

THE INFLUENCE OF PARTICIPANT PREFERENCE AND PERCEIVED
DIFFICULTY ON EXERCISE ADHERENCE

By

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This study examined whether (a) assignment to preferred versus non-preferred exercise treatments or (b) perceived difficulty of prescribed exercise predicted adherence to walking programs that varied in intensity and frequency. This study also examined the relationship between pre-exercise treatment preference and perceived difficulty.

Participants were 68 female and 84 male sedentary adults (65.1% Caucasian, 20.4% African American, 6.6% Asian, 5.9% Hispanic, 2.0% unspecified; mean age = 49.2 years). Participants were randomly assigned in a 2X2 design to walk 30 min/day at an intensity of either 45-55% or 65-75% of maximum heart rate reserve, at a frequency of either 3-4 days/week or 5-7 days/week. *Prior* to notification of treatment assignment, each participant indicated a preferred level (moderate versus high) of intensity and frequency for exercise training. *After* notification of actual treatment assignment but *before* beginning the exercise program, each participant rated the perceived difficulty associated with completing the assigned treatment. Dependent measures were derived

from daily exercise logs completed over six months. Analyses were completed for the proportion of total prescribed minutes completed and for the proportion of total prescribed minutes completed while in a target heart rate training zone. Results showed that participants assigned to their preferred treatment did not exhibit different rates of frequency or intensity adherence than those assigned to non-preferred treatments. Perceived difficulty showed a significant negative correlation with the proportion of prescribed minutes of exercise completed ($r = -.20, p = .04$); however, this relationship was mediated by the level of intensity assigned. Participants who preferred programs of moderate frequency, moderate intensity walking made significantly higher ratings of perceived difficulty of their assigned prescription than did participants who preferred regimens of higher frequency and higher intensity ($p = .03$). Post-hoc analyses revealed that baseline aerobic fitness (VO_{2max} adjusted for age and sex) was largely responsible for this relationship, with less fit individuals preferring regimens of moderate intensity. However, the association between baseline fitness and exercise adherence was not significant (frequency adherence, $p = .09$; intensity adherence, $p = .20$). Collectively, these findings suggest that program-related variables, such as the intensity level of prescribed exercise, may be more influential in predicting exercise adherence than person-related variables such as participant preference, perceived difficulty, or baseline fitness.

CHAPTER 1 INTRODUCTION

Sedentary behavior has been linked to the development of a variety of chronic illnesses, including coronary heart disease, type 2 diabetes, hypertension, colon cancer, and obesity (United States Department of Health and Human Services, 2002). Thus, recognizing that an inactive lifestyle is a modifiable risk factor, public health officials have made initiatives promoting increased physical activity a priority in recent years. While the percentage of Americans reporting no leisure-time physical activity has decreased from 31% in 1989 to 26% in 2004 (Centers for Disease Control and Prevention, 2004), a great deal of research is still being dedicated to investigating ways to bring this statistic down even more. Further, even when individuals do adopt exercise programs, long-term adherence to increased physical activity is problematic (Marcus et al., 2000). Thus, much of the current literature has focused on investigating the variables that might be responsible for promoting or compromising adherence.

A potential exerciser's perceptions and preferences regarding a prescription of structured exercise may influence subsequent adherence to the program. Social cognitive theory (Bandura, 1997) and behavioral choice theory (Epstein, 1998) posit that individuals engaging in a preferred modality of exercise will show better adherence than those engaging in a non-preferred type of exercise. A variety of studies have investigated the factors that participants may consider when making these appraisals of a recommended exercise program. Preferences based on type of exercise have been examined in both the U.S. (King et al., 2000) and in Australia (Booth et al., 1997);

studies concur that walking is the preferred type of exercise among both middle-aged and older adults. Further, a population-based mail survey of 1,332 adults found that 53% of respondents preferred unstructured physical activity, while only 31% preferred structured activity (Salmon et al., 2003). This survey research has focused largely on inquiring about the qualitative aspects of exercise. However, there is little data on preference for the quantitative aspects of exercise, namely the preferred frequency and intensity levels of exercise.

After determining what kinds of exercise individuals prefer, a number of researchers have examined whether recommending preferred programs of exercise might be an avenue through which exercise adherence may be bolstered. Some studies have shown that assigning participants to their preferred modality of weight loss (Adams, 1998) and exercise (Parfitt & Gledhill, 2004) have led to more successful behavior change, as well as to other benefits such as heightened self-efficacy and improved psychological health. Yet other studies have failed to show improved adherence based on tailoring treatment to individual preferences. For instance, when sedentary adults were given either standardized or tailored physical activity prescriptions, participants did not differ significantly in the amount of activity completed (Renjilian et al., 2001). In addition, participants who were given a choice of activities in an exercise class did not show higher rates of attendance than individuals assigned to a particular activity (Patten et al., 2000). Hence, the influence of individuals' a priori preferences on subsequent exercise adherence remains unclear.

Self-efficacy may be another cognitive factor that influences adherence. A number of studies have found that higher self-efficacy during an exercise program (Brassington et

al., 2002) is associated with superior adherence. Further, self-efficacy has emerged as a more powerful predictor of exercise maintenance than other psychological constructs such as exercise intention, attitude, and affect (Courneya & McAuley, 1994). One component of self-efficacy particularly important in exercise adherence is perceived difficulty of the program (Garcia & Mann, 2004; Hagger et al., 2004). A number of studies have investigated which factors a participant might consider when assessing the difficulty of a recommended program of exercise. It has become clear that individuals use a variety of criteria in making these appraisals. While the general population cites lack of time (Godin et al., 1994), lack of facilities (Salmon et al., 2003), and laziness (Godin et al., 1991) as significant barriers to adhering to an exercise regimen, older adults endorse health status as an important determinant of difficulty (Booth et al., 1997).

Perceived difficulty during exercise and concurrent adherence have been related in several studies. In population-based survey research, correlations between perceived difficulty and exercise participation have been detected (De Bourdeaudhuij & Sallis, 2002). This pattern has been detected in intervention studies as well; for example, ratings of perceived difficulty made after five weeks of participation in an exercise program accounted for 38% of the variance in adherence to the 11 week supervised regimen. While these findings may be important when working with individuals who are already engaged in an exercise program, there may be clinical utility in assessing perceived difficulty before exercise actually begins.

Some studies have found that baseline ratings of the broader construct of self-efficacy can also predict subsequent exercise adherence. For instance, in a study of overweight adults receiving counseling for changes in physical activity in a primary care

setting, baseline self-efficacy predicted positive changes in activity level after 4 months and after 12 months of the intervention (Stephens et al., 2000). However, other studies have found that the dose of exercise recommended was more predictive of adherence than was exercise self-efficacy assessed at baseline (Petrella et al., 2003). Thus, it remains unclear whether baseline ratings of perceived difficulty, a component of self-efficacy, might be predictive of subsequent exercise adherence.

This study examined the influence of participant preference and perceived difficulty on adherence to walking regimens. We hypothesized that these cognitive constructs, when assessed at baseline, would predict subsequent exercise adherence. Specifically, we predicted that those participants assigned to preferred exercise programs would show different rates of adherence than those participants assigned to non-preferred programs of exercise. In addition, we hypothesized that participants' pre-exercise ratings of perceived difficulty of their assigned program would be negatively related to their adherence to that program over the course of the exercise trial. Lastly, we hypothesized that there would be a relationship between these two pre-exercise cognitions; namely, those participants preferring prescriptions of moderate intensity and frequency would make higher ratings of perceived difficulty to their assigned programs than would those participants preferring programs of high intensity and frequency. We attempted to advance the existing literature by assessing these characteristics before the initiation of exercise and by employing an objective and cumulative measure of adherence over a six-month period.

CHAPTER 2 MATERIALS AND METHODS

Participants

Participants were 152 healthy but sedentary women ($n = 68$) and men ($n = 84$) participating in a 2-year study examining the effects of walking regimens that differed in frequency and intensity. (The participant data considered in the present study comprise a subset of the participants from the parent study (Perri et al., 2002). Because only the fourth and fifth cohorts of this 5 cohort study completed the questionnaires from which the data were extrapolated, only these participants' data could be considered. The subsample chosen did not differ from the total sample in terms of relevant baseline characteristics.) Participants were adults, aged between 30 and 69 years, who endorsed a sedentary lifestyle (defined as less than one hour per week of leisure-time physical activity over the prior 12 months), had a body mass index (BMI) between 19 and 45 and a resting blood pressure below 140 mm Hg systolic and 90 mm Hg diastolic. Participants also consented to maintaining their typical physical activity patterns and to not beginning any new exercise programs other than the one assigned in the study. Individuals who failed to give informed consent, who refused to accept random assignment, or who were already involved in another research study were excluded. Potential participants were also excluded if, at screening, their medical history, clinical examination, or laboratory results revealed any of the following conditions: coronary heart disease; chronic or recurrent respiratory or gastrointestinal conditions; hypercholesterolemia (for women, LDL-cholesterol > 190 mg/dl; for men, > 160 mg/dl) or use of antihyperlipidemia

medication; diabetes mellitus; fasting blood glucose > 110 mg/dl; cancer within 10 years; or bone, muscle, or joint conditions that would prevent walking on a regular basis.

Women in the study agreed to use appropriate birth control to avoid pregnancy during the course of the study.

Procedures

Recruitment

Participants were recruited through newspaper advertisements, direct mailings, community-based presentations, and television and radio announcements. After completing an initial screening by telephone, potentially eligible individuals attended an informational meeting during which the investigators explained the study in detail and obtained informed consent from the participants. After consenting, participants completed a medical history questionnaire that inquired about illness and surgery history, as well as about current medication use.

Baseline assessment

During a baseline testing session, each participant completed a symptom-limited maximal exercise test to determine maximum heart rate. Prior to this treadmill test, blood pressure and a standard 12-lead electrocardiogram were obtained in the sitting and standing positions. Three ECG leads were monitored continuously during the exercise test and a 12-lead ECG was repeated every 60 seconds of exercise and at 1, 3, and 5 minutes into recovery. Participants between the ages of 30 and 49 years performed the standard Bruce protocol (Bruce et al., 1973). Participants between the ages of 50 and 69 years performed a modified Bruce protocol (Pollock & Willmore, 1990), with workloads increasing by approximately three metabolic equivalents every 3 minutes. The tests continued until participants reached voluntary maximal exertion or until they became

symptomatic or developed significant hemodynamic or electrocardiographic endpoints.

The Karvonen formula (American College of Sports Medicine, 1986) was used to calculate heart rate reserve, HR_{res} ($HR_{res} = HR_{max} - \text{resting HR}$).

Experimental Design

Following stratification by age (30-49 years and 50-69 years), sex, and peak oxygen consumption (VO_{2max}), participants were randomly assigned to one of the following four exercise training conditions: (1) higher intensity, higher frequency; (2) higher intensity, moderate frequency; (3) moderate intensity, higher frequency; (4) moderate intensity, moderate frequency, or to a fifth group, (5) a physician's advice group. The computer randomization was carried out using SAS's PROC PLAN (Spector et al., 1985).

Intensity prescriptions. After determining each participant's maximum and resting heart rate during the baseline treadmill testing, each individual was given an individualized training heart rate (THR). Participants in the moderate intensity groups were assigned a THR corresponding to 45-55% HR_{res} ; participants in the higher intensity were given a THR corresponding to 65- 75% HR_{res} . These designations of 'moderate' and 'higher' correspond to the intensity ranges characterized as 'moderate' and 'hard' in the 1996 Surgeon General's Report (USDHHS, 1996). Participants were taught how to monitor their heart rate during the orientation to the program, and they were instructed how to adjust their walking pace to adhere to their intensity prescription, so that their heart rate would fall in their assigned THR zone. In order to confirm self-reported heart rate values during unsupervised walking sessions, each participant completed a 30 minute walk during the weekly meetings on three separate occasions - during weeks 5, 12, and 24 - while wearing a monitor that recorded heart rate at one minute intervals.

Frequency prescriptions. With regard to the frequency prescriptions, participants were instructed to walk in their THR zone for 30 minutes a day (either in a continuous session or in up to three sessions, each at least 10 minutes in duration) for either 3-4 days (in the moderate frequency conditions) or 5-7 days (in the higher frequency conditions). Walking could be completed at home or at a work site or both. Further, each participant was given a tailored program to gradually attain his or her full intensity and frequency prescription over the first month of the study.

Exercise Intervention

Following randomization, the participants in exercise training groups (1-4) participated in an exercise intervention using walking as the mode of training for a total of 24 months. The first six months consisted of the active treatment, and the last eighteen months focused on maintenance. Participants were instructed to attend each of the 11 group intervention sessions offered over the first six months. The sessions were led by counselors (counterbalanced by condition) with graduate training in exercise science and/or behavioral science who followed a structured manualized protocol. The sessions focused on various aspects of social cognitive theory (Bandura, 1986), and included lessons on such topics as goal setting, cognitive restructuring, self-monitoring, and problem solving. Sessions were conducted weekly during Month 1, biweekly during Months 2 and 3, and monthly during Months 4-6. Participants could accumulate walking minutes during the day in either structured 10 minute walking increments or more continuously (for a total duration of 30 structured minutes/day). Further, training occurred wherever was most convenient for the participant (i.e. at home, work, or some combination thereof).

Exercise Logs

Each day, participants were instructed to use daily training logs for self-monitoring of their exercise. In these logs, participants recorded the duration (i.e. number of minutes) and the intensity (i.e. average heart rate) of all leisure-time bouts of walking of at least 10 minutes duration that occurred during that day. Each participant was given a Polar Beat Heart Rate monitor (Polar Electro, Inc., Port Washington, N.Y.), which displayed the participant's heart rate continuously. Participants were told to wear the monitor during each bout of walking and to record in their exercise logs the heart rate they observed most frequently. The exercise logs were collected by staff at the intervention sessions, and when participants were absent from these sessions, staff collected the information by telephoning the participants.

Predictor Measures

Exercise preference. After attending an informational session during which an investigator explained how the four walking programs in the study would differ in the frequency and intensity of exercise that would be required, participants answered the following question: *As you know, in this study it will be necessary to randomize you to a training group. However, if you could choose, which training program would you choose to be in?* Participants answered in a forced-choice format, endorsing one of the following: (a) walking at a moderate intensity, 3-4 days/week; (b) walking at a moderate intensity, 5-7 days/week; (c) walking at a high intensity, 3-4 days/week; (d) walking at a high intensity, 5-7 days/week; (e) walking at any intensity that you want on each day you walk; or (f) other. Participants answered this question *before* they were notified of their actual randomization assignment, and thus before they began exercise.

Perceived difficulty. After participants were informed of which of the four walking programs they had been randomized to, they were asked the following question: “*Now that you know which training program you will be asked to participate in, how difficult do you think it will be for you to accomplish the expected changes in your physical activity?*” Participants made a global rating of difficulty, on a scale ranging from 0 (not difficult at all) to 100 (maximally difficult). Ratings were made *before* participants began their exercise programs.

Criterion Measures

Two indicators of exercise adherence were calculated: (a) *frequency adherence*, the mean proportion of prescribed walking minutes completed per week, and (b) *intensity adherence*, the mean proportion of prescribed walking minutes completed in target heart rate zone per week. Previous studies have suggested that heart rate is a valid and reliable indicator of the intensity level of physical activity (King et al., 1991). Each of these proportions was calculated using data recorded on the daily exercise logs kept by the participants over the 6-month intervention. For participants in the moderate frequency groups, the total number of walking minutes completed per week (and total number of minutes completed in their target heart rate zone) was divided by 90 minutes (30 min on 3 days); for participants in the higher frequency groups, the total number of walking minutes per week (and total number for minutes completed in their target heart rate zone) was divided by 150 minutes (30 min on 5 days). Missing data were treated in a conservative fashion, by assuming that when participants did not record exercise in their logs, the exercise did not occur. In addition, if a participant dropped out of treatment, it was assumed that he or she had stopped exercising.

Statistical Analyses

Treatment preference. Those participants who had been assigned to the walking program for which they had indicated a preference were dummy coded in the analysis with a value of 0 and labeled “matched” participants. Those participants who had been assigned to one of the three walking programs for which they had not indicated a preference were dummy coded as 1 in the analysis and labeled “mismatched” participants. Subsequently, the “matched” and “mismatched” participants were compared in independent sample t-tests with regard to measures of frequency adherence and measures of intensity adherence. An alpha level of .05 was used for significance testing.

Perceived difficulty. Two Pearson bivariate correlations were conducted; one examining the relation between ratings of perceived difficulty and frequency adherence and the other examining the relation between ratings of perceived difficulty and intensity adherence. An alpha level of .05 was used for significance testing.

Relation between treatment preference and perceived difficulty. A one-way analysis of variance (ANOVA) was conducted to compare differences in perceived difficulty ratings when participants were grouped according to which of the four walking programs they had endorsed as their preferred group. The between-subjects variable was which walking program a participant indicated as preferred; there were four levels of this variable, one for each of the four programs offered. The dependent variable was ratings of perceived difficulty. An alpha level of .05 was used for significance testing and Bonferroni corrections were used in post hoc testing.

CHAPTER 3 RESULTS

Participant Characteristics

The sample was composed of 152 middle aged, overweight, but well educated men ($n = 84$) and women ($n = 68$). The baseline demographic characteristics of participants when grouped according to whether they were assigned to their preferred prescription are displayed in Table 1. The ethnic-racial makeup of the sample was 65.1% Caucasian, 20.4% African American, 6.6%Asian, 5.9% Hispanic, and 2.0% unknown. ANOVAs showed that the treatment groups did not differ significantly in baseline measures of age, educational level, or BMI. After six months of the intervention, 9 women and 6 men had dropped out, five of whom were African-American and ten of whom were Caucasian, and these participants had a mean age of 46.93 ($SD = 9.4$) and a mean body mass index of 24.80 ($SD = 5.01$). The racial composition, sex composition, BMI, and age of the group before individuals dropped out and the group after the individuals dropped out were not significantly different.

Treatment Preference

After comparing participant preferences and actual randomization assignments, 23 individuals were labeled “matched” participants while 82 were labeled “mismatched” participants. Those participants who did not complete the questionnaire were excluded from this analysis. The two groups that emerged did not differ significantly in mean age, education level, gender composition, racial composition, fitness level, or BMI ($ps > .05$). Independent samples t-tests revealed that those assigned to preferred exercise

prescriptions did not differ from those not assigned to preferred prescriptions in terms of frequency adherence or intensity adherence. The results of the t-tests are shown in Table 2. The effect sizes of the frequency and intensity adherence analyses were $d = 0.26$ and 0.11 , respectively; both are small effect sizes (Cohen, 1988).

Perceived Difficulty

A significant negative relationship was detected between perceived difficulty and frequency adherence ($r = -.20$, $R^2 = .04$, $p = .04$). The relationship between perceived difficulty and intensity adherence was marginally significant ($r = -0.17$, $p = .09$). However, after conducting a 2 X 2 ANOVA, with assigned intensity level (moderate versus high) and assigned frequency level (moderate versus high) as between-subject factors and perceived difficulty as the dependent variable, a significant main effect emerged for intensity level assigned [$F(1, 100) = 9.12$, $p = 0.003$]. Individuals assigned to higher intensity prescriptions made significantly higher perceived difficulty ratings than those assigned to moderate intensity prescriptions, as described in Table 3. There was no main effect of assigned frequency nor an interaction between frequency and intensity assignments.

To determine whether the association between perceived difficulty and adherence was mediated by the intensity prescribed, a partial correlation was conducted controlling for the assigned intensity level. The findings showed a weakened association between perceived difficulty and frequency adherence ($r = -.16$, $p = 0.11$) and intensity adherence ($r = -.07$, $p = .50$). Thus, intensity assignment appeared to partially mediate the relationship between perceived difficulty and adherence.

Relation between Treatment Preference and Perceived Difficulty

A one-way ANOVA, conducted to determine whether a relationship existed between prescription preference and perceived difficulty of assigned prescription, revealed significant group differences [$F(3, 96) = 3.01, p = .03$]. Means and standard deviations of ratings of perceived difficulty (made by participants when grouped by exercise preference) are shown in Table 4. Post-hoc analyses using Bonferroni corrections showed that those who preferred a prescription of moderate frequency and moderate intensity reported significantly higher ratings of perceived difficulty than did participants who preferred a prescription of higher frequency and higher intensity ($p < 0.05$).

Secondary Analyses

A series of one-way ANOVAs were conducted to establish whether relevant baseline characteristics might be related to either treatment preference or to ratings of perceived difficulty. To examine the relation between treatment preference and baseline characteristics, a series of 2X2 ANOVAs were conducted. The between-subjects variables for all ANOVAs were preferred walking frequency and preferred walking intensity. The dependent variables examined were age, sex, baseline fitness (VO_{2max}), and exercise history (minutes of exercise/year). Bonferroni corrections were used in post hoc testings. The ANOVA examining baseline fitness revealed a significant main effect for intensity preference, but no main effect was uncovered for either frequency preference or the interaction between frequency and intensity preferences. Those individuals preferring moderate intensity exercise were significantly less fit at baseline than those preferring high intensity programs [$F(1, 116) = 4.23, p = .04$].

To examine the relation between perceived difficulty ratings and baseline characteristics, a series of Pearson bivariate correlations were conducted to look for associations between perceived difficulty and age, sex, baseline fitness, or exercise history. The only significant negative relation that emerged was between baseline fitness and the perceived difficulty of assigned exercise prescription ($r = -.21, p = .03$). Thus, it appeared that baseline fitness partially mediated the relation between intensity preference and perceived difficulty. However, baseline fitness and adherence (the original construct of interest) were not related (frequency adherence, $r = .16, p = 0.09$; intensity adherence, $r = .12, p = .20$).

Lastly, to determine the amount of variance that each examined variable (match to preferred group, perceived difficulty, frequency assignment, intensity assignment) contributed to each measure of adherence, two linear regressions were conducted. In both regressions, the level of intensity of exercise prescribed accounted for the greatest proportion of the variance when the variance from the other factors were accounted for (frequency adherence, $\beta = -.16$; intensity adherence, $\beta = -.40$). The only factors that contributed significant unique variance were the level of intensity assigned and the level of frequency assigned in the intensity adherence analysis. The beta weights associated with each factor in each regression are displayed in Table 5. In addition, it was found that match to preferred group, perceived difficulty, frequency assignment, and intensity assignment (when considered simultaneously in a regression model) collectively accounted for 53% of the variance in frequency adherence and for 62% of the variance in intensity adherence.

Table 1. Baseline Demographic Characteristics of Participants Assigned to Preferred and Non-Preferred Groups

Characteristic	Preferred Group		Non-Preferred Group		p
	M	SD	M	SD	
Age (years)	48.44	8.42	49.28	9.46	.69
BMI (kg/m ²)	28.40	5.74	28.04	5.19	.76
VO ₂ max (ml/kg/min)					
Men	32.04	4.29	29.25	6.28	.32
Women	24.70	4.58	24.28	4.44	.85

Table 2. Adherence of Participants Assigned to Preferred or Non-Preferred Exercise

	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
Frequency Adherence						
Assigned Preferred	30	.56	.39			
Assigned Non-preferred	122	.68	.35			
				-1.47	.14	.26
Intensity Adherence						
Assigned Preferred	30	.49	.39			
Assigned Non-preferred	122	.55	.37			
				-.76	.45	.11

Note. Adherence refers to the proportion of the minimum prescription fulfilled by the participant over six months.

Table 3. Ratings of Perceived Difficulty with Participants Grouped by Intensity Assignment

<i>Intensity Assignment</i>	M	SD
Moderate	24.17	25.70
High	38.21	25.89

Note. Ratings of perceived difficulty were made on a global scale from 0 (no difficulty) to 100 (maximally difficult).

Table 4. Ratings of Perceived Difficulty with Participants Grouped by Exercise Preference

<i>Exercise Preference</i>	M	SD
Moderate Frequency/Moderate Intensity	43.96 _a	27.78
High Frequency/Moderate Intensity	28.84 _{ab}	27.51
Moderate Frequency/High Intensity	28.79 _{ab}	22.94
High Frequency/High Intensity	19.58 _b	19.94

Note. Ratings of perceived difficulty were made on a global scale from 0 (no difficulty) to 100 (maximally difficult); means with different subscripts are significantly different from each other at $p < .05$.

Table 5. Standardized Beta Weights for Factors Contributing to Variance in Exercise Adherence

Adherence Type	Factor	β	p
Frequency Adherence			
	Match to Preferred Exercise	.14	.17
	Perceived Difficulty	-.13	.23
	Frequency Assigned	-.14	.17
	Intensity Assigned	-.16	.13
Intensity Adherence			
	Match to Preferred Exercise	.10	.27
	Perceived Difficulty	-.02	.85
	Frequency Assigned	-.20	.04
	Intensity Assigned	-.40	.001

Note. Adherence refers to the proportion of the minimum prescription fulfilled by the participant over six months.

CHAPTER 4 DISCUSSION

The present study examined how a potential exerciser's initial impressions of a physical activity program might be associated with subsequent adherence to the program. The associations between various baseline participant characteristics and cognitions were also investigated. Although we hypothesized that participants assigned to preferred levels of walking frequency and intensity would show different rates of adherence than participants who were not, our data did not reveal such a difference. However, the effect size of the frequency adherence analysis (Cohen's $d = .26$) suggests that there may have been insufficient power to detect this relatively small effect size. Nonetheless, these findings imply that tailoring treatments to participant preference may not effectively improve adherence in clinical settings.

Additionally, although we found support for our hypothesis that frequency adherence and perceived difficulty were negatively related, the relationship was only marginally significant for intensity adherence. Also, these relationships appeared to be partially explained by prescription assignment. When level of assigned intensity was controlled for, the relationships between perceived difficulty and adherence were weakened. These results concur with prior studies (Dishman & Buckworth, 1996; Perri et al., 2002) that found participants in higher intensity groups showed poorer adherence than participants assigned to moderate intensity exercise. Therefore, intensity assignment may be a more important factor than perceived difficulty when considering adherence to exercise programs.

Lastly, our data supported the hypothesis that prescription preference and perceived difficulty are related. Participants who preferred prescriptions of moderate frequency and intensity reported significantly higher ratings of perceived difficulty than did those participants who preferred higher frequency and intensity. Participants' fitness was related to both prescription preference and perceived difficulty; thus, baseline fitness level may be responsible for this relationship. However, there emerged no relationship between fitness and adherence.

Collectively, these findings suggest that *characteristics of an exercise program*, such as the intensity level of exercise prescribed, may be more influential in predicting exercise adherence than *characteristics of the individual*, such as participant preference, perceived difficulty, or baseline fitness. Further, the characteristics of the program appeared to be more predictive of intensity adherence than frequency adherence, as the level of frequency and level of intensity assigned each contributed significant, unique variance to intensity adherence. Because the intensity adherence measure captured information regarding both frequency and intensity of exercise, it is likely that this measure was more sensitive and therefore was able to detect existing relationships.

Thus, prescribing moderate intensity exercise may be more effective in improving adherence than tailoring programs to participant-related variables. This finding may be particularly important when prescribing exercise for highly fit individuals, who may perceive less difficulty and thus prefer programs of higher intensity. Since our results suggests that individuals assigned to higher intensity programs may show compromised adherence, these potential exercisers might benefit from encouragement to begin with moderate intensity programs.

This study represents a methodological improvement over previous research conducted in this area. The majority of studies assessing the factors governing changes in physical activity have gathered their data at a single time point. For example, one study assessing osteoporosis health beliefs and the practice of preventative weight-bearing exercises collected information about both factors in a single testing session (Wallace, 2002), as did another study investigating the association between older women's beliefs about exercise barriers and the amount of physical activity practiced (O'Brien Cousins, 2000). By contrast, participants in the present study indicated their perceived level of difficulty before commencing exercise; therefore we are able to make some conjectures about the direction of causality between perceived difficulty and adherence.

In addition, previous studies have generally not utilized objective measures of adherence, relying solely upon general, retrospective self-reports that are often descriptive in nature (i.e. Corwyn & Brenda, 1999). To address this limitation, the present study used daily logs to track exercise, with participants utilizing heart rate monitors to gather an objective measure of intensity and using pedometers to conduct validity testing of reported frequency.

There were, however, a number of potential limitations associated with the present study. The first limitation involves the measure used to gather data concerning treatment preference. Because participants were simply asked to indicate which of the four walking programs they preferred, they had no method to indicate the strength of their preference. Therefore, especially for those participants whose strength of preference was weak, the test-retest reliability of the measure would likely be low, bringing its validity into

question. In addition, relying on a single item to encompass potentially complicated constructs may have rendered our analyses too crude and insensitive to detect existing relationships. Another limitation concerning the treatment preference investigation was that participants were not randomly assigned to either their preferred walking program or their non-preferred walking program. These analyses were conducted after the trial had been completed; thus, the “matched”/ “mismatched” distinction was made post-hoc. This necessarily led to a larger group of participants who were “mismatched” with their preferred group. However, Levene’s test for homogeneity of variance was not significant, supporting the assumption that the variance of the “matched” group did not differ significantly from the variance of the “mismatched” group.

There were also a variety of potential limitations associated with the design of the parent study. First, the measures of adherence were derived completely from self-reported data, subject to intentional and accidental inaccuracies. However, previous research has shown self-reported heart rate to be a reliable and valid indicator of intensity during physical activity (King et al., 1991; Koltyn & Morgan, 1992; Pollock & Wilmore, 1990). Also, past studies have demonstrated high convergent validity for exercise logs shown through agreement with ambulatory HR monitoring (King et al., 1991). Further, since participants were given heart rate monitors to monitor intensity during exercise, we were able to obtain a sample of digitally recorded heart rate data during selected exercise bouts. An examination of these data revealed that most participants were indeed walking within their prescribed heart rate zones. Second, before generalizing our findings to a larger population of sedentary adults, one must consider the fact that our participants had a considerably higher level of educational achievement ($M = 15.9$ years of education, SD

= 3.7) than would be expected overall for adults in the United States, and that the majority of our sample was Caucasian (65.1%). Further, the climate in the community where the study was conducted (Gainesville, FL) may have been particularly favorable for outdoor exercise, without the ice and snow that may represent barriers to exercise in other locations. On the other hand, however, the heat and humidity present in the summer months may have represented a barrier that those in other communities may not have to face.

In light of this final limitation, extensions of this work should investigate whether these findings generalize to other specific populations for which exercise recommendations are being made. For instance, it may be useful to assess whether the initial impressions of an exercise program influence adherence in a more obese population, for which the perceived barriers and probable preferences likely differ. In addition, because pediatric obesity is becoming an increasingly serious problem in the United States, it may behoove public health officials to determine how initial impressions of an exercise program influence children's adherence to activity programs. Another possible extension of this research could investigate the effect of these initial impressions on long-term maintenance of exercise, since the findings of the present study are limited to the "adoption" phase of an exercise program.

In summary, the present study suggests that, during the adoption phase of exercise, the characteristics of the recommended program are more predictive of adherence than are characteristics of potential exercisers. Specifically, the data suggest that participants exhibited higher adherence rates to programs of moderate, rather than high, intensity; this relation appeared to exist regardless of participant exercise

preference, perceived difficulty, or fitness at baseline. Thus, as public health officials continue to revise recommendations for physical activity, it is suggested that recommending programs of moderate intensity may lead to better adherence among the majority of previously sedentary, middle-aged, unfit American adults.

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BIOGRAPHICAL SKETCH

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