6.11	3.51**	2.00	2.41	2.87**
AnyDays 2-B	3.13	5.73	2.62**	3.08	4.80	2.23*
AnyMins 1-B	147.43	125.87	5.62***	38.83	88.87	1.51
AnyMins 2-B	114.52	162.82	3.37**	68.42	140.11	1.69
OE 1-PRE	0.17	0.40	1.94 <sup>†</sup>	0.16	0.52	1.09
OE 2-PRE	0.12	0.49	1.09	0.10	0.56	0.64
OE POST-PRE	0.30	0.22	6.46***	0.04	0.25	0.58
SE 1-PRE	0.51	1.04	2.26*	0.36	1.98	0.63
SE 2-PRE	0.27	1.16	1.04	0.53	1.51	1.20
SE POST-PRE	0.86	1.12	3.51**	0.02	0.97	0.06

<sup>a</sup> SE at Follow-up 2 n=21

<sup>§</sup> Suffixes as follows: B=Baseline; 1=Follow-up 1; 2=Follow-up 2; PRE=Pretreatment; POST=Post-treatment, e.g. "1-B" refers to Follow-up 1 minus Baseline.

<sup>†</sup>p<.10, \*p<.05, \*\*p<.01, \*\*\*p<.001

**Table 5. Repeated Measures ANCOVA for Days Aerobic Activity (AerDays).**

---

	<i>df</i>	F	<i>p</i>
<b>Within Subjects</b>			
Time	1,31	0.04	.843
Time x Group	1,31	2.17	.151
Time x Baseline	1,31	0.27	.605
Time x Age	1,31	0.02	.879
<b>Between Subjects</b>			
Group	1,31	0.09	.761
Baseline	1,31	7.44	.010
Age	1,31	0.22	.642

---

	<u>Follow-up 1</u>	<u>Follow-up 2</u>
<b>LS Means</b>		
Experimental Group	8.22	7.23
Control Group	6.66	7.65

---

**Table 6. Repeated Measures ANCOVA for Days Aerobic Activity for 20 Minutes or More at a Time (AerDays  $\geq$  20).**

	<i>df</i>	F	<i>p</i>
<b>Within Subjects</b>			
Time	1,31	0.69	.412
Time x Group	1,31	0.53	.472
Time x Baseline	1,31	0.08	.781
Time x Age	1,31	0.82	.372
<b>Between Subjects</b>			
Group	1,31	0.19	.668
Baseline	1,31	0.10	.748
Age	1,31	3.15	.086
<hr/>			
	<b>Follow-up 1</b>	<b>Follow-up 2</b>	
<b>LS Means</b>			
Experimental Group	4.45	4.10	
Control Group	3.30	3.98	

**Table 7. Repeated Measures ANCOVA for Total Number of Minutes Aerobic Activity (AerTime).**

	<i>df</i>	F	<i>p</i>
<b>Within Subjects</b>			
Time	1,32	0.65	.427
Time x Group	1,32	3.41	.074
Time x Baseline	1,32	0.34	.562
<b>Between Subjects</b>			
Group	1,32	1.22	.278
Baseline	1,32	6.91	.013

	Follow-up 1 <sup>†</sup>	Follow-up 2
<b>LS Means</b>		
Experimental Group	215.97	188.98
Control Group	123.73	174.53

<sup>†</sup> within time-point difference  $p < .10$

**Table 8. Repeated Measures ANCOVA for Total Number of Minutes Aerobic Activity for 20 Minutes or More at a Time (AerTime  $\geq$  20).**

	<i>df</i>	F	<i>p</i>
<b>Within Subjects</b>			
Time	1,31	0.18	.676
Time x Group	1,31	1.14	.294
Time x Baseline	1,31	0.02	.896
Time x Age	1,31	0.23	.638
<b>Between Subjects</b>			
Group	1,31	0.29	.591
Baseline	1,31	3.49	.071
Age	1,31	0.98	.330
<hr/>			
	<b>Follow-up 1</b>	<b>Follow-up 2</b>	
<b>LS Means</b>			
Experimental Group	156.32	138.60	
Control Group	99.72	140.51	

**Table 9. Repeated Measures ANCOVA for Days Any Type of Activity (AnyDays).**

	<i>df</i>	F	<i>p</i>
<b>Within Subjects</b>			
Time	1,31	0.18	.674
Time x Group	1,31	3.19	.084
Time x Baseline	1,31	0.73	.400
Time x Age	1,31	0.26	.613
<b>Between Subjects</b>			
Group	1,31	0.47	.497
Baseline	1,31	25.43	.001
Age	1,31	0.02	.884
<hr/>			
	<b>Follow-up 1</b>	<b>Follow-up 2</b>	
<b>LS Means</b>			
Experimental Group	9.59	8.20	
Control Group	7.20	8.36	

**Table 10. Repeated Measures ANCOVA for Total Number of Minutes for Any Type of Activity (AnyMins).**

	<i>df</i>	F	<i>p</i>
<b>Within Subjects</b>			
Time	1,32	0.85	.364
Time x Group	1,32	3.02	.092
Time x Baseline	1,32	2.74	.107
<b>Between Subjects</b>			
Group	1,32	2.47	.126
Baseline	1,32	49.84	.001
<hr/>			
	<b>Follow-up 1*</b>	<b>Follow-up 2</b>	
<b>LS Means</b>			
Experimental Group	267.33	230.27	
Control Group	160.54	198.07	

\* within time-point difference  $p < .05$

**Table 11. Repeated Measures ANCOVA for Outcome Expectancy (OE).**

	<i>df</i>	F	<i>p</i>
Within Subjects			
Time	2,29	0.95	.400
Time x Group	2,29	1.27	.300
Time x Baseline	2,29	0.91	.414
Between Subjects			
Group	1,30	0.97	.332
Baseline	1,30	64.30	.001

---

	Post**	Follow-up 1	Follow-up 2
LS Means			
Experimental Group	4.28	4.15	4.09
Control Group	4.00	4.11	4.06

\*\* within time-point difference  $p < .001$

**Table 12. Repeated Measures ANCOVA for Self-Efficacy (SE).**

	<i>df</i>	<i>F</i>	<i>p</i>
Within Subjects			
Time	2,28	0.43	.652
Time x Group	2,28	2.71	.084
Time x Baseline	2,28	0.37	.694
Between Subjects			
Group	1,29	0.48	.493
Baseline	1,29	11.18	.002

	<u>Post*</u>	<u>Follow-up 1</u>	<u>Follow-up 2</u>
LS Means			
Experimental Group	4.53	4.24	3.94
Control Group	3.71	4.07	4.22

\* within time-point difference  $p < .05$

**Table 13. Reported vs. Actual Stage of Change at Baseline.**

*Experimental Group*

Reported Stage of Change	Actual Stage of Change	
	Contemplation	Preparation
Contemplation	7	2
Preparation	3	11

*Control Group*

Reported Stage of Change	Actual Stage of Change	
	Contemplation	Preparation
Contemplation	2	5
Preparation	3	2

**Table 14. Frequencies for Stage of Change Movement Across Time for Experimental Group (n=23).**

	Baseline to Follow-up 1	Follow-up 1 to Follow-up 2	Baseline to Follow-up 2
Contemplation to Preparation	10	0	6
Preparation to Action	4	3	2
Contemplation to Action	0	0	3
Remained the Same	9	17	12
Action to Preparation	N/A	2	N/A
Preparation to Contemplation	0	1	0
Action to Contemplation	N/A	0	N/A

**Table 15. Frequencies for Stage of Change Movement Across Time for Control Group (n=12).**

	Baseline to Follow-up 1	Follow-up 1 to Follow-up 2	Baseline to Follow-up 2
Contemplation to Preparation	3	2	4
Preparation to Action	1	2	3
Contemplation to Action	0	0	0
Remained the Same	8	5	3
Action to Preparation	N/A	0	N/A
Preparation to Contemplation	0	3	2
Action to Contemplation	N/A	0	N/A

**Table 16. Correlations for Outcome Expectancy and Self-Efficacy with dependent measures for the Experimental Group across all time points (n=21).**

	Outcome Expectancy				Self-Efficacy			
	Pre	Post	F-1	F-2	Pre	Post	F-1	F-2
<b>AerDays</b>								
Baseline	0.28	0.26	-0.14	-0.17	0.17	0.19	0.33	0.20
Follow-up 1	-0.05	-0.03	-0.13	-0.04	0.09	0.16	0.14	0.05
Follow-up 2	-0.05	-0.09	-0.06	0.03	0.27	0.05	0.12	0.23
<b>AerDays<math>\geq</math>20</b>								
Baseline	0.02	0.08	-0.18	-0.02	0.38 <sup>†</sup>	0.25	0.23	0.13
Follow-up 1	0.06	0.02	-0.07	0.13	0.30	0.14	0.16	0.08
Follow-up 2	-0.14	-0.12	-0.20	0.06	0.37	0.06	0.09	0.16
<b>AerTime</b>								
Baseline	0.09	0.12	-0.28	-0.17	0.27	0.25	0.30	0.13
Follow-up 1	0.06	-0.02	-0.04	0.01	0.48*	0.26	0.38 <sup>†</sup>	0.21
Follow-up 2	-0.06	-0.11	-0.04	0.04	0.53*	0.20	0.28	0.24
<b>AerTime<math>\geq</math>20</b>								
Baseline	0.29	0.26	-0.11	-0.21	0.21	0.20	0.40 <sup>†</sup>	0.23
Follow-up 1	0.06	0.00	-0.02	-0.04	0.31	0.22	0.34	0.20
Follow-up 2	0.02	-0.06	0.07	0.03	0.45*	0.19	0.29	0.26
<b>AnyDays</b>								
Baseline	0.03	0.09	-0.16	-0.01	0.38	0.12	0.23	0.18
Follow-up 1	0.20	0.21	0.07	0.35	0.23	-0.03	0.10	0.12
Follow-up 2	-0.17	-0.12	-0.21	0.11	0.33	-0.02	0.04	0.17
<b>AnyMins</b>								
Baseline	0.08	0.12	-0.19	-0.10	0.40 <sup>†</sup>	0.24	0.33	0.19
Follow-up 1	0.14	0.10	0.07	0.17	0.54*	0.24	0.36	0.24
Follow-up 2	-0.04	-0.05	0.00	0.12	0.61**	0.24	0.28	0.25

<sup>†</sup> $p < .10$ , \* $p < .05$ , \*\* $p < .01$

**AerDays** = Days aerobic activity (regardless of time per session); **AerDays $\geq$ 20** = Days aerobic activity (including only sessions of 20 or more minutes); **AerTime** = Total number of minutes aerobic activity; **AerTime $\geq$ 20** = Minutes of aerobic activity (including only sessions of 20 or more minutes); **AnyDays** = Days any type of activity; **AnyMins** = Total number of minutes for any type of activity

**Table 17. Correlations for Outcome Expectancy and Self-Efficacy with dependent measures for the Control Group across all time points (n=12).**

	Outcome Expectancy				Self-Efficacy			
	Pre	Post	F-1	F-2	Pre	Post	F-1	F-2
<b>AerDays</b>								
Baseline	0.11	0.26	-0.06	-0.10	0.58*	0.84***	0.06	0.25
Follow-up 1	0.29	0.11	0.31	0.22	-0.26	0.34	0.40	0.13
Follow-up 2	0.59*	0.47	0.59*	0.48	-0.00	0.54†	0.66*	0.46
<b>AerDays≥20</b>								
Baseline	-0.14	-0.12	0.12	-0.02	0.56†	0.31	0.15	0.33
Follow-up 1	-0.14	-0.24	0.30	0.22	0.03	0.29	0.46	0.44
Follow-up 2	-0.02	-0.06	0.47	0.32	0.25	0.47	0.46	0.35
<b>AerTime</b>								
Baseline	-0.05	0.05	-0.12	-0.26	0.49	0.65*	-0.04	0.09
Follow-up 1	0.08	-0.02	0.14	0.03	-0.08	0.53†	0.28	0.09
Follow-up 2	0.33	0.35	0.43	0.33	0.27	0.79**	0.50†	0.35
<b>AerTime≥20</b>								
Baseline	-0.00	0.11	-0.17	-0.26	0.35	0.63*	-0.09	0.01
Follow-up 1	0.13	0.03	0.09	-0.00	-0.15	0.47	0.20	-0.02
Follow-up 2	0.49	0.49	0.44	0.35	0.21	0.74**	0.53†	0.40
<b>AnyDays</b>								
Baseline	-0.05	-0.15	0.35	0.22	0.13	0.15	0.36	0.42
Follow-up 1	-0.10	-0.20	0.31	0.20	0.14	0.28	0.45	0.44
Follow-up 2	0.02	-0.05	0.46	0.29	0.25	0.40	0.45	0.36
<b>AnyMins</b>								
Baseline	0.24	0.11	0.38	0.19	-0.02	0.32	0.38	0.30
Follow-up 1	0.19	0.02	0.36	0.22	-0.23	0.25	0.45	0.25
Follow-up 2	0.39	0.30	0.57*	0.42	0.05	0.57†	0.60*	0.41

† $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**AerDays** = Days aerobic activity (regardless of time per session); **AerDays≥20** = Days aerobic activity (including only sessions of 20 or more minutes); **AerTime** = Total number of minutes aerobic activity; **AerTime≥20** = Minutes of aerobic activity (including only sessions of 20 or more minutes); **AnyDays** = Days any type of activity; **AnyMins** = Total number of minutes for any type of activity

**Table 18. Hierarchical Regression Analyses for Days Aerobic Activity (AerDays).**

	Total R <sup>2</sup>	ΔR <sup>2</sup>	df for ΔR <sup>2</sup>	F for ΔR <sup>2</sup>
<b><i>Follow-up 1</i></b>				
Baseline	.304 <sup>***</sup>		1,33	14.390
Baseline, Group	.317 <sup>**</sup>	.014	1,32	0.644
Baseline, Group, OEpost	.349 <sup>**</sup>	.032	1,31	1.516
Baseline, Group, SEpost	.327 <sup>**</sup>	.010	1,31	0.463
<b><i>Follow-up 2</i></b>				
Baseline	.158 <sup>*</sup>		1,33	6.180
Baseline, Group	.160	.002	1,32	0.090
Baseline, Group, OEpost	.225 <sup>*</sup>	.065	1,31	2.580
Baseline, Group, SEpost	.181	.021	1,31	0.804

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**Table 19. Hierarchical Regression Analyses for Days Aerobic Activity for 20 Minutes or More at a Time (AerDays  $\geq$  20).**

	Total R <sup>2</sup>	$\Delta R^2$	df for $\Delta R^2$	F for $\Delta R^2$
<i>Follow-up 1</i>				
Baseline	.015		1,33	0.510
Baseline, Age	.154	.139*	1,32	5.251
Baseline, Age, Group	.169 <sup>†</sup>	.015	1,31	0.558
Baseline, Age, Group, OEpst	.199	.030	1,30	1.117
Baseline, Age, Group, SEpst	.202	.033	1,30	1.252
<i>Follow-up 2</i>				
Baseline	.000		1,33	0.000
Baseline, Group	.002	.002	1,32	0.078
Baseline, Group, OEpst	.036	.033	1,31	1.073
Baseline, Group, SEpst	.085	.082 <sup>†</sup>	1,31	2.789

<sup>†</sup> $p < .10$ , \* $p < .05$

**Table 20. Hierarchical Regression Analyses for Total Number of Minutes Aerobic Activity (AerTime).**

	Total R <sup>2</sup>	$\Delta R^2$	df for $\Delta R^2$	F for $\Delta R^2$
<i>Follow-up 1</i>				
Baseline	.197**		1,33	8.070
Baseline, Group	.283**	.086 <sup>†</sup>	1,32	3.856
Baseline, Group, OEpost	.311**	.028	1,31	1.269
Baseline, Group, SEpost	.316**	.034	1,31	1.519
<i>Follow-up 2</i>				
Baseline	.109 <sup>†</sup>		1,33	4.040
Baseline, Group	.111	.002	1,32	0.062
Baseline, Group, OEpost	.112*	.001	1,31	0.045
Baseline, Group, SEpost	.235*	.124*	1,31	5.015

<sup>†</sup> $p < .10$ , \* $p < .05$ , \*\* $p < .01$

**Table 21. Hierarchical Regression Analyses for Total Number of Minutes Aerobic Activity for 20 Minutes or More at a Time (AerTime  $\geq$  20).**

	Total R <sup>2</sup>	$\Delta$ R <sup>2</sup>	df for $\Delta$ R <sup>2</sup>	F for $\Delta$ R <sup>2</sup>
<i>Follow-up 1</i>				
Baseline	.128*		1,33	4.860
Baseline, Age	.187*	.059	1,32	2.302
Baseline, Age, Group	.216 <sup>†</sup>	.029	1,31	1.166
Baseline, Age, Group, OEpost	.264*	.048	1,30	1.938
Baseline, Age, Group, SEpost	.242 <sup>†</sup>	.026	1,30	1.034
<i>Follow-up 2</i>				
Baseline	.107		1,33	3.940
Baseline, Group	.107	.000	1,32	0.016
Baseline, Group, OEpost	.120	.013	1,31	0.463
Baseline, Group, SEpost	.211 <sup>†</sup>	.103 <sup>†</sup>	1,31	4.062

<sup>†</sup> $p < .10$ , \* $p < .05$

**Table 22. Hierarchical Regression Analyses for Days Any Type of Activity (AnyDays).**

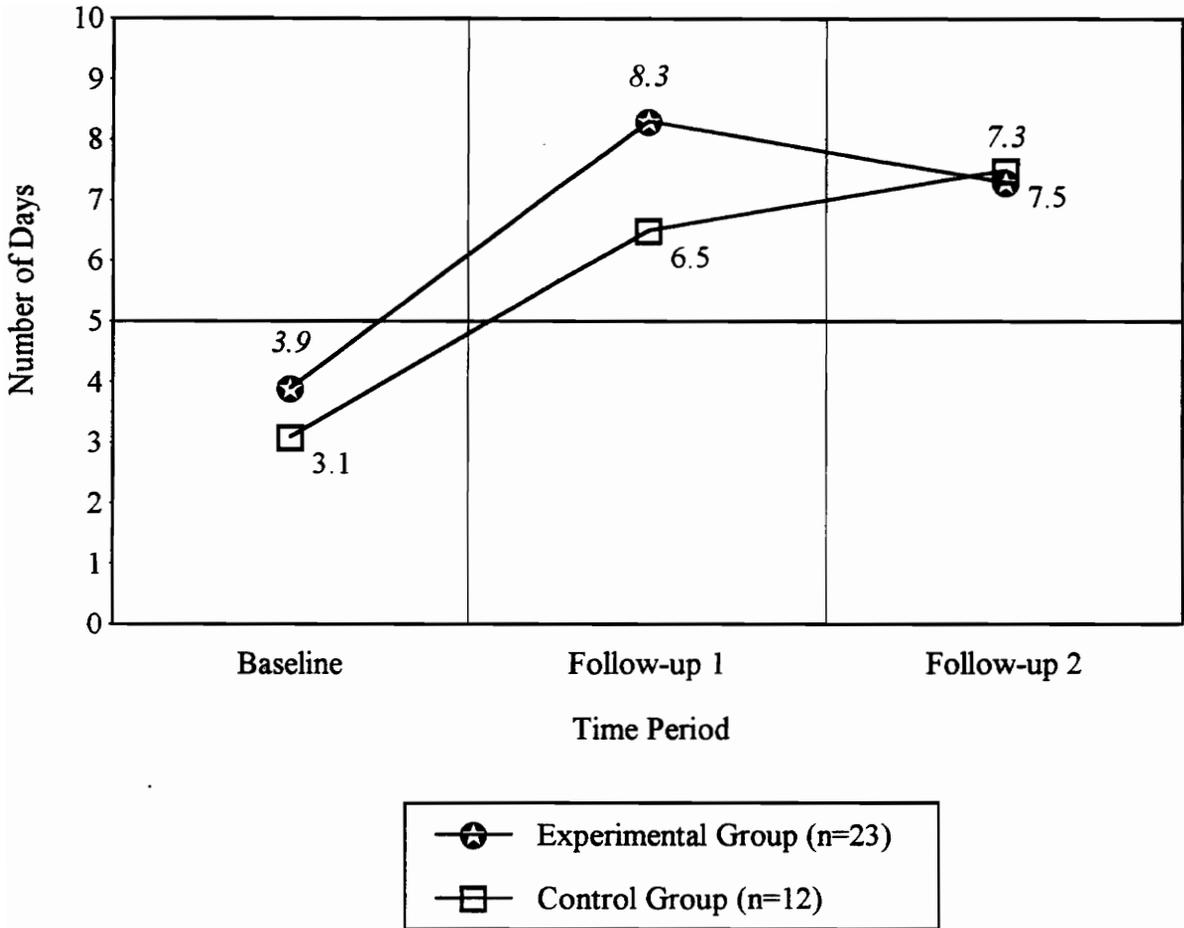
	Total R <sup>2</sup>	ΔR <sup>2</sup>	df for ΔR <sup>2</sup>	F for ΔR <sup>2</sup>
<i>Follow-up 1</i>				
Baseline	.422 <sup>***</sup>		1,33	24.140
Baseline, Group	.456 <sup>***</sup>	.034	1,32	1.993
Baseline, Group, OEpost	.460 <sup>***</sup>	.004	1,31	0.208
Baseline, Group, SEpost	.465 <sup>***</sup>	.009	1,31	0.522
<i>Follow-up 2</i>				
Baseline	.444 <sup>***</sup>		1,33	26.310
Baseline, Group	.444 <sup>***</sup>	.000	1,32	0.006
Baseline, Group, OEpost	.457 <sup>***</sup>	.013	1,31	0.749
Baseline, Group, SEpost	.452 <sup>***</sup>	.009	1,31	0.489

\*\*\**p*<.001

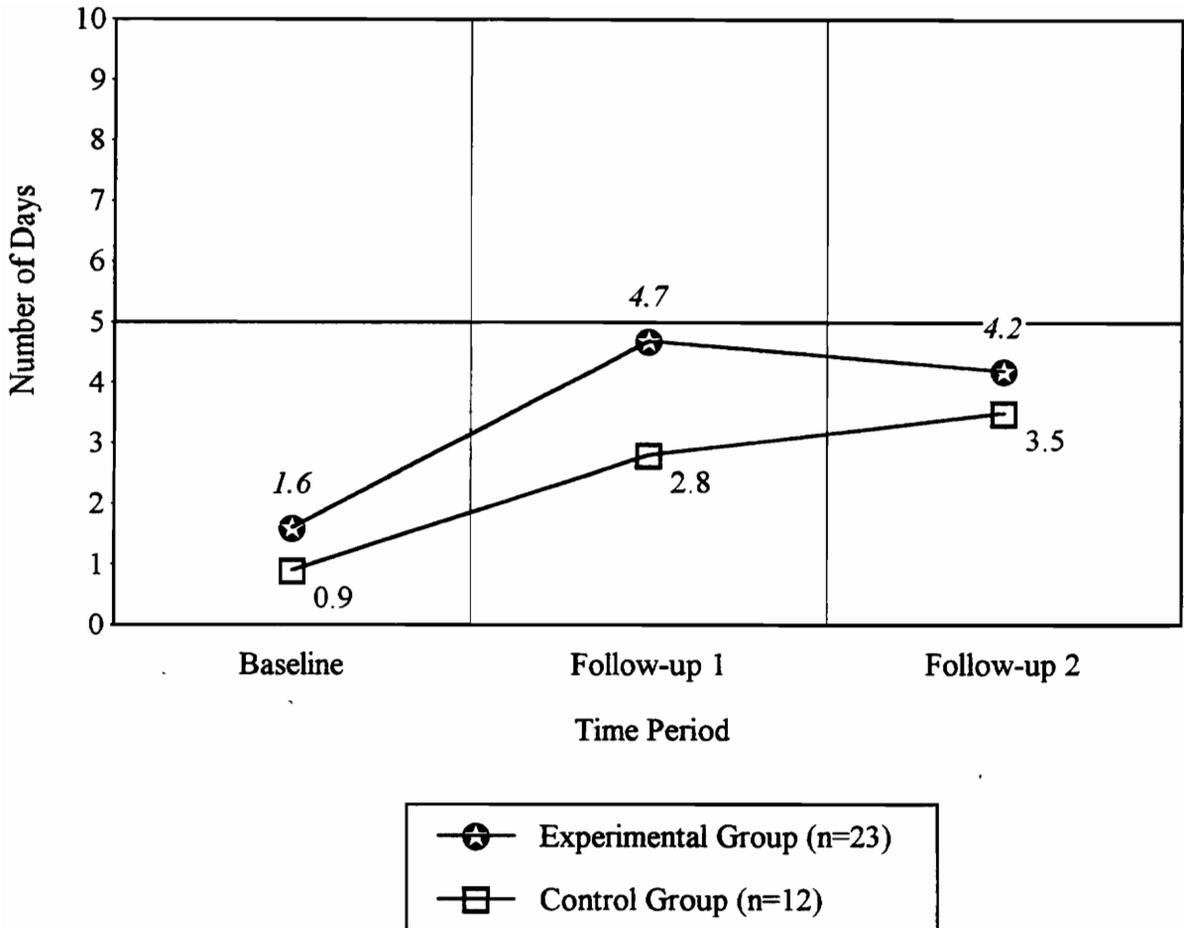
**Table 23. Hierarchical Regression Analyses for Total Number of Minutes for Any Type of Activity (AnyMins).**

	Total R <sup>2</sup>	ΔR <sup>2</sup>	df for ΔR <sup>2</sup>	F for ΔR <sup>2</sup>
<i>Follow-up 1</i>				
Baseline	.621 <sup>***</sup>		1,33	54.060
Baseline, Group	.684 <sup>***</sup>	.063 <sup>*</sup>	1,32	6.430
Baseline, Group, OEpst	.692 <sup>***</sup>	.007	1,31	0.726
Baseline, Group, SEpst	.687 <sup>***</sup>	.002	1,31	0.219
<i>Follow-up 2</i>				
Baseline	.433 <sup>***</sup>		1,33	25.250
Baseline, Group	.439 <sup>***</sup>	.006	1,32	0.340
Baseline, Group, OEpst	.440 <sup>***</sup>	.000	1,31	0.010
Baseline, Group, SEpst	.497 <sup>***</sup>	.057 <sup>†</sup>	1,31	3.526

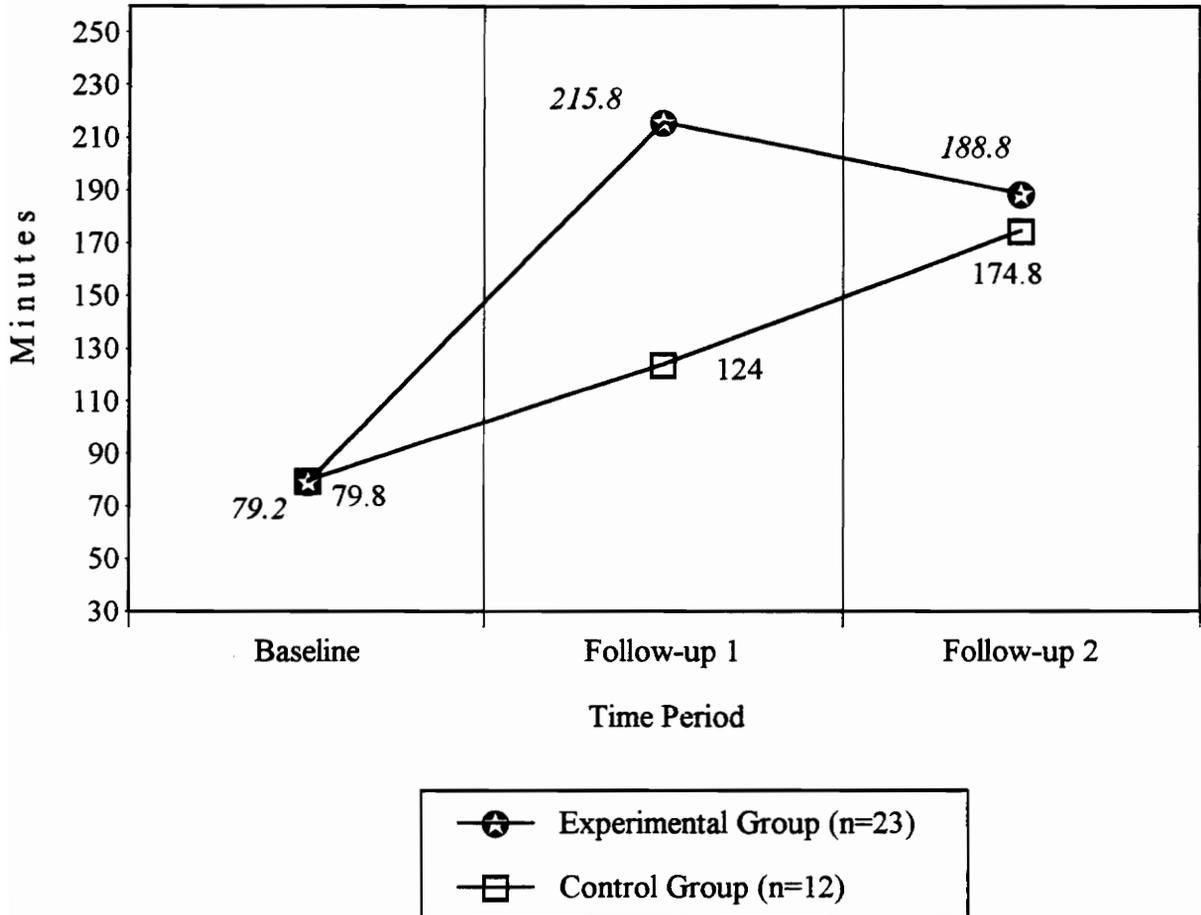
†*p*<.10, \**p*<.05, \*\**p*<.01, \*\*\**p*<.001



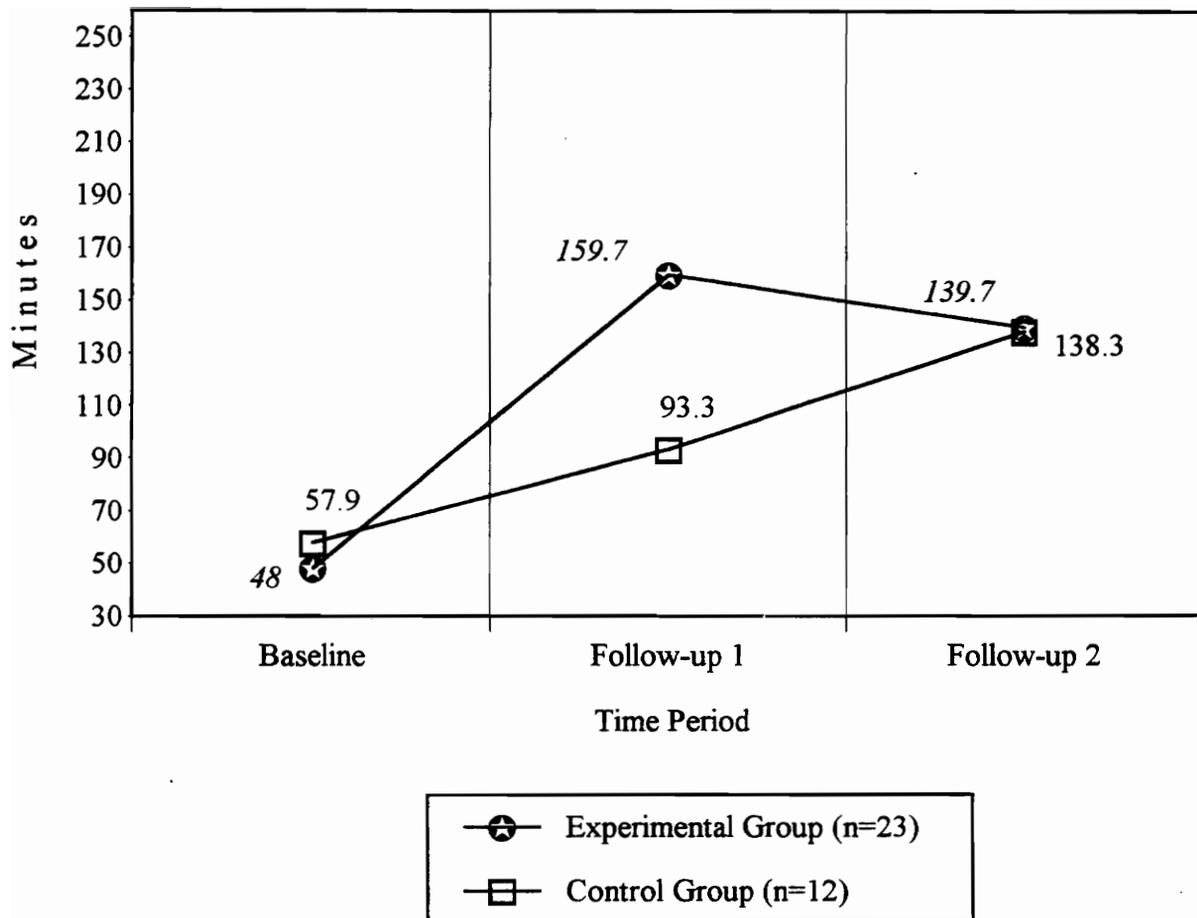
**Figure 1. Means Across Time by Group for Days Aerobic Activity (AerDays).**



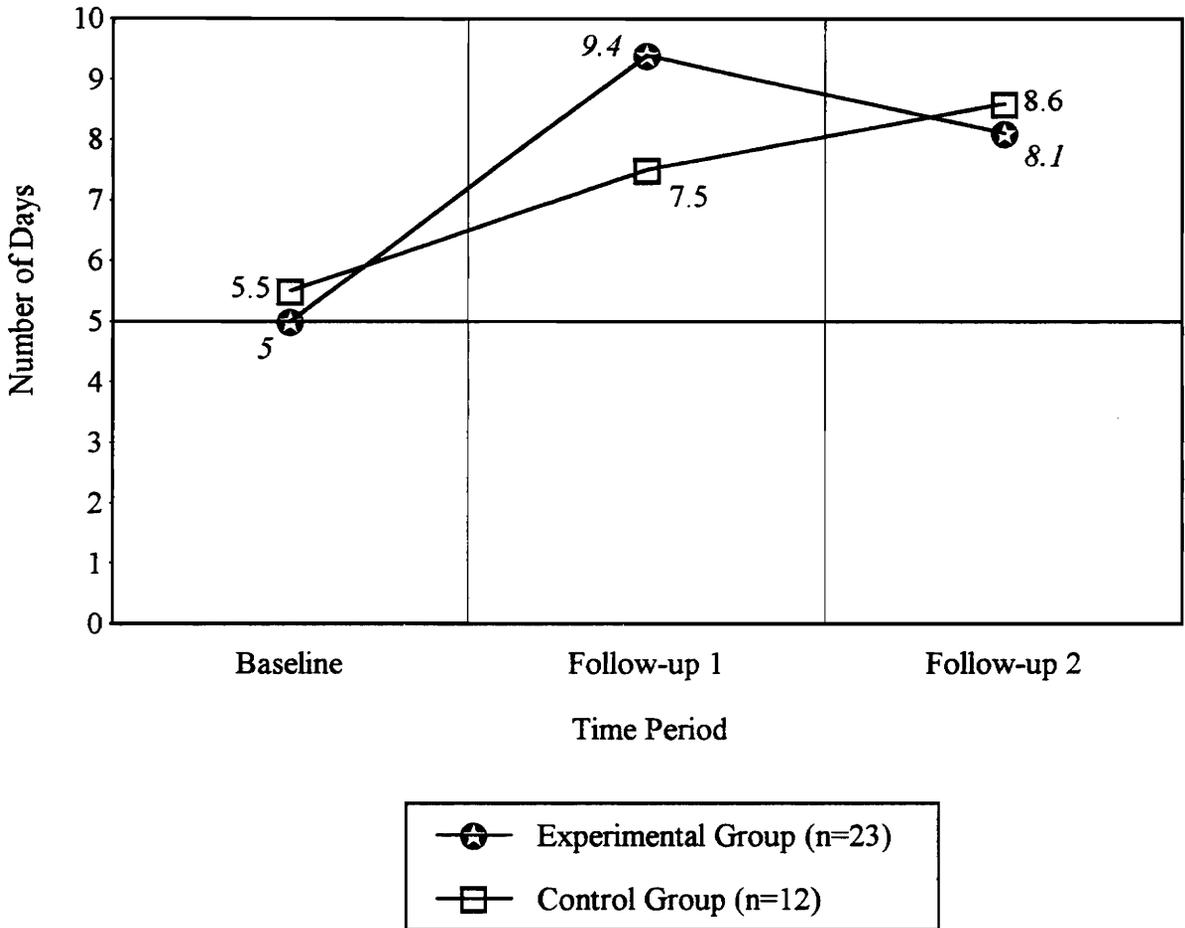
**Figure 2. Means Across Time by Group for Days Aerobic Activity for 20 Minutes or More at a Time (AerDays  $\geq 20$ ).**



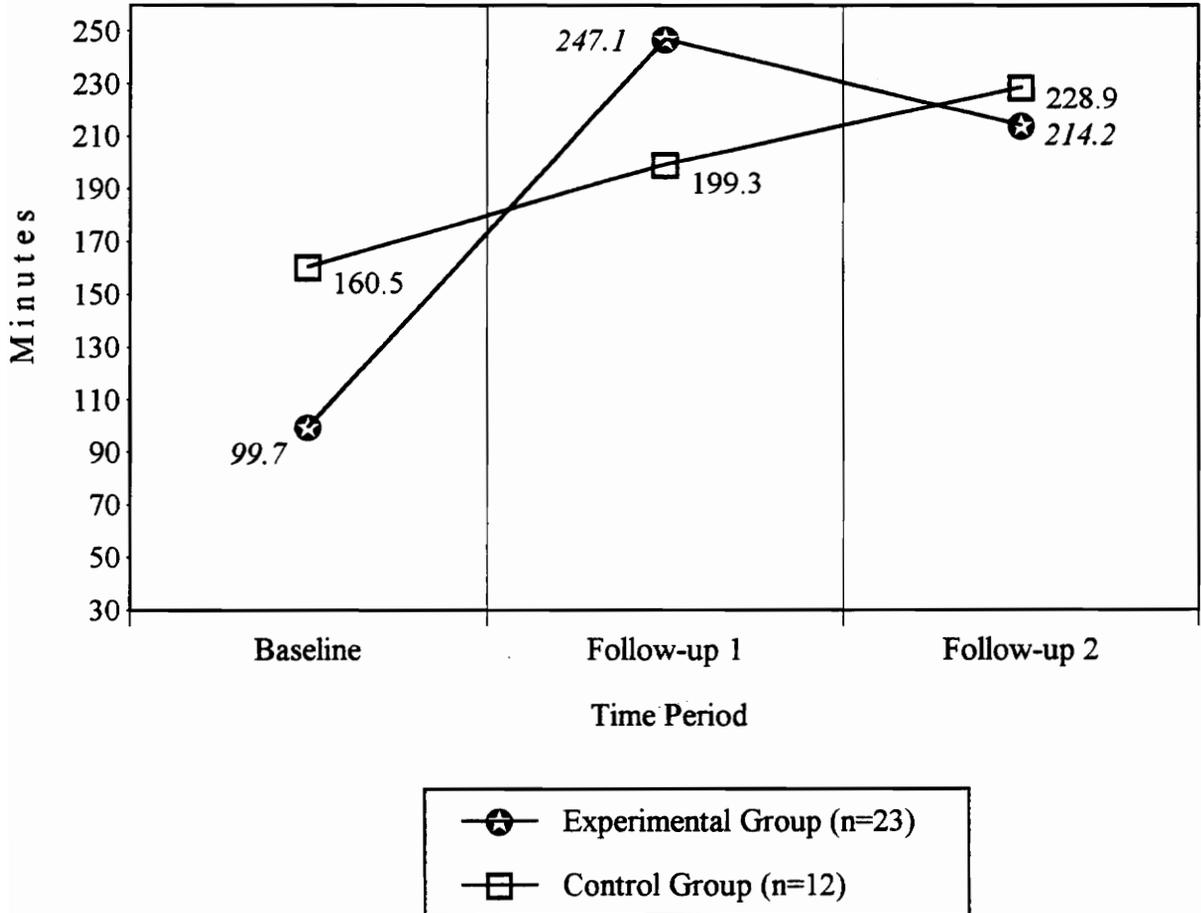
**Figure 3. Means Across Time by Group for Total Number of Minutes Aerobic Activity (AerTime).**



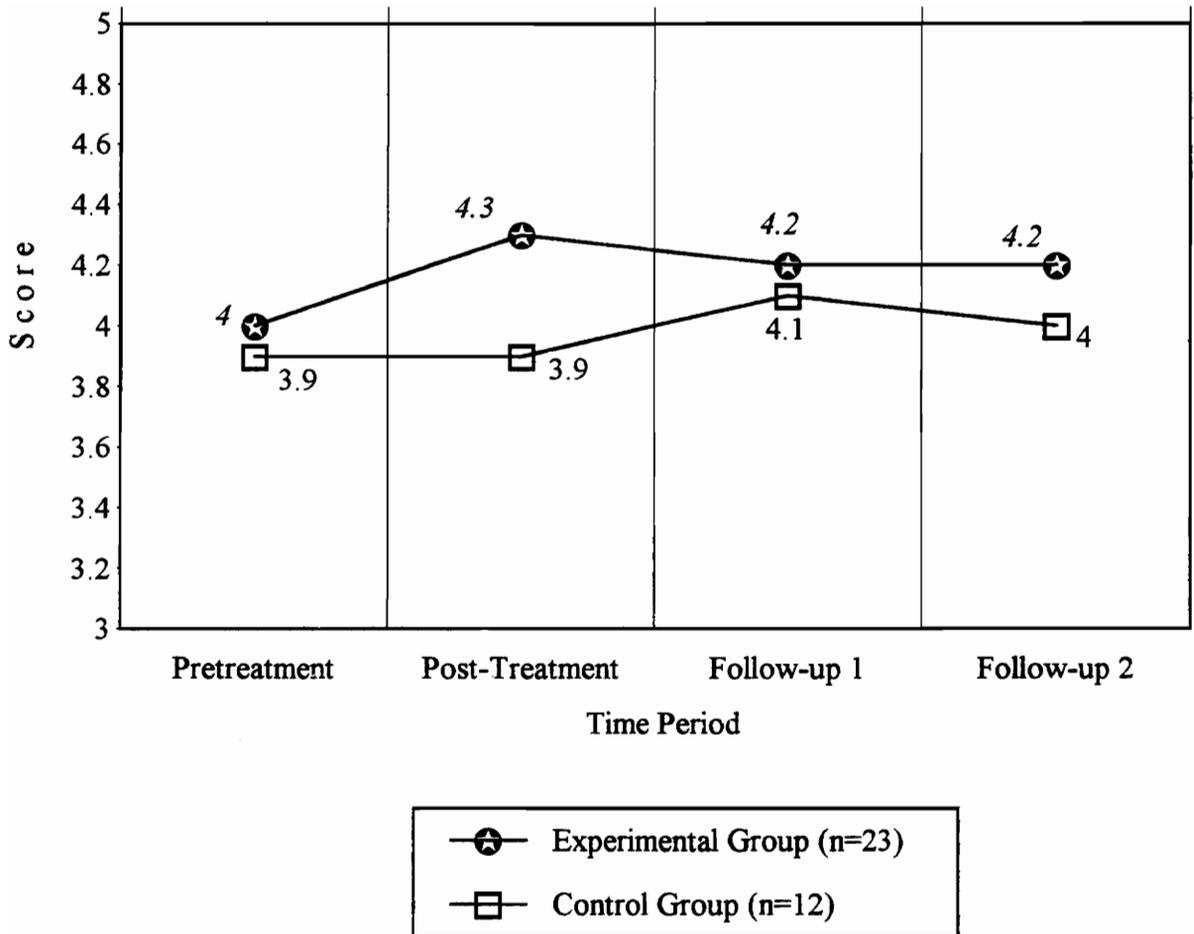
**Figure 4. Means Across Time by Group for Total Number of Minutes Aerobic Activity for 20 Minutes or More at a Time (AerTime  $\geq$  20).**



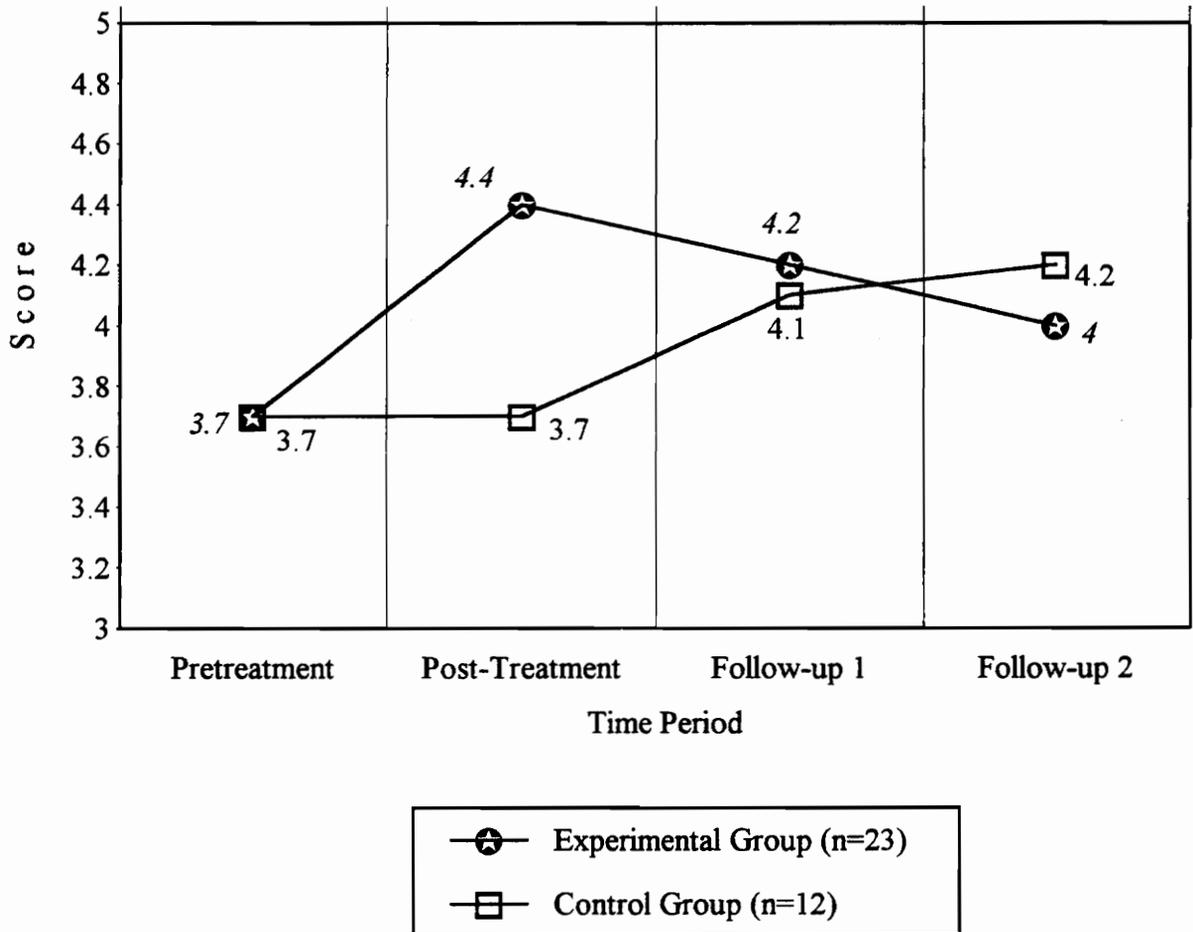
**Figure 5. Means Across Time by Group for Days Any Type of Activity (AnyDays).**



**Figure 6. Means Across Time by Group for Total Number of Minutes Any Type of Activity (AnyMins).**



**Figure 7. Means Across Time by Group for Outcome Expectancy (OE).**



**Figure 8. Means Across Time by Group for Self-Efficacy (SE).**

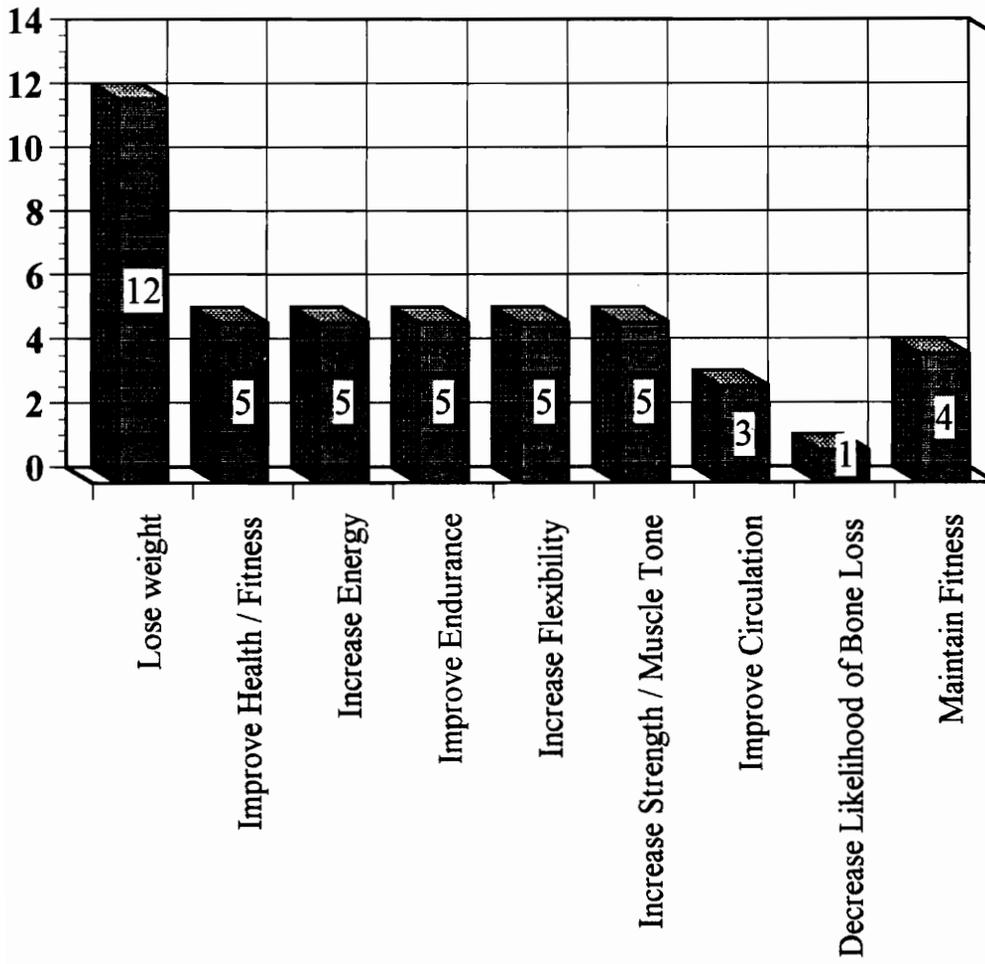


Figure 9. Frequencies of Long Term Goals (n=23).

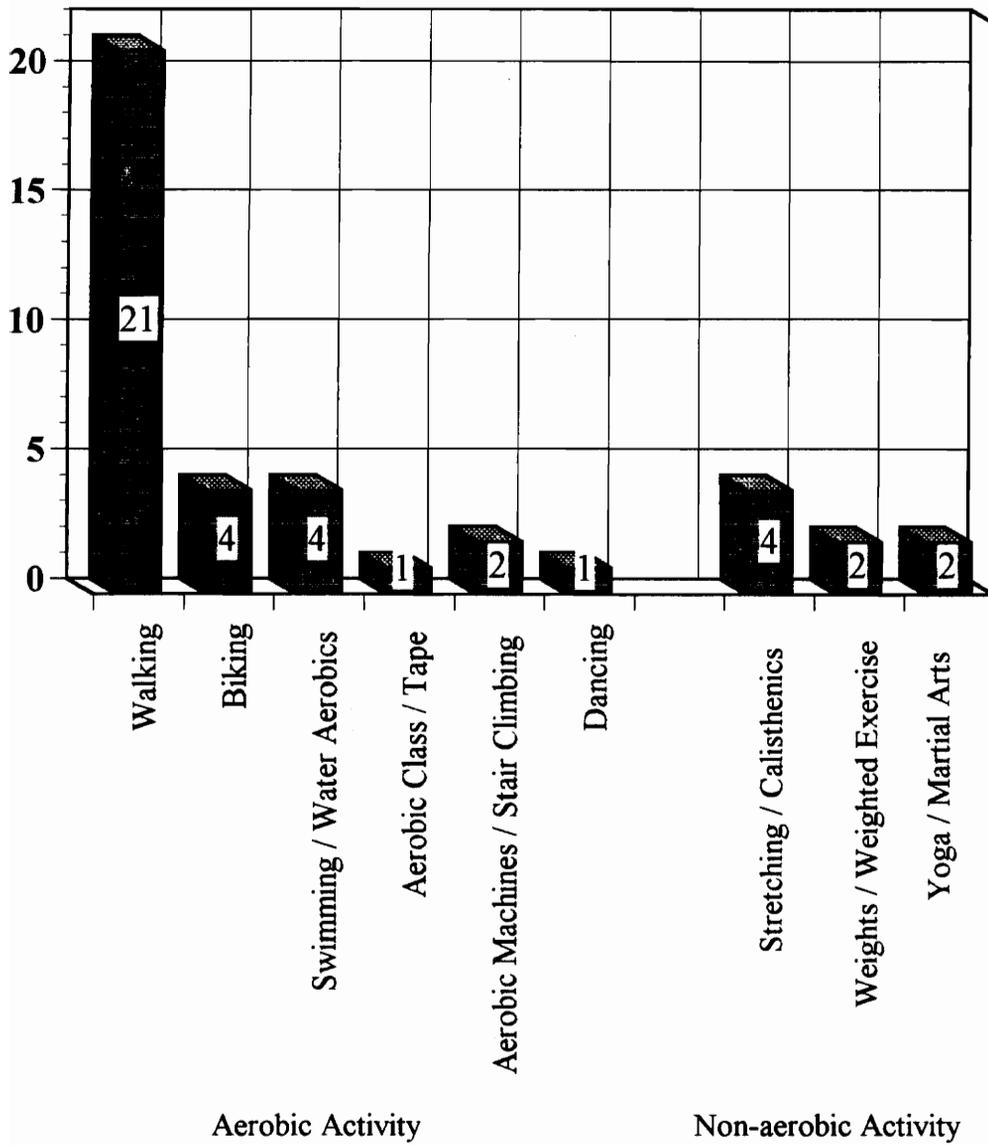


Figure 10. Frequencies of Chosen Activities (n=23).

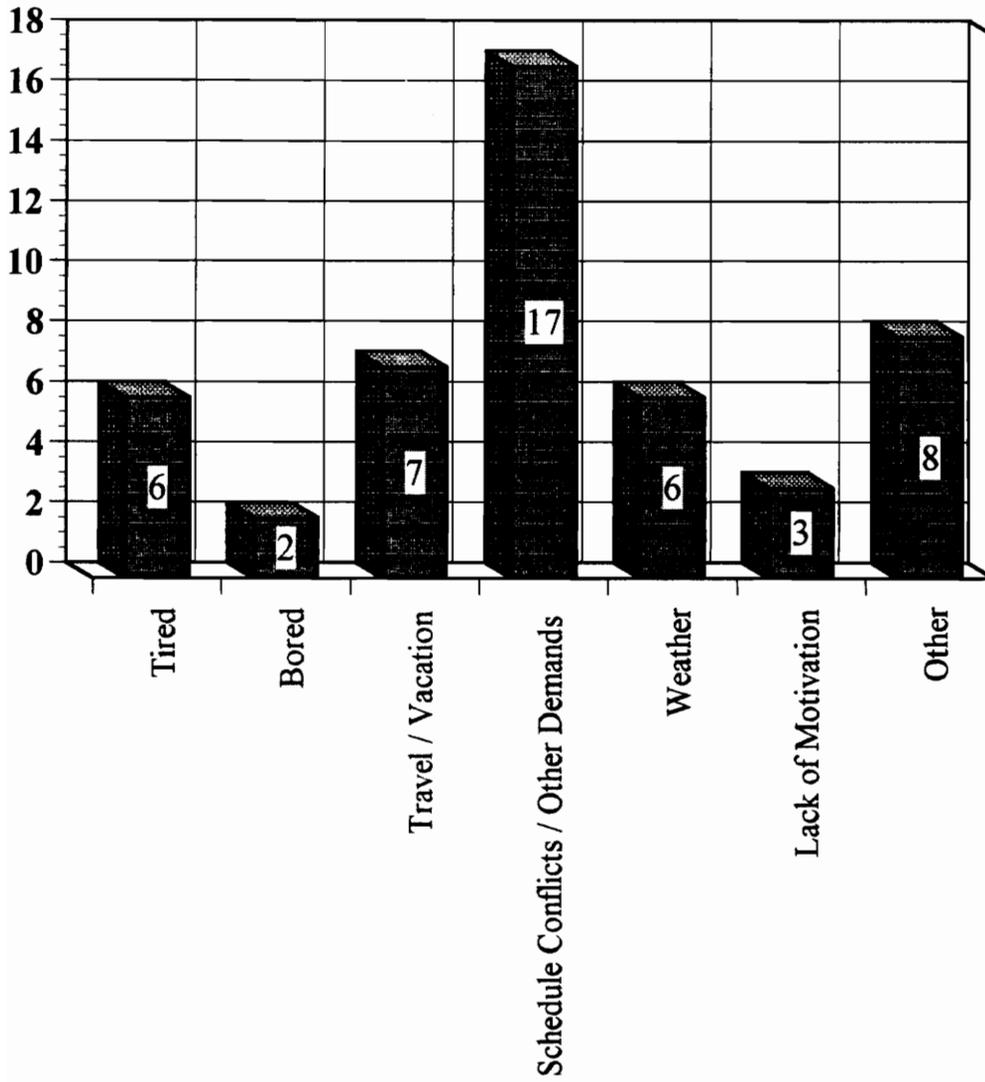


Figure 11. Frequencies of Types of Anticipated Barriers to Exercise (n=23).

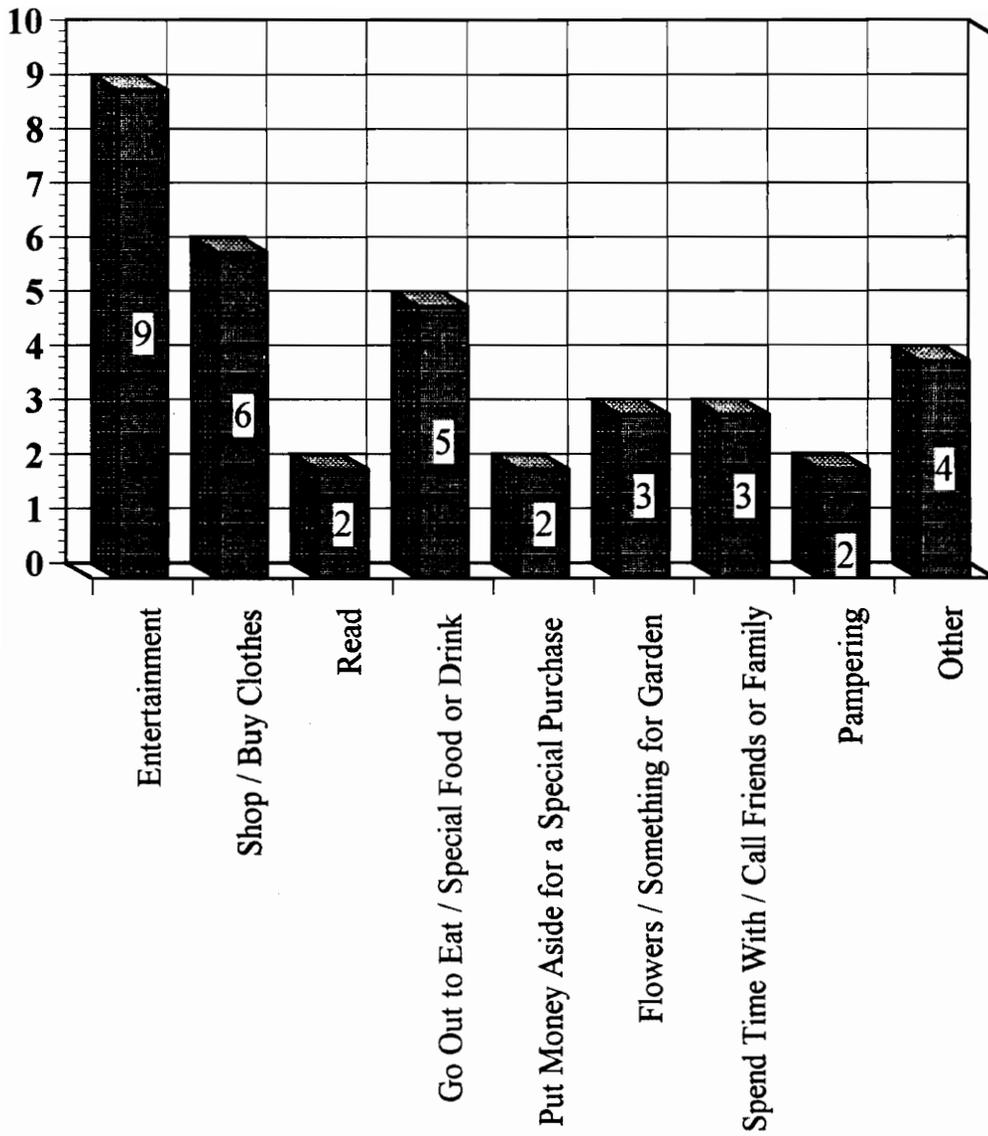


Figure 12. Frequencies of Types of Rewards for Exercise Goal Achievement (n=23).

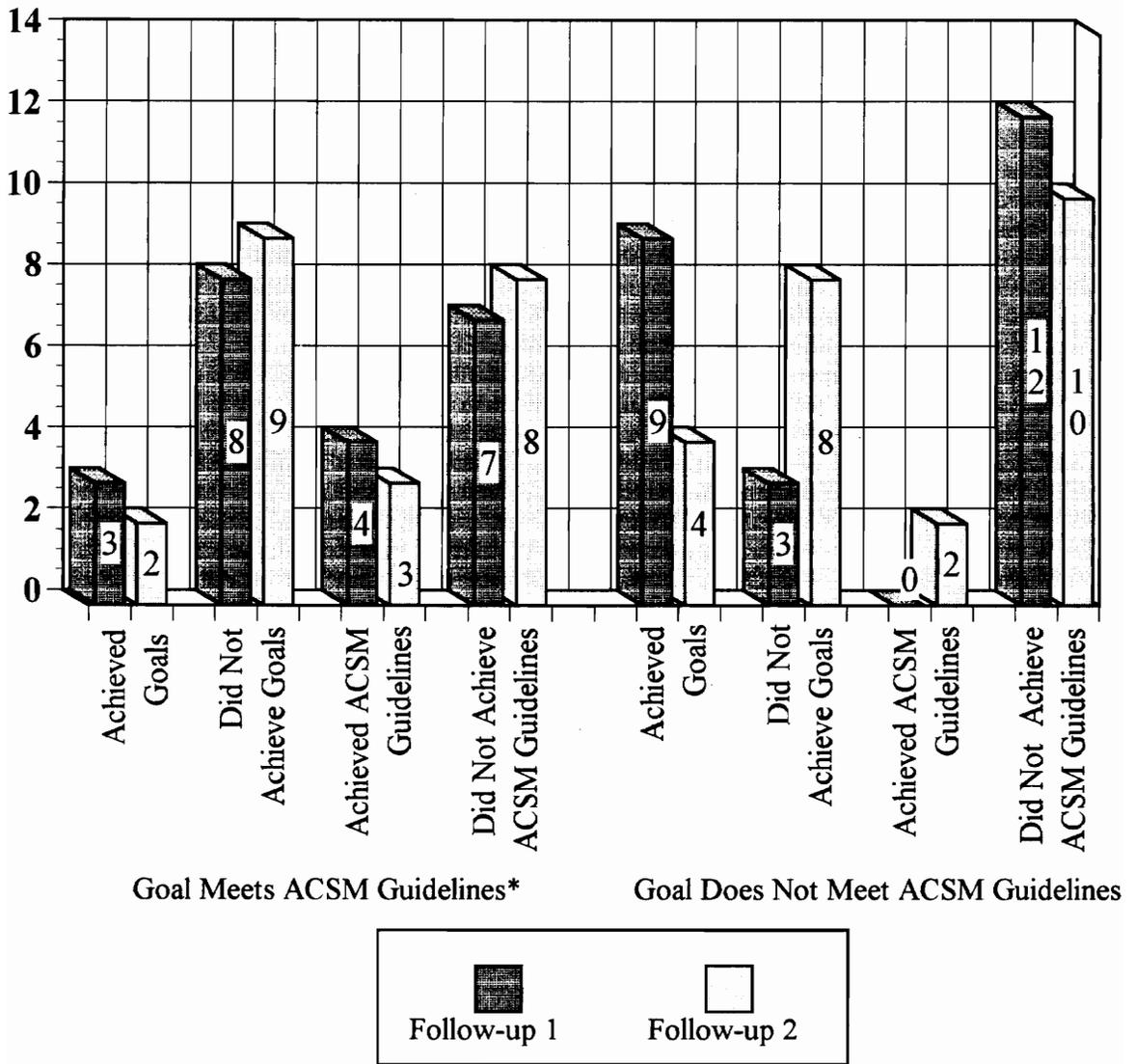


Figure 13. Personal plan goal achievement.

\*American College of Sports Medicine (ACSM;1990): Aerobic activity 3 or more days per week for 20 minutes or more per session.

Appendix A

William T. Hendricks, M.D.  
Plaza 1, Bldg A, Suite 2  
200 Country Club Drive  
Blacksburg, VA 24060  
703-951-1675

April 4, 1994

Dear

As you know, I believe exercise is important for preventive health. I am writing to inform you of an opportunity to learn more about exercise. Donna Yaffe, a Psychology Ph.D. candidate, is recruiting participants for her research project regarding education about exercise. She will call you to see if you are interested and explain the project. If you do not want her to call you, please call my office promptly and we will tell her not to call. I encourage you to receive her call to learn more about the project.

This project would require only a few hours of your time. It would not involve an organized exercise activity, although you may choose to exercise more on your own after receiving the information.

Best Wishes.

Yours truly,



William T. Hendricks, M.D.

WTH/wt

## Appendix B

### Stage of Change Scale

Code # \_\_\_\_\_

Date \_\_\_\_\_

Please circle the number corresponding to the statement that most accurately describes your current exercise behavior. "Regular exercise" refers to continuous exercise three or more times per week for at least 20 minutes each time (e.g.- walking, swimming, aerobics).

- 0 I currently do not exercise and I do not intend to start exercising in the next 6 months
- 1 I currently do not exercise, but I am thinking about starting to exercise in the next 6 months
- 2 I currently exercise some, but not regularly
- 3 I currently exercise regularly but I have only begun doing so within the last 6 months
- 4 I currently exercise regularly and have done so for longer than 6 months

Appendix C  
CONSENT FORM

Description

You are invited to participate in a study about exercise and seniors. The study involves a test of the effectiveness of interventions for increasing the amount of exercise that seniors engage in. To accomplish the goals of the study, you will be asked to do the following:

(1) Keep a log of any exercise you engage in for approximately nine weeks.

(2) Have log entries signed or otherwise verified whenever possible by asking a friend, spouse, exercise partner, aerobic instructor, or other person who can verify each exercise session to sign your activity log or provide you with another form of verification (e.g. - aerobics class receipt).

(3) Attend a meeting with the researchers and other study participants. This meeting will not involve any exercise on your part. You will be randomly assigned to attend one of 2 types of meetings. One type of meeting will involve completing a series of questionnaires and briefly reviewing a handout containing a variety of information about exercise. The other type of meeting will involve the same as the first type, and will also include watching 2 brief videotapes about exercise and seniors and making a personal plan (with the aid of the researchers) to begin an exercise program. You will not be required to follow this plan but will be asked to commit to giving it a try.

(4) Attend 2 brief meetings (occurring approximately 3 and 6 weeks following the initial meeting) at which time you will complete questionnaires and return your activity log.

\* This study does not require that you increase your exercise level but only that you fulfill the obligations described above...regardless of your activity level.

The results of this study will be kept strictly confidential. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. The information you provide will have your name removed and only a subject number will identify you during analyses and any written reports of the research.

Risks and Benefits

Regular exercise has been endorsed by the American College of Sports Medicine (1990) as beneficial for individuals of all ages. However, many individuals have particular medical conditions which may require particular exercise prescriptions. For this reason, physician consultation is strongly recommended and physician release is required regardless of whether you choose to increase your exercise level as a result of participation in this study.

There are no apparent risks to you from simply participating in this study since exercise is not required. However, if you choose to increase your exercise level, the risks include certain discomforts associated with increases in exercise (e.g., stiff muscles, minor joint pain, and shortness of breath). These can be avoided or minimized by adequately stretching and warming-up prior to exercise, increasing your level gradually, avoiding exercising to the point of discomfort, and cooling-down following all exercise sessions. If you choose to increase your exercise level during this study and have any questions or concerns about your ability to safely do so, you should contact your physician.

One of the possible benefits of this study is an increased knowledge about exercise and seniors. In addition, if you choose to increase your exercise level, you may begin to feel increased endurance, muscle tone, mobility, and/or strength. You may also decrease your body fat and weight and decrease your risk for heart disease, hypertension, non-insulin dependent diabetes, and colon cancer (or improve these conditions if you have them). You may find that you sleep more soundly, feel a reduction in stress, and experience an overall sense of well-being. Finally, you may begin to establish a healthy "routine" which you can feel proud of.

## Physical Activity Readiness Questionnaire

For most people, physical activity should not pose any problem or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

1. Has your doctor ever said you have heart trouble?
2. Do you frequently suffer from pains in your chest?
3. Do you often feel faint or have spells of severe dizziness?
4. Has a doctor ever told you that you have a bone or joint problem such as arthritis that might be aggravated by exercise, or might be made worse with exercise?
5. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
6. Are you over age 65 and not accustomed to vigorous exercise?

If a person answers yes to any question, vigorous exercise or exercise testing should be postponed. Medical clearance may be necessary.

## Appendix D

### Physician's Release Letter

Dear Dr. \_\_\_\_\_,

One of your patients, \_\_\_\_\_, has agreed to participate in a study about exercise and seniors. The study involves a test of the effectiveness of interventions for increasing the amount of exercise that seniors engage in. As you know, regular exercise has been found to be beneficial for both the prevention and alleviation of a number of chronic diseases. For older adults, exercise can be particularly helpful for deterring the decline in functional capacity typically associated with aging. Unfortunately, approximately 80% of people aged 65 and older have 1 or more chronic health conditions. This age group will account for approximately 22% of the U.S. population by the year 2030. Clearly, getting more older adults to exercise regularly is very important.

The study your patient has agreed to participate in does not involve a supervised exercise program nor does it require that participants increase their exercise level. However, it does require that participants attend 2 or 3 meetings, the first of which will involve the implementation of the interventions. Through random assignment, some participants may attend a meeting where they will complete questionnaires and receive a handout containing a variety of information about exercise which will be briefly highlighted. The other group will do the same, and will also watch 2 brief videotapes about exercise and seniors and make a personal plan (with the aid of the researchers) to begin an exercise program. They will not be required to follow this plan but will be asked to commit to giving it a try. All participants will also be required to keep a log detailing any exercise that they engage in.

Since some participants in this study may choose to increase their exercise levels, they will be reminded to adequately warm-up and cool-down before and after engaging in exercise. They will also be reminded to never exert themselves to the point of discomfort. In fact, the study will emphasize increases in the frequency and duration of exercise – participants will not track intensity. For those who are involved in the "planning" intervention, moderate levels and gradual increases in exercise frequency and duration will be emphasized. For example, participants who state they would like to increase their endurance might be encouraged to begin with a walk or swim at a comfortable but brisk pace for about 20 minutes, 2 times per week. Their goal might be to increase the duration of these activities to 30 minutes and the frequency to 3 times per week over a period of three weeks. Additional activities likely to be suggested are low impact aerobics, stretching classes, and dance classes. Participants will be told to contact their physician if they have questions or concerns regarding their ability to safely increase their exercise level if they choose to do so.

Since participants in this study may choose to increase their exercise levels as a result of the interventions, it is important that they not do so if, for medical reasons, they should not. In addition, if your patient has a particular medical condition which should be considered when and if he/she makes a decision to increase his/her exercise level, it is important that he/she be informed of this information. A photocopy of your release and any recommendations and/or limitations will thus be provided to your patient. Please note that a copy of the Physical Activity Readiness Questionnaire (PAR-Q) has been included as a guideline for you to use when considering releasing your patient for participation in this study. The questionnaire was not given to your patient.

If you have any questions regarding this study, please feel free to contact me at 231-8746 or 552-1353. Thank you very much.

Sincerely,

---

Donna Yaffe, M.A.

\* Prompt return of the enclosed form would be appreciated as the interventions will take place in approximately 2 weeks. Thank you.

You are free to withdraw from participation in this study without penalty. The information from this research may be used for scientific or educational purposes. It may be presented at scientific meetings and/or published and reproduced in professional journals or books, or be used for any other purpose that VA Tech's Department of Psychology considers proper in the interest of education, knowledge, or research.

This research project has been approved by the Human Subjects Committee of the Department of Psychology and by the Institutional Review Board of VA Tech.

**Informed Consent**

I have read the above statements and have had the opportunity to ask questions. I know of no reason I cannot participate in this study. I fully understand my responsibilities as a participant in this study as describe to me herein. I give the researchers permission to contact my physician regarding my participation in this study. I further understand that I may withdraw from participation in this study at any time without penalty.

I understand that should I have any questions regarding this research and its conduct, I should contact any of the persons named below.

Primary Researcher: Donna Yaffe (231-8746)

Faculty Advisor: Dr. Richard Winett (231-8746)

Chair, Human Subjects Committee: Dr. Robert Harvey (231-7030)

Chair, Institutional Review Board: Dr. Ernest Stout (231-9359)

Date\_\_\_\_\_

Participant Signature\_\_\_\_\_

## Appendix E

### ACTIVITIES

The following are activities which you should enter in your log any time that you engage in them. Please be as specific as possible when making the log entries. For example, if you take a dance class, specify what kind of dance it was (ballroom, country/western, etc.). Thank you.

- Walking/Fast Walking
- Dancing/Dance Class
- \* • Aerobics Class (low or high impact)
- \* - Yoga
- Stair Climbing Machine
- Cross Country Skiing
- \* Weight Lifting (machines or at home with cans, etc.)
- Basketball
- - Golf (walking between holes)
- Calisthenics/Calisthenics Class
- Running/Jogging
- Swimming
- Stretching (class or at home)
- Bike Riding (Indoor or outdoor)
- Rowing Machine
- Water Aerobics
- Volleyball
- \* • Hiking
- - Any team sport (specify type)
- \* • Exercise Tape (specify type)

• = Recommended for increased endurance and weight loss/maintenance (when done continuously at a moderate pace)

\* = Recommended for increased strength (for aerobics, only if strength training is included during exercise session)

- = Recommended for increased flexibility and mobility

# EXERCISE - All you need to know...

## Feel Young!

Was there a time when you had more energy? Did you ever play sports? Did you ever feel great all day, stay up into the wee hours, then sleep like a rock and wake up ready to go?

## You Can Get Those Great Feelings Back!

Activity is the answer. Add activity to each day and amaze yourself.

## "I Don't Know What You're Talking About."

Maybe you've never felt alive and energetic. You can, you know. Activity works wonders. Just read on and let your imagination go to work.

## Being Active Means Moving More.

If you spend a lot of time sitting down, you begin by getting up! Turn off the TV. Take a walk...get a breath of fresh air. Start spring cleaning, plant a garden, or simply walk whenever you can.



## Every Bit of Activity Counts.

If you feel you can't spare the time for a walk, find a project at home. Spend an extra ten minutes on a job that lets you move your arms and legs..a job that lets you bend and stretch. You'll be getting exercise and you'll have something to show for it. Take the stairs, park a little further away, and go for a stroll.

## Moving Feels Good!

Go bowling, dance, ride a bike. Whatever you do, have fun! Even little things will help get your body and mind back into action and ready to go.

## Be an active participant in your own life!

### "Why Start?..."

I don't have time...  
I'll feel sore...  
I'm uncoordinated...  
I haven't done anything in years...  
I'm too tired...  
Exercise is boring...takes too long...costs too much...  
I'm too fat  
I'm too old...

### Here's Why!

Activity makes you strong...  
Tones your muscles...  
Helps you lose weight...  
Keeps weight off...  
Helps you handle stress...  
Gives you energy...

Helps manage blood pressure...

Reduces risk of heart disease...

Feel good...

Feel more self-confident...

Sleep better...

Be happier...

## Stressed Less.

You may find that when you exercise regularly, life's little problems "melt away" and big ones seem more manageable. Moods and attitudes will bounce back instead of getting "bent out of shape."

**Every idea won't be for you...but if the sneaker fits...wear it!**

## Just Imagine!

Every action starts as an idea.

### Let's Imagine...Action.

For instance, let's go for a make-believe walk.

## Read, Then Really Do It!

Close your eyes and imagine you are walking. What motions are you making? Are you walking fast or slow? Breathe as you move and feel the air on your cheeks. Imagine that you're feeling great, that the weather is perfect. See if you can keep your imaginary walk for a minute or two. When you're done, take a deep breath.

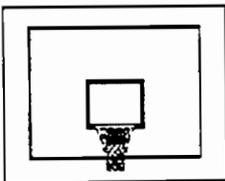
**What if...** Instead of imaging, you really went for that two minute walk? It didn't take long. It wasn't hard. And if you haven't been active, a minute or two is all it takes to get started.

**Imagination Works!**

This technique is called visualization. People in all walks of life use visualization to "try out" or feel more relaxed about new situations or endeavors. Athletes often use visualization to improve their form and performance.

**How about Walking?  
Walk For Fun.  
Walk For Fitness.  
Walk For Transportation.**

The benefits are tremendous. No one is too small, too big, too busy, too fit, too young or too old to start a walking program. It's not only one of the safest, easiest, most convenient and least expensive forms of exercise, it's also a popular sport.



**Walk To Get In Shape.**

\* Walking strengthens legs and stomach muscles and tones arms and shoulders. Muscles contract 1500-3000 times every mile you walk-more than almost any other exercise.

\* Walking increases circulation and makes your heart stronger while lowering blood pressure.

**Walk To Lose Weight.**

\* Taking a brisk walk before you eat helps you eat less.

\* The longer you walk the more calories you burn.

\* If your goal is to lose weight, exercise longer, not harder. A thirty minute walk is better than a twenty minute jog.

**How many calories will you burn in one hour?**

For a person weighing 150 pounds, cals burned per hour:

Walking	200
Walking briskly	400
Watching TV	80
Sleeping	65
Standing	100

**The Right Way To Walk.**

\* Hold your head up, keep your back straight, and take long, easy strides.

\* If your hands tend to swell, bend the elbows at a 90 degree angle as you swing your arms.

**Buddy Up!**

Do you have a friend who would like to be more active? Do you have a friend who already is active? Team up and you can both succeed. A buddy makes exercise more fun and keeps you going.

So ask a friend, a neighbor, spouse, or kids to join you for a stroll, a game of tennis or a swim.

**You Don't Have To Sweat To Be Healthy.**

Just don't sit so much!



**Move For The Fun Of It.**

Find a friend and go mall walking, swimming, or take a stretching class together. Like to dance? Join a dance club or take lessons.

Maybe, once upon a time, you enjoyed playing a sport. Dust off your bowling shoes or get back into an old favorite like golf, soccer, baseball, tennis, basketball, or volleyball. You're never too old to enjoy activities you did as a kid.

# REWARDS!

## Are You Like Jane?

Jane has been watching her grandchildren, taking care of her husband, cleaning house, etc... and she feels exhausted. She wants to have more energy and feel better, so she's decided to increase her activity. She does fine for a few days, then she forgets or just doesn't feel like it one day...and her whole program falls apart. Soon she finds herself feeling tired and discouraged and just sits in front of the TV.

Jane needs something to remind her of what a good job she was doing... something that said to her..."Keep up the good work."

She decided that, each week, if she followed through with her plans to be more active, she would reward herself with a movie or some shopping.



## You Deserve a Medal!

Kathy bought a bracelet to reward herself for staying active for a month. Now every time it jingles on her wrist, she remembers her goal of making her life more active. And she's well on her way to a second bracelet.

## Reward Yourself!

Here are some ideas:

- call a friend long distance
- fresh flowers/a plant
- a bike
- new sneakers
- a weekend away
- a new hair style
- an evening out
- a movie
- a health club membership
- new sports equipment
- a manicure
- a fishing rod
- a magazine subscription
- window shopping
- a foot massage
- a bubble bath
- a TV show
- something new to wear

## What's It Like at a Health Club?

Health clubs offer a wide range of exercise classes and services. Many also have special classes for seniors and classes that won't leave you feeling like you were hit by a steamroller. Advantages are that the club is there, rain or shine, and offers variety (which can help you stay interested).

## Visit the Health Club...

Get a feel for the place. Most will offer you a "guest pass." Bring along a friend so you feel more comfortable.

Most clubs offer exercise equipment such as Nautilus machines, treadmills, rowing and stair climbing machines, and Lifecycles. Don't be shy about asking for instruction. Ask a staff member to introduce you to

the equipment you might be using. Everyone was a beginner once and the club wants you to use the machines properly to avoid injury.

## You Don't Need Special Clothes.

Just wear something loose and comfortable. Your old sweat pants and a T-shirt are fine.

## Aerobics Classes.

Great exercise and fun! The music will keep you bopping to the beat. You'll meet people too. You'll tone muscles and condition your heart and lungs. If you're trying to lose weight, aerobics will speed up weight loss and help you keep weight off for good.

Try a low-impact class. Low-impact means you won't jump around. One foot will always be in contact with the floor. This is easy on your joints.

## Low-Impact is a Real Workout.

Low-impact does not mean low-intensity. In the beginning you might get winded during the workout. Your muscles may tire. If you can't continue, simply slow down or stop and rest. But, keep trying for a few weeks and you will truly amaze yourself. What seemed impossible will soon be easy. You'll feel great, relaxed and more energetic. You'll also notice a change for the better in how you look.

## Start By Doing Less!

Many an exercise program hits the dust when you do too much too soon. Driving yourself too hard will exhaust you and your enthusiasm.

Get excited. Imagine how great you're going to feel and look. But then...start slowly, and you'll work up an appetite for more.

## Ready For Action.

You can start today by sitting less...doing more.

---

**Keep it light...  
Keep it fun...and  
you'll most likely  
keep it up!**

---

## Growing Good Habits.

The good news is...if you keep up your exercise program for nine months, you have an 80% chance it will become a lifetime habit. Make it to one year, and you're almost certainly a lifetime exerciser.

## GOALS

### Long Term and Short Term Goals.

Do you want to get in shape, increase your energy, feel stronger, lose thirty pounds? To reach long term goals, break them down into smaller bites. Set short term goals which help you focus on the skills you need to

develop. Meeting short term goals gives you a chance to take special notice of the progress you're making and celebrate.

### Here's an Example:

## Marcia

### *Marcia's Long Term Goal*

Marcia is 60 years old. She's been sitting more and getting out less over the years. Her goal is simply "to feel more flexible and energetic."

It won't take Marcia long to reach her goal, but she needs to build the habit of activity into her life.

### *Good short Term Goals...*

- \*I'll do at least one activity every day this week...
- \*I'll get out for a short walk at least twice this week...
- \*I'll take a longer walk once a week...
- \*I'll do five minutes of stretching exercise each morning

## Setting Your Own Goals

- Pick activities that will help you move toward your goals
- Set a short term goal. Pick a goal you feel you can accomplish.
- When you succeed, set a new short term goal.
- Reward yourself when you meet a short term goal.

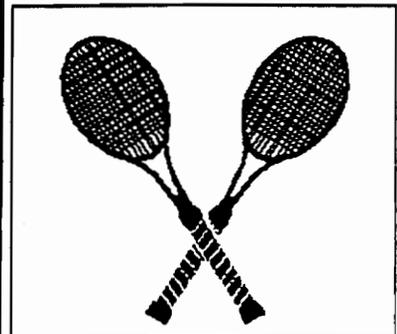
-Forgive yourself when you don't.

-Be flexible. If you don't succeed, try again or change your short term goal to something a little easier.

## The Day After...

### "Wow, I Can Really Feel Those Muscles!"

Many new exercisers never get past the first week. If you feel sore, slow down, but KEEP GOING! In a few days your body will adjust and you won't feel sore after exercise.



## Remember...

Exercisers increase their chances of continuing if they build four basic elements into their program:

1. Goals
2. Rewards
3. Variety
4. Buddy Support

# KEEP IT MODERATE

## "The Talking Test"

One of the ways to make sure you are not over exerting yourself during exercise is to take the talking test. If you can't comfortably hold a conversation with another person *while* you are exercising, you are probably pushing yourself *too hard*. Slow down a bit...



### PLEASE NOTE...

If you should experience any of the following, stop and contact your physician before continuing with your exercise program: severe shortness of breath, dizziness, anginal chest pain, extra pulse beats, abnormal heart rhythms, nausea, confusion, extreme fatigue, near fainting, or intermittent calf pain.



## Monitoring Your Heart Rate

A more precise way to be sure that you are exercising at a moderate intensity is to monitor your heart rate. When beginning an exercise program you will want to exercise at the Low End of your Target Heart Rate Zone and then gradually increase the intensity of your workout toward the High End. At the peak of your workout (point of sustained maximum activity), stop to take your 10 second heart rate. Use two fingers to take your pulse, at your carotid artery (on the side of your neck) or on the inside of your wrist one inch below your thumb, for 10 seconds, then complete your workout.

## To Calculate Your Target Heart Rate Zone:

**FIRST...**

	Age
	Adjusted
220 - your age (years) =	Heart
	Rate
	Maximum
220 - _____ = _____ (HR max)	

**SECOND...**

$.60 \times \text{(HR max)} = \text{Low End of Target Heart Rate Zone}$

$.60 \times \text{_____} = \text{_____}$

**THIRD...**

$.75 \times \text{(HR max)} = \text{High End of Target Heart Rate Zone}$

$.75 \times \text{_____} = \text{_____}$

## To Evaluate Your Intensity Level:

- \*\* Compare your 10 second heart rate during exercise to your Target Heart Rate Zone:
1. (Your 10 sec heart rate) x 6
  2. Compare to your Target Heart Rate

**If...** your actual heart rate is GREATER than your High End Target Heart Rate, you should SLOW DOWN. If your heart rate is LESS than your Low End Target Heart Rate, you may want to speed up a bit to get health benefits from your workout, but only if you feel comfortable doing so!

## Is Cross Training for You?

"I love to walk but every year my program stops dead in its tracks when the cold weather hits."

"I found a nice route in Foxridge. I walked it every day for a long time. Suddenly one day I was so sick of it I just stopped walking altogether."

## Cross Training Is For You!

Keep your mind and body interested and challenged. Cross training simply means getting involved in more than one activity so different groups of muscles get exercised.

A second activity guards against injury. Variety prevents boredom and, with more choices, your program is less likely to go into a tailspin if the weather is bad or you miss a class.

### Good Cross Training Combinations

\*If you usually walk or run...try biking or swimming.

\*If you usually do aerobics...try volleyball or weightlifting.

\*If you usually bike...try racquet sports, rowing, weightlifting.

\*If you usually swim...try walking, biking, or stair climbing.

\*If you usually lift weights...try any aerobic exercise, such as running, aerobic dance or biking.

## INJURIES

### Don't Forget To Avoid Injury!

An injury can certainly take all the fun out of exercise. Treating a sports injury may require a doctor, but here are a few tips to help you get back into action.

**BLISTERS:** The key is prevention. Make sure shoes fit comfortably. Wear socks that absorb sweat. Two pairs of socks can help eliminate friction. Use band-aids to cover "hot spots" and prevent blisters from forming.



**SHIN SPLINTS:** What are they? Pain along the front side of the lower leg caused by inflammation of the muscles. To prevent shin splints, do different activities on alternating days to let muscles rest. Increase the time, intensity, and frequency of exercise gradually. Stretch your calves before exercising. Wear shoes with good arch support.

Treat shin splints by changing activities, resting, and applying ice for twenty minutes at a time.

**LOW BACK PAIN:** Over 80% of adults experience some kind of back discomfort. Never exercise if you're experiencing back pain. To reduce strain on your lower back, build leg and abdominal muscles and keep off excess weight. Drive with your car seat forward and your knees higher than your hips. Sit with a small pillow behind your lower back to provide support. Stand straight, chin tucked in, pelvis forward. Don't go back to your regular program before an injury is completely healed. The best way to prevent an injury is to stretch before and after exercise.

**STRETCHING:** Stretch the muscles you'll be using when you exercise. Stretching to the point of mild tension helps the muscles and joints prepare for exercise. Stretching while your muscles are warm (e.g. after a few minutes of walking) increases your range of motion, prevents stiffness, and promotes circulation. Most importantly, stretching helps prevent injuries.

Stretch only as far as your body is ready to go. Overstretching can lead to injury as well. You are stretching too far if the very muscles you are trying to stretch tighten up! Stretch slowly and easily for maximum benefit.

**Just When Your Exercise Habit Seems to be Going Strong...**

What problems might keep you from continuing with a newly developed exercise habit?

**The Usual Suspects...**

The weather isn't cooperating...

I'm not making progress...

My schedule is too crazy...

It's too hard for me...

I'm bored...

I'm too old...

I can't keep it up day after day...

I don't feel like it...

I've had a bad day...

If any one of these things happen, you're not to blame, your exercise program is! If you feel discouraged, it's time to remember how far you've come and why you wanted to be more active in the first place.

Re-evaluate your choice of activities, the time of day you're exercising, changing your reward system, and how hard you're pushing yourself.



**Let's look at some of the suspects...**

**If: The weather isn't cooperating.** Get involved in indoor activities such as indoor tennis, aerobics class, bowling, mall walking, or calisthenics at home.

**If: You feel you're not making progress.** Feeling discouraged occasionally happens to everyone. New improvement (moving faster, feeling stronger, looking better) may be just around the corner. And your body is improving in ways you cannot see. This is a good time to focus on how far you've come.

**If: Your schedule is crazy.** Make exercise a high priority. It's important. It gives you the strength and the energy to cope with all the other facets of your busy life. Consider changing the time of day you regularly exercise.

**If: You don't like the instructor.** Try a different program or instructor until you find one you do like. An instructor should be easy to follow and should offer encouragement and advice.

**If: It's too hard for you.** Don't push yourself so hard. Work up to your goals gradually.

**If: You're bored.** Build in variety. Try to exercise at a new time, in a new place, or find a new exercise altogether.

**If: You think you're too old.** You're not. You're never too old to feel better about yourself and feel the benefits of regular exercise.

**If: You can't keep it up day after day.** Don't. Find other ways to be active on days when you can't exercise. Take a short walk, plant a garden, clean a closet. Try cross-training!

**If: You don't feel like it or had a bad day.** Do it anyway. You'll probably feel good about it once you get started. Get the ball rolling and your mood will be better too!



**GET GOING-KEEP GOING**



**You'll be glad you did!**

**Physical Activities in the New River Valley Area**

**AEROBICS**

- The Body Shop (951-4229)  
Mon/Wed/Fri 8:15am  
Low impact aerobics  
Other classes available  
First class is free  
\$20.00 for 12 classes (no membership fee)
- The Fitness Connection (953-1044)  
Mon/Wed/Fri 10:00am Beginning class for older adults  
Mon/Wed/Fri 12:00pm Stretch Class  
Other classes available  
Discounts for adults age 62 and older
- Blacksburg Parks and Recreation (961-1135)  
Mon/Wed/Fri 10:00am  
Golden Aerobics for adults age 55 and older  
Other classes available  
\$12.00 for 13 classes, can try a class for \$1.00
- YMCA Open University (231-4208)  
Fitness classes/Stretch and tone classes available  
Fee per class (call for information/brochure)
- Senior Center in Christiansburg (382-8173)  
Mon/Wed/Fri 8:00am Senior Aerobics  
Tues/Thurs 9:00am Easy Motion Exercise  
No fee for either class, register at the Senior Center
- Radford Wellness Center (639-3241)  
Mon/Wed/Fri 10:00am  
Exercise classes for adults age 55 and older  
\$14.00 a month for classes
- Radford Recreation Department (731-3633)  
Mon/Tues/Wed/Thurs 10:00am, 5:45pm, 7:00pm  
All low impact classes  
\$10.00 a month for adults age 50 and older

**WATER AEROBICS**

- Blacksburg Aquatic Center (961-1852)  
Tues/Thurs 9:00am  
Offer classes designed specifically for seniors  
Fee varies for each session, register at the Aquatics Center

**SWIMMING**

- Blacksburg Aquatics Center (961-1852)  
Fees vary depending on membership selected  
Discounts for adults age 62 and older

## WALKING CLUBS

- The New River Valley Mall/Hearts in Motion (381-0004)  
Individualized program with quarterly meetings  
No fee for participation, register at the Mall  
Health screenings offered
- Radford Senior Center (731-3634)  
Mon/Wed/Fri 9:00am  
The Radford Recreation Gym  
No fee for participation, for adults age 50 and older
- Senior Center in Christiansburg (382-8173)  
Walk individually (record miles)  
Meet Thursdays 8:00am  
No fee for participation, register at the Senior Center
- Wellness Center in Radford (639-3241)  
Mondays 8:00am, April through November  
Blood pressure screening and exercise advice  
\$7.00 annual fee for participation

## MARTIAL ARTS

## DANCE

- Ed Hampton's School of Karate (552-3466)  
Tues/Thurs 6:15pm-8:00pm  
Internal Kung Fu, oriented toward health and building energy  
Three classes free, then discuss membership options
- Blacksburg Parks and Recreation (961-1135)  
Beginning and advanced karate  
Fees and times vary (call for information/brochure)
- YMCA Open University (231-4208)  
Various classes offered  
Call for information/brochure

## WEIGHTLIFTING

- YMCA Open University (231-4208)  
Various classes offered  
Call for information/brochure
- VTWC Fitness Center (951-2949)  
\$25.00 a month
- University Gym (552-2470)  
\$23.00 a month
- The Fitness Connection (953-1044)  
Discount for adults age 62 and older

## GOLF

- Municipal Golf Course (961-1137)
- Cox's Golf Driving Range (951-0948)
- Virginia Tech Golf Course (231-6435)

### FITNESS MACHINES

- Treadmills, bikes, rowers, and stairclimbers available at the following:
- The Fitness Connection (953-1044)
- VTWC Fitness Center (951-2949)
- Radford Community Hospital Wellness Center (639-3241)

### COURT SPORTS

- Tennis courts available on Virginia Tech campus and in Foxridge Apartment Community
- Racquetball courts available at The Fitness Connection (953-1044)
- Blacksburg Recreation Department has various team activities (volleyball, basketball)  
Call for information/brochure (961-1135)
- Radford Recreation Department has various team activities (volleyball, basketball)  
Call for information/brochure (731-3633)

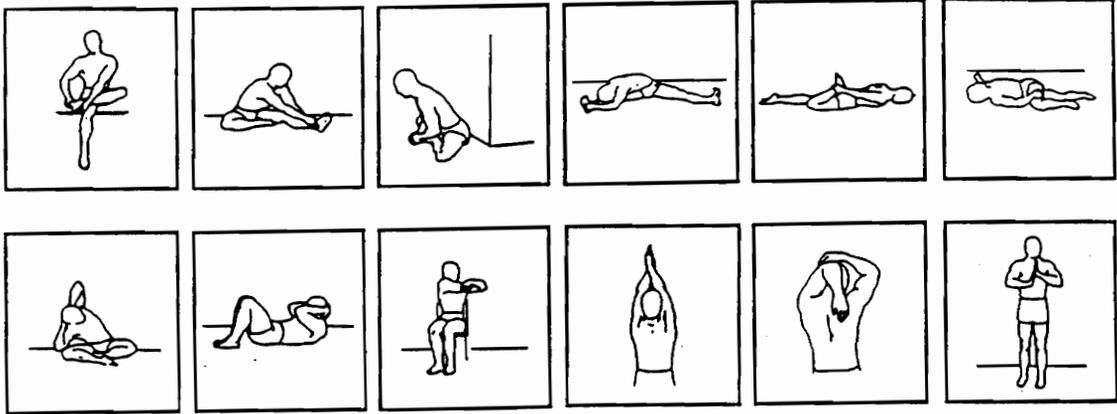
### NOTES

- Seniors refers to adults of age 55 or older unless otherwise specified
- Look for the Health Notes and Seniors columns in The New River Valley Current (inside the Roanoke Times) for additional activities

Appendix H  
**STRETCHING**

**Most Beneficial Stretches for the Older Athlete**

- To eliminate risk of injury, perform all stretches from a sitting or lying position for maximum balance and support.



**STRETCHING GUIDELINES**

Before beginning a stretching routine, always follow these guidelines.

- Warm up prior to stretching.
- Develop a positive mental attitude.
- Isolate the muscle group to be stretched.
- Move slowly and smoothly into the stretch to avoid initiation of the stretch reflex.
- Use proper mechanics and strive for correct alignment.
- Breathe normally and freely, but accentuate the exhalation when moving deeper into the stretch.
- Hold the stretch (usually about 20 seconds to 1 minute) and relax. Do not strain or passively force a joint beyond its normal range of motion.
- Concentrate and feel the stretch.
- Anticipate and communicate when stretching with a partner.
- Come out of each stretch as carefully as you went into it.

From: Alter, Michael (1990) Sport Stretch, Leisure Press

## Appendix I

Video Name Be Well: Physical Fitness in the Later Years (1983)

Distributor Churchill Films, Inc.

Film Length 24 minutes

### Content Examples

1. Woman shown sleeping, husband enters and tries to convince her to join him in walk. She complains no time, other excuses said by numerous individuals. Milton Berle explains we're all naturally lazy but need to move so don't get "the blahs."
2. Dr. Farquar shown-talks about problems of old age, often caused by inactivity.
3. Herbert DeFries shown-mentions functional capacity. Milton Berle discusses daily benefits: insomnia, weight, dependence. Man shown trying to take on too much too soon ("I'll really exercise"). Milton Berle and Dr. DeFries discuss need for check-up first.
4. Aerobic exercise and benefits discussed. Numerous models shown engaging in activities-describe how it has helped them.

Video Name Exercise and the Older Individual (1986)

Distributor Milner Fenwick, Inc.

Film Length 18 minutes

### Content Examples

1. Woman gets news from doctor. Dr. says her sugar and cholesterol is a bit high and weight has increased 5 or 6 lbs. Suggests diet and exercise. She asks, "Aren't I too old?" This woman shown periodically throughout video embarking on exercise program. Benefits shown and discussed.
2. Narrator discusses stress testing. Target heart rate discussed and how to find "target zone" explained.
3. Warming up discussed. Cold weather dressing described followed by explanation and modelling of how to walk for fitness. Cool-down discussed.
4. Social benefits shown and discussed.

YOUR PERSONALIZED EXERCISE PLANName SARAH SMITHCode Number 2099**EXAMPLE****DON'T FORGET...**

1. One step at a time! Small increases lead to big ones and are more likely to help you remain confident and injury free.
2. Stretch before and after exercise to loosen major muscle groups.
3. Warm up and cool down! For example, walk slowly and gradually work your way up to a brisk, comfortable pace. Likewise, slow down at the end of your workout before coming to a complete stop. Your heart and your muscles will thank you!
4. Don't push to the point of discomfort! You probably won't be doing anything good for your body and you certainly won't enjoy your exercise session. The saying, "no pain, no gain" is simply not true!

Are you ready to figure out the best plan of action for you? All you have to do is answer the following questions. We'll help you through it ...

**STEP 1:** What is the most important reason I want to exercise more?

GOAL = LOSE WEIGHT

**STEP 2:** What are the activities which would be best to do to help me achieve this goal?

SOME POSSIBLE ACTIVITIES = (WALKING, INDOOR BICYCLE, SWIMMING,  
LO-IMPACT AEROBICS)

**STEP 3:** Of these activities, which would I be willing to do more of or try out to see if I enjoy it?

ACTIVITY CHOICE(S) = WALKING

**STEP 4:** How many days per week and for how many minutes per session do I feel I could definitely exercise during the next 3 weeks? (Include at least 10 minutes for stretching, warming up, and cooling down. Then, subtract this from your goal below)

MINIMUM GOAL = 2 Days/Week 10 Minutes

**STEP 5:** What days of the week and times of the day do I feel confident I could regularly schedule exercise sessions?

DAYS = MON. + THURS. TIMES = 8 AM, 9 AM

STEP 6: Things sometimes get in the way of scheduled exercise. What are some alternative days and times I could exercise (I may have to re-arrange my schedule, but it's worth it!)?

ALTERNATIVE DAYS = TUES. + FRI. ALTERNATIVE TIMES = 5 PM, 5:30 PM

STEP 7: What are some alternative activities I would be willing to try if I find that I don't enjoy, can't participate in, or tire of my chosen activity(ies)?

ALTERNATIVE 1 = SWIMMING ALTERNATIVE 2 = INDOOR BIKE

STEP 8: Knowing me, the following are things that I predict could interfere with my exercise routine:

REASONS I MIGHT NOT EXERCISE = SCHEDULE CONFLICTS (E.G., TRAVEL),  
TOO TIRED

STEP 9: I'll plan ahead to deal with these situations. These are things I'll try to do which I think might work for me:

POTENTIAL INTERFERENCE 1 = SCHEDULE CONFLICTS

STRATEGY(IES) = ① IMMEDIATELY COMMIT TO MY ALTERNATIVE DAYS + TIME  
② TELL MYSELF THAT A 10 MIN. WALK CAN BE FIT INTO A VACATION TOO ③ ADJUST MY SCHEDULE AHEAD OF TIME

POTENTIAL INTERFERENCE 2 = TOO TIRED

STRATEGY(IES) = ① REMIND MYSELF THAT EXERCISE IS ENERGIZING  
② REMIND MYSELF THAT I'LL FEEL BETTER (AND PROUD) AFTERWARD IF I "JUST DO IT"

POTENTIAL INTERFERENCE 3 = ③ BEGIN STRETCHING - THIS SHOULD GET ME IN THE MOOD TO EXERCISE

STRATEGY(IES) = \_\_\_\_\_

STEP 10: I'll definitely deserve a reward if I exercise more! I'll reward myself with one of the following for each week I achieve my minimum goal:

MY REWARD CHOICES = BUY SOMETHING NEW TO PLANT IN MY GARDEN,  
SEE A MOVIE

STEP 11: What if I don't follow this plan and I don't reach my minimum exercise goal? That must mean that there are some changes I'll need to make in my plan. I'll go back through steps 1-10 and see where the difficulties arose. Then I'll make an adjustment and try out the new, modified plan!

**YOUR PERSONALIZED EXERCISE PLAN**

Name \_\_\_\_\_

Code Number \_\_\_\_\_

**DON'T FORGET...**

1. One step at a time! Small increases lead to big ones and are more likely to help you remain confident and injury free.
2. Stretch before and after exercise to loosen major muscle groups.
3. Warm up and cool down! For example, walk slowly and gradually work your way up to a brisk, comfortable pace. Likewise, slow down at the end of your workout before coming to a complete stop. Your heart and your muscles will thank you!
4. Don't push to the point of discomfort! You probably won't be doing anything good for your body and you certainly won't enjoy your exercise session. The saying, "no pain, no gain" is simply not true!

Are you ready to figure out the best plan of action for you? All you have to do is answer the following questions. We'll help you through it ...

**STEP 1:** What is the most important reason I want to exercise more?

GOAL = \_\_\_\_\_

**STEP 2:** What are the activities which would be best to do to help me achieve this goal?

SOME POSSIBLE ACTIVITIES = \_\_\_\_\_

**STEP 3:** Of these activities, which would I be willing to do more of or try out to see if I enjoy it?

ACTIVITY CHOICE(S) = \_\_\_\_\_

**STEP 4:** How many days per week and for how many minutes per session do I feel I could definitely exercise during the next 3 weeks? (Include at least 10 minutes for stretching, warming up, and cooling down. Then, subtract this from your goal below)

MINIMUM GOAL = \_\_\_\_\_ Days/Week \_\_\_\_\_ Minutes

**STEP 5:** What days of the week and times of the day do I feel confident I could regularly schedule exercise sessions?

DAYS = \_\_\_\_\_ TIMES = \_\_\_\_\_

**STEP 6:** Things sometimes get in the way of scheduled exercise. What are some alternative days and times I could exercise (I may have to re-arrange my schedule, but it's worth it!)?

ALTERNATIVE DAYS = \_\_\_\_\_ ALTERNATIVE TIMES = \_\_\_\_\_

**STEP 7:** What are some alternative activities I would be willing to try if I find that I don't enjoy, can't participate in, or tire of my chosen activity(ies)?

ALTERNATIVE 1 = \_\_\_\_\_ ALTERNATIVE 2 = \_\_\_\_\_

**STEP 8:** Knowing me, the following are things that I predict could interfere with my exercise routine:

REASONS I MIGHT NOT EXERCISE = \_\_\_\_\_

**STEP 9:** I'll plan ahead to deal with these situations. These are things I'll try to do which I think might work for me:

POTENTIAL INTERFERENCE 1 = \_\_\_\_\_

STRATEGY(IES) = \_\_\_\_\_

POTENTIAL INTERFERENCE 2 = \_\_\_\_\_

STRATEGY(IES) = \_\_\_\_\_

POTENTIAL INTERFERENCE 3 = \_\_\_\_\_

STRATEGY(IES) = \_\_\_\_\_

**STEP 10:** I'll definitely deserve a reward if I exercise more! I'll reward myself with one of the following for each week I achieve my minimum goal:

MY REWARD CHOICES = \_\_\_\_\_

**STEP 11:** What if I don't follow this plan and I don't reach my minimum exercise goal? That must mean that there are some changes I'll need to make in my plan. I'll go back through steps 1-10 and see where the difficulties arose. Then I'll make an adjustment and try out the new, modified plan!

Appendix L

**MY COMMITMENT**

I, \_\_\_\_\_, have developed an individualized exercise plan and hereby make a commitment to myself and the researchers to try to follow my plan to the best of my ability. I am aware that this plan is not binding - I may adjust any parts of it at any time. However, I sincerely want to exercise more than I do currently and will therefore attempt to do so by trying out the plan I have developed today.

Signature \_\_\_\_\_

Code # \_\_\_\_\_

Date \_\_\_\_\_

Appendix M

Self-Efficacy Questionnaire

Code # \_\_\_\_\_

Date \_\_\_\_\_

Please indicate your confidence in your ability to persist with exercise in the following situations by circling the appropriate number. You may circle 0 if the item does not apply to you.

I am confident I can participate in regular exercise when:

1. I am tired

0 does not apply to me      1-----2-----3-----4-----5-----6-----7 very confident  
not at all confident

2. I am in a bad mood

0 does not apply to me      1-----2-----3-----4-----5-----6-----7 very confident  
not at all confident

3. I feel I don't have the time

0 does not apply to me      1-----2-----3-----4-----5-----6-----7 very confident  
not at all confident

4. I am on vacation

0 does not apply to me      1-----2-----3-----4-----5-----6-----7 very confident  
not at all confident

5. It is raining or snowing

0 does not apply to me      1-----2-----3-----4-----5-----6-----7 very confident  
not at all confident

## Appendix N

### Outcome Expectancy Questionnaire

Code # \_\_\_\_\_

Date \_\_\_\_\_

This questionnaire asks you to indicate what you think would happen to you if you were to exercise regularly. Please indicate your agreement or disagreement by placing the appropriate number in the blank space beside each statement.

- 1=Disagree
- 2=Disagree Somewhat
- 3=Unsure
- 4=Agree Somewhat
- 5=Agree

- \_\_\_ I would have more energy for my family and friends if I exercised regularly
- \_\_\_ Regular exercise would help me relieve tension
- \_\_\_ I think I would be too tired to do my daily work after exercising
- \_\_\_ I would feel more confident if I exercised regularly
- \_\_\_ I would sleep more soundly if I exercised regularly
- \_\_\_ I would feel good about myself if I kept my commitment to exercise regularly
- \_\_\_ I would find it difficult to find an exercise activity that I enjoy that is not affected by bad weather
- \_\_\_ I would like my body better if I exercised regularly
- \_\_\_ It would be risky for me to exercise regularly because of my age
- \_\_\_ It would be easier for me to perform routine physical tasks if I exercised regularly
- \_\_\_ I would feel uncomfortable when I exercise because I would get out of breath and my heart would beat very fast
- \_\_\_ I would feel less stressed if I exercised regularly
- \_\_\_ I would feel more comfortable with my body if I exercised regularly
- \_\_\_ Regular exercise would help me have a more positive outlook on life
- \_\_\_ Family members would worry about me if I exercised regularly
- \_\_\_ Regular exercise would help me control my weight
- \_\_\_ I would have less time for my family and friends if I exercised regularly
- \_\_\_ Regular exercise would make me more independent or help keep me independent
- \_\_\_ Regular exercise would be fun
- \_\_\_ At the end of the day, I would be too exhausted to exercise
- \_\_\_ Regular exercise would help reduce anxiety, tension, or depression for me
- \_\_\_ Regular exercise would enhance my social life
- \_\_\_ Regular exercise would reduce my risk for physical problems like bone loss, diabetes, and heart disease

Appendix O

**ACTIVITY LOG**

Thank you for your participation in this exercise project. Please record the following for each occasion that you exercise. Asking participants to obtain verification is a standard part of studies such as this one. Therefore, please obtain a signature, receipt, or other form of verification of activity whenever possible. Also, a guideline for recording your "perceived exertion" (last column) is attached. Thank you!

Code # \_\_\_\_\_

	Date	Activity (e.g., walking)	How long? (total minutes)	Verification signature	Relation to participant (e.g., walking partner)	Perceived exertion
<u>CORRECT</u> EXAMPLE:	5/20/94	Swimming (laps)	20	<i>D. Smith</i>	Lifeguard at pool	3
<u>INCORRECT</u> EXAMPLE:	5/20/94	{ Stretching Aerobics Housework	60	<i>J. Doe</i>	<i>Spouse</i>	3

Each of these activities and the time spent doing each should be recorded as a separate entry (Separate line for each one)

Type of Aerobics should be specified. Example - "Aerobics-low impact tape"

Housework should not be entered (see Activities List)

Does this say Spouse? Please write clearly!

---

---

---

---

---

---

---

---

---

---

## Appendix P

### Perceived Exertion Scale

The Perceived Exertion Scale is a self-report scale which was developed to assess your perceptions of physical workload or exertion during exercise - how "hard or heavy" you felt you exercised. After your exercise session, please record a number from this scale which best matches your perceived exertion at the peak (most strenuous point) of your workout. We recommend that you maintain a moderate level of exertion when exercising.

- |     |                              |
|-----|------------------------------|
| 0   | Nothing at all               |
| 0.5 | Very, very weak              |
| 1   | Very weak                    |
| 2   | Weak                         |
| 3   | Moderate                     |
| 4   | Somewhat strong              |
| 5   | Strong                       |
| 6   |                              |
| 7   | Very strong                  |
| 8   |                              |
| 9   |                              |
| 10  | Very, very strong<br>Maximal |



6. How motivated do you feel now to increase your exercise level or maintain the increase that you have achieved?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Not at all motivated                      Somewhat motivated                      Very motivated

7. How easy or difficult was it to complete the activity logs over the weeks?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Very easy                                      A bit difficult                                      Very difficult

8. How enjoyable were the following parts of the meeting?

Videotapes                      1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Very unenjoyable                      Neutral                      Very enjoyable

Information Review                      1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Very unenjoyable                      Neutral                      Very enjoyable

Personal Planning                      1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Very unenjoyable                      Neutral                      Very enjoyable

9. How helpful were the following parts of the group meeting?

Videotapes                      1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Not at all helpful                      Neutral                      Very helpful

Information Review                      1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Not at all helpful                      Neutral                      Very helpful

Personal Planning                      1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Not at all helpful                      Neutral                      Very helpful

10. How comfortable did you feel during the personal planning section of the group meeting?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Very uncomfortable                      Neutral                      Very comfortable

11. How often did you look at and/or think about your personal exercise plan during the 6 weeks following the meeting?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5  
Never                                      Occasionally                                      Every day

12. Do you feel that the questionnaires you completed asked pertinent questions?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

If no, please explain

---

---

---

13. Please describe what you would change, if anything, about the meeting you attended

---

---

---

14. Please comment further if you would like

---

---

---

---

**Thank you very much. We appreciate your feedback!**



6. How motivated do you feel now to increase your exercise level or maintain the increase that you have achieved?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5 \_\_\_\_\_  
Not at all motivated                      Somewhat motivated                      Very motivated

7. How easy or difficult was it to complete the activity logs over the weeks?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5 \_\_\_\_\_  
Very easy                                      A bit difficult                                      Very difficult

8. How enjoyable was the meeting?

1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5 \_\_\_\_\_  
Not at all enjoyable                                      Neutral                                      Very enjoyable

9. Do you feel that the questionnaires you completed asked pertinent questions?

\_\_\_\_\_ Yes                                      \_\_\_\_\_ No

If no, please explain

---

---

---

10. Please describe what you would change, if anything, about the meeting you attended

---

---

---

11. Please comment further if you would like

---

---

---

---

Thank you very much. We appreciate your feedback!

## **CURRICULUM VITAE**

**Donna M. Yaffe**

### **Addresses**

505 West University Parkway, A22  
Baltimore, MD 21210  
(410) 366-8340

The Johns Hopkins University School of Medicine  
Department of Psychiatry and Behavioral Sciences  
600 North Wolfe Street/Meyer 218  
Baltimore, MD 21287-7218  
(410) 955-6606 FAX: (410) 614-3366

### **Education**

- 1990-1996 Virginia Polytechnic Institute and State University  
Blacksburg, VA  
Doctorate of Philosophy in Clinical Psychology  
Area of Concentration: Health Psychology  
Dissertation: Increasing Physical Exercise Among Older Adults: The  
Effects of Information, Peer-Modelling, Personalized Planning, and  
Commitment-Making  
Preliminary Examination Paper: Physical Activity Among Older Adults: Problems  
of Initiation and Maintenance and the Potential Usefulness of Matching  
Strategies  
Advisor: Richard Winett, Ph.D.
- 1988-1990 University of the Pacific  
Stockton, CA  
Master of Arts in Psychology  
Area of Concentration: Behavioral Medicine  
Thesis: Hostility and Type A beliefs: Relationship to  
Emotional and Physical Reactivity Among Coaches  
Advisor: Martin Gipson, Ph.D.
- 1981-1985 Brown University  
Providence, RI  
Bachelor of Arts in Psychology  
Honors Thesis: Visual Control of Stride Length During Running  
Thesis Advisor: William Warren, Ph.D.

### **Professional Affiliations**

Association for the Advancement of Behavior Therapy  
Society of Behavioral Medicine  
American Psychological Association

## Clinical Experience

September 1995 to present     Post-Doctoral Fellowship in Behavioral Medicine  
Division of Medical Psychology  
Department of Psychiatry and Behavioral Sciences  
The Johns Hopkins University School of Medicine, Baltimore, MD  
Supervisors: Jennifer Haythornthwaite, Ph.D. and Leslie Heinberg, Ph.D.

Provide psychological assessment, cognitive-behavioral interventions, and consultation to patients and multi-disciplinary treatment team on an inpatient chronic pain unit. Facilitate coping skills group for chronic pain patients three times per week. Provide individual psychotherapy and consultation and evaluation services. Presently developing therapist manual for chronic pain coping skills group. Co-wrote proposal for research study which will investigate the cognitive effects of aerobic and anaerobic exercise on elderly residents at a local retirement community.

1994-1995     Pre-Doctoral Internship in Clinical Psychology (Health Psychology Track)  
West Haven VA Medical Center, West Haven, CT  
Supervisors: Robert Kerns, Ph.D., Matthew Burg, Ph.D., Teresa Cozza, Psy.D., Annette Payne, Ph.D., and Andrew Meisler, Ph.D.

All clinical activities were conducted throughout the internship year except the cardiac health and pain management programs, which were each 6 month rotations.

Cardiac Health and Rehabilitation Program. Psychosocial evaluation of patients referred to CHRP and co-facilitation of a structured group therapy program for recently discharged patients and patients identified as high risk for CAD.

Comprehensive Pain Management Center. Functioned as primary clinician and case manager - conducted comprehensive cognitive-behavioral evaluations and provided individual and couples treatment within cognitive-behavioral and rehabilitation perspectives.

Health Promotion Program. Developed and implemented groups for patients wishing to stop smoking and manage stress more effectively.

Health Psychology Outpatient Clinic. Evaluated and provided therapy for patients seen during hospitalization and patients referred from outpatient sources throughout the medical center.

Renal Dialysis Center. Acted as consulting member of the dialysis health care team, working closely with physicians, nursing staff and other mental health professionals involved in patient care. Conducted stress management seminar with nursing staff.

PRIME. A newly funded initiative in primary care. Served as member of the treatment team in an outpatient medicine clinic within the medical center. Evaluated psychosocial and life-style factors in the assessment of patients' risk for subsequent illness and current patient needs. Within the context of the treatment team, devised plans for the provision of services targeted to the presenting problem and the reduction of illness risk. Also served a consultation and educational role within this interdisciplinary team setting.

Sexual Dysfunction Program. Conducted clinical interviews and subsequent treatment/evaluation recommendations. Coordinated inpatient evaluations where nocturnal penile tumescence monitoring, neurological examination, and additional clinical evaluation was completed to further enhance the ability to determine the relative contribution of organic and psychogenic factors. Provided psychological treatment of dysfunction when appropriate.

Psychological Consultation Liaison Service. Provided clinical evaluation, formulation of recommendations, and development of appropriate intervention strategies.

Substance Use/PTSD Treatment Program. Provided evaluation, individual treatment, and was facilitator of a relapse prevention group for dual-diagnosis veterans.

1993 - 1994      Pain Management Counselor  
Center for Behavioral Medicine  
Radford, VA  
Supervisor: Bruce Walker, Ph.D.

Multidisciplinary clinic for patients with chronic pain. Conducted psychological evaluations and group therapy/training sessions (assertiveness, pain management, stress management, relaxation training, and biofeedback). Also provided individual and couples counseling and gathered and processed program evaluation statistics. Developed a couples interview which is now a standard element of the clinic's intake evaluation protocol. Presented "Dealing with the Difficult Patient" to CBM staff.

1990-1991      Graduate Clinician  
and  
1992-1993      Psychological Services Center  
VPI & SU, Blacksburg, VA  
Supervisors: George Clum, Ph.D. and Russell Jones, Ph.D.

Provided individual and couples' therapy with individuals from the community and university. Also provided assessment and diagnosis of individuals with a variety of presenting problems. Supervised first and second year students as fourth year clinician during 1992-1993.

1991-1993      AIDS Risk Reduction Group Leader  
Supervisors: Richard Winett, Ph.D. and Laurie Desiderato, Ph.D.

Graduate Project Assistant for NIH funded multi-site grant aimed at reducing high risk sexual behavior among gay men in small cities (Principle Investigator: Jeff Kelley, Ph.D., University of Wisconsin Medical Center). Clinical intervention involved co-leading six session AIDS education and communication groups to influential gay men in two Southeastern communities.

1992-1993      Sport Psychology Consultant  
VPI & SU Women's Basketball and Volleyball Teams  
Blacksburg, VA  
Supervisors: George Clum, Ph.D. and Richard Winett, Ph.D.

Worked collaboratively with coaches and players to create individual and team goals and feedback system. Served as consultant to coaching staff. Provided individual counseling to team members presenting with interpersonal and/or performance-related difficulties. Conducted various workshops including assertiveness training and relaxation.

1988 -1990      Graduate Therapist  
Behavioral Medicine Clinic, University of the Pacific  
Stockton, CA  
Supervisors: Gary Howells, Ph.D. and Doug Matheson, Ph.D.

Utilized behavior therapy techniques, including biofeedback, provided family counseling, and provided psychological testing and diagnosis. Also co-led parent training workshop.

1988 -1990      Health Promotion Intern  
Health and Safety Office, Stockton Developmental Center  
Stockton, CA  
Supervisor: Wendy Maxwell, M.S.

Developed and conducted various health-related workshops for employees including stress management and back care workshops.

1989 -1990      Cardiac Rehabilitation Stress Management/Support Group Leader  
St. Joseph's Medical Center  
Stockton, CA  
Supervisor: Tom Styers, R.N.

Led weekly stress management groups with patients involved in SJMC cardiac rehabilitation program. Topics included diaphragmatic breathing, progressive muscle relaxation, cognitive restructuring, and nutrition.

1986-1987      Milieu Therapist  
AtlantiCare Medical Center; Lynn, MA

Behavior management and counseling for emotionally disturbed children and adolescents in a therapeutic day school.

1984-1985      Counselor for Autistic Adolescents  
Behavioral Development Center; Providence, R.I.

1984-1985      Peer Counselor  
Brown University; Providence, R.I.

### Teaching Experience

1990 and 1993      Graduate Teaching Assistant  
Introductory Psychology  
Virginia Tech - Blacksburg, VA

Led discussion groups and aided in administrative work for undergraduate course.

1988-1990      Graduate Teaching Assistant  
Abnormal Psychology, Human Sexuality, Behavior Change Practicum  
University of the Pacific - Stockton, CA

Led discussion groups, supervised practicums, guest lectured, and did administrative work for undergraduate psychology courses.

## Research

- 1996                    Dissertation Research  
Title: Increasing Physical Exercise Among Older Adults: The Effects of Information, Peer-Modelling, Personalized Planning, and Commitment-Making  
Advisor: Richard Winett, Ph.D.
- Study evaluated cognitive and behavioral changes among sedentary older adults following the presentation of videotapes (providing information and peer modelling) and commitment making to an individualized exercise plan. Dependent measures included exercise self-efficacy and outcome expectancies and frequency and duration of activity.
- 1996-present        Effects of Aerobic and Anaerobic Exercise on Cognition Among the Elderly
- Study evaluating the acute and long-term effects of aerobic and strength training exercise on various cognitive parameters among elderly residents at a local retirement community. Proposal has been approved to be conducted at the retirement community and subject recruitment is anticipated occur Fall, 1996.
- 1991-1993            Community Intervention to Reduce AIDS Risk Behavior  
Graduate Project Assistant
- Multisite NIMH funded 3 year project evaluated the impact across settings of an intervention based on the diffusion of innovation model to reduce high risk sexual behavior among homosexual men in smaller, rural cities. Popular opinion leaders in the community social networks were trained to inform others about safer sex practices and ways to put these practices into action. Dependent measures included self-reports of risk behavior, condom counts taken from gay bars, and reports of sexually transmitted diseases and AIDS cases reported in relevant counties.
- 1992                    "Golden Olympics" Study
- Qualitative study investigated barriers and incentives to exercise among older adults participating in an annual Olympic style event in Virginia. Developed, implemented and analyzed both survey and interview data.
- 1989-1993            Masters Thesis Research  
Title: Hostility and Type A beliefs: Relationship to Emotional and Physical Reactivity Among Coaches  
Advisor: Martin Gipson, Ph.D.
- Correlational study evaluated the relationship between measures of Type A beliefs, hostility, anger, cardiovascular symptomology, and emotional reactivity among male college and university basketball coaches predominantly in Northern California.
- 1991                    AIDS Risk Behavior Among College Women  
Focus group leader
- Conducted focus groups with women at a single-sex college in Virginia. The groups were aimed at identifying beliefs and attitudes about AIDS risk as well as risk behavior. The information was used to help develop a risk reduction intervention.

## Publications

Kelly, J. A., Murphy, D. A., Roffman, R. A., Solomon, L. J., Winett, R. A., Stevenson, L. Y., Koob, J. J., Ayotte, D. R., Flynn, B. S., Desiderato, L. L., Hauth, A. C., Lemke, A. L., Lombard, D., Morgan, M. G., Norman, A. D., Sikkema, K. J., Steiner, S., & Yaffe, D. M. (1992). Acquired Immunodeficiency Syndrome/Human Immunodeficiency Virus risk behavior among gay men in small cities: Findings of a 16-city national sample. *Archives of Internal Medicine*, *152*, 2293-2297.

## Presentations

Hauth, A. C., Perry, M. J., Solomon, L. J., Kelly, J. A., Roffman, R. A., Winett, R. A., Sikkema, K. J., Kalichman, S. C., Desiderato, L. L., Norman, A. D., Koob, J. J., Stevenson, L. Y., Morgan, M. G., Steiner, S., Yaffe, D. M., Flynn, B. S., & Lemke, A. (1993). Heavy alcohol use is strongly associated with continued risky sex among gay men: Risk behavior patterns and alcohol-sex attributions. Paper presented to the IX International Conference on AIDS, Berlin.

Kelly, J. A., Solomon, L. J., Roffman, R. A., Winett, R. A., Sikkema, K. J., Stevenson, L. Y., Kalichman, S. L., Koob, J. J., Yaffe, D. M., Steiner, S., Perry, M., Norman, A. D., Morgan, M. G., Lombard, D., Lemke, A. L., Hauth, A. C., Desiderato, L. L., Flynn, B. S., & Ayotte, D. R. (November, 1992). Producing HIV risk behavior change among gay men in small cities by community diffusion of innovation: Results of a 16-city randomized field trial. Paper presented at the 120th Annual Meeting of the American Public Health Association, Washington, D.C.

Kelly, J. A., Sikkema, K. J., Murphy, D. A., Kalichman, S. L., Stevenson, L. Y., Morgan, M. G., Koob, J. J., Hauth, A. C., Solomon, L. J., Perry, M., Flynn, B. S., Ayotte, D. R., Winett, R. A., Desiderato, L. L., Yaffe, D. M., Lombard, D., Roffman, R. A., Norman, A. D., Steiner, S., & Lemke, A. L. (August, 1992). Community level intervention to prevent the spread of HIV infection. Symposium presentation to the Annual Meeting of the American Psychological Association, Washington, D. C.

Kelly, J. A., Sikkema, K. J., Winett, R. A., Solomon, L. J., Roffman, R. A., Kalichman, S. L., Stevenson, L. Y., Koob, J. J., Lombard, D., Morgan, M. G., Norman, A. D., Perry, M., Steiner, S., Yaffe, D. M., Ayotte, D. R., Flynn, B. S., Desiderato, L. L., Hauth, A. C., & Lemke, A. L. (July, 1992). Outcomes of a 16-city randomized field trial of a community-level HIV risk reduction intervention. Paper presented at the VIII International Conference on AIDS, Amsterdam.

Yaffe, D., Watkins, P.L., & Gipson, M. (April, 1991). Hostility and Type A beliefs: Relationship to emotional and autonomic reactivity among coaches. Poster presented at the meeting of the Society for Behavioral Medicine, Rockville, MD.

Foster, M., Gipson, M., Ciccolella, M., Yaffe, D., Moore, R., & Gottshall, K. (April, 1989). Behavioral science in athletic training: Status and needs. Poster presented at the meeting of the Society of Behavioral Medicine, San Francisco.

Gipson, M., Foster, M., Yaffe, D., O'Carroll, V., Bene, C., & Moore, R. (April, 1989). Opportunities for health psychology in sports medicine services and training. Poster presented at the meeting of the Western Psychological Association, Reno, NV.

Hankins, P., Gipson, M., Foster, M., & Yaffe, D. (April, 1989). Social-psychological context of injured women volleyball players: Diagnosis and rehabilitation. Poster presented at the meeting of the Society of Behavioral Medicine, San Francisco.

Yaffe, D.M. (April, 1989). Computer-assisted treatment application for essential hypertension (D.W. Matheson, Chair). Symposium presentation at the meeting of the Western Psychological Association.

### Invited Addresses

Payne, A., Yaffe, D.M., & Broderick, D. (1995). Managing Chronic Pain. Cooperative Health Education Program, Department of Veterans Affairs, Togus, Maine.

### Grants

Graduate Research Development Project grant recipient, 1993. Grant awarded for dissertation research by the Graduate Student Assembly at Virginia Polytechnic Institute and State University.

### Review Activities

Ad Hoc Reviewer for Society of Behavioral Medicine Abstracts, 1995

Guest reviewer for the Journal of Applied Behavioral Analysis, 1993

A handwritten signature in black ink that reads "Doreen Yaffe". The signature is written in a cursive style with a large initial 'D' and 'Y'.