

Manual Development and Pilot Testing of a Mindfulness- and Acceptance-Based Intervention

for Increasing Cardiorespiratory Fitness in Sedentary Adults

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**Abstract**

The aim of this research project was to conduct a manual development study and an open clinical trial in order to demonstrate the feasibility and efficacy of a mindfulness and acceptance based intervention for increasing cardiorespiratory fitness (CRF) in sedentary adults through adherence to a fitness walking program. Development of the treatment manual followed a 3-phase process (literature review and initial draft preparation, expert review, draft revision) based on expert systems analysis, and organizational structure was derived from Carroll and Nuro's Stage Model for Psychotherapy Manual Development. Field experts (N=3) were provided with the manual draft, as well as a semi-structured interview form for revision data. The manual included treatment introduction sections for the therapist and the participant, as well as 8 topic modules. In the 10-week open trial, sedentary adults (N=24) engaged in a fitness walking program, while attending regular group therapy sessions whose content was based primarily on Acceptance and Commitment Therapy (ACT). Results indicated a large significant decrease in total walk test time [ $t(18) = 4.61, p = .0002, d = 0.64$ ], with a mean decrease of 64.69 seconds. A moderate significant increase in estimated V02max [ $t(18) = -4.05, p = .0007, d = -0.43$ ] was also evidenced, with a mean increase of 2.9 ml/kg/min. Analyses indicate a moderate non-significant increase in general experiential acceptance as measured by the AAQ-II [ $t(18) = 1.18, p = .26, d = 0.37$ ], and a large significant increase in experiential acceptance of exercise-related internal experiences [ $t(18) = -9.19, p < .0001, d = -2.09$ ] as measured by the PA-AAQ. Finally, feasibility and acceptability of the intervention were demonstrated through high levels of adherence to the walking program, group attendance, and measures of comprehension. This study demonstrated the usefulness of ACT in the field of behavioral medicine, particularly with health behavior change.

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## **Background and Significance**

### **Introduction**

Engaging in vigorous physical activity (PA) has been widely promoted for increasing one's level of cardiorespiratory fitness (CRF). *Healthy People 2020*, a comprehensive document published by the United States Department of Health and Human Services (USDHHS) which sets forth a 10-year agenda for improving our nation's health, includes as an objective to increase the percentage of adults who engage in vigorous PA regularly (USDHHS, 2010b). Vigorous PA has been shown to be a predictor of CRF, which is itself a strong, independent predictor of premature morbidity and mortality in adults (Lee et al., 2010). To illustrate this strong predictive relationship recent research has shown relative risk (95% CIs) of mortality to be 0.42 (0.36 to 0.48) for men with high levels of CRF and 0.50 (0.36 to 0.71) for women, compared to men and women with low CRF as the referent at 1.00 (Lee et al., 2010).

The 2008 Physical Activity Guidelines for Americans recommends that adults engage in a minimum of one hour and 15 minutes of vigorous PA per week (USDHHS, 2008). For more extensive health benefits, that amount is increased to two and a half hours per week. However, only 31% of American adults report engaging in regular leisure-time PA, while the general population averages only 5,117 steps per day (Bassett, Wyatt, Thompson, Peters, & Hill, 2010; USDHHS, 2010a). Additionally, it should be noted that the above percentage relates to those meeting minimal PA standards; it is likely the percentage for those engaging in vigorous PA that promotes CRF is substantially lower.

Numerous studies have found CRF to be an independent predictor of all-cause (Blair et al., 1995; Blair et al., 1989; Kodama et al., 2009; Mora et al., 2003), cardiovascular (Blair et al.,

1989; Kodama et al., 2009, Mora et al., 2003, Sandvik et al., 1993), type 2 diabetes (Blair & Church, 2003; Wei et al., 1999) and cancer (Blair et al., 1989) related mortality in men and women. Therefore it is understandable why vigorous PA, a behavior that promotes CRF, would be targeted as a modifiable risk factor in the *Healthy People* document. However, the dose-response curve between CRF levels and risk reduction does not show an evenly graded relationship (Blair et al., 1989; Williams, 2001). Indeed, research has shown that the largest risk reduction often occurs between the lowest fitness categories and the second lowest (Blair et al., 1989; Blair & Church, 2003; Lee et al., 2010; Myers et al., 2004; Myers et al., 2002; Williams, 2001). Specifically, mortality rates show the largest difference between the least-fit grouped individuals and the next-least-fit group. Demonstrating this point, Lee and colleagues (2010) found a nearly 44-45% risk reduction in a sample of relatively healthy men and women moving from low to moderate CRF, but only 6-13% reduction when comparing men and women with moderate CRF to those with high CRF. This suggests that the health benefits of CRF are highlighted when moving those with extremely low fitness levels to more moderate levels, and supports a public health focus on more sedentary individuals.

### **Cardiorespiratory Fitness and Physical Activity**

Vigorous levels of PA have been found to increase aerobic fitness more effectively than moderate PA, as well as demonstrating greater health gains across multiple domains (Swain & Franklin, 2006). Various clinical trials have found higher exercise intensity groups to have greater increases in aerobic capacity when compared to lower intensity groups (Braith, Pollock, Lowenthal, Graves, & Limacher, 1994; Crouse et al., 1997; Kang et al., 2002). Further epidemiological research regarding vigorous PA outcomes has also shown greater health benefits in terms of blood pressure and glucose control (Swain & Franklin, 2006). Finally, vigorous PA

has additionally been found to produce greater cardioprotective benefits, including decreased risk for coronary heart disease (CHD), while lower intensities have failed to demonstrate the same relationship (Lee, Sesso, Oguma, & Paffenbarger, 2003; Sesso, Paffenbarger, & Lee, 2000; Tanasescu et al., 2002). Many of these cardioprotective benefits have been found regardless of whether the increases in intensity were relative or absolute (Lee et al., 2003).

Despite the above findings, many fitness and PA trials continue to prescribe moderate intensity exercise programs. In part, this may be due to the fact that past CRF research has shown a significant difference between adherence levels to high intensity fitness promoting prescriptions when compared to moderate intensity prescriptions (Duncan et al., 2005). While the reason for this difference is often not formally addressed, it is likely that participants find high-intensity exercise to be in some way more aversive, possibly due to uncomfortable physiological sensations or self-defeating thoughts, than moderate intensity exercise.

Accompanying cognitive-behavioral therapeutic techniques widely used in fitness and PA trials (e.g. Duncan et al., 2005; Dunn et al., 1999) often focus on controlling, restructuring, or eliminating these negative thoughts and emotions as a means of promoting behavioral engagement. However, as previously stated and expanded upon below, only a small amount of success in increasing CRF gains has been found using these techniques.

### **Previous Fitness Trials**

While multiple trials have been published regarding various types of PA interventions, relatively few have targeted CRF. A brief review of key studies that have targeted CRF gains is appropriate in order to fully evaluate the progress made thus far. Overall, the studies referred to below, while of high-caliber, have fallen short of demonstrating truly significant clinical gains. Further inspection offers some insight as to the strengths and limitations of these studies.

Dunn and colleagues (1999), in their randomized control trial comparing lifestyle and structured interventions, evaluated both PA outcomes as well as CRF. Sedentary men and women were randomized into either a structured exercise group in a supervised setting, or a lifestyle group, in which participants were encouraged to engage in a certain amount of PA in a way that adapted to their lifestyle. For both groups, a psychological model for behavior change based on cognitive and behavioral strategies was used. The cognitive strategies adopted specifically targeted changing the participant's ways of thinking about PA. Results found similar gains in PA and CRF between groups. While the authors reported that the gains in CRF were statistically significant, it should be noted that these gains approximated only about a half of a MET<sup>1</sup>.

Like Dunn et al. (1999), Duncan and colleagues' (2005) exercise intervention also used psychological counseling that utilized cognitive reframing techniques, and encouraged participants to "replace" their negative internal experiences (i.e. thoughts) with more positive ones. Again, minimal gains in CRF were evidenced. However, this study did show between group differences suggesting that three to four days per week of higher intensity exercise (i.e. 65-75% Heart Rate Reserve [HRR]) could have similar health benefits to five to seven days per week of moderate intensity exercise (i.e. 45-55% HRR); with high intensity and high frequency being the most beneficial combination. Again, it should be noted that this most beneficial category also demonstrated the lowest adherence rates, possibly due to the increased negative internal experiences associated with it.

More recently, Church and colleague's 2007 randomized trial with overweight or obese postmenopausal women documented only about a half of a MET change in their best group, with

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<sup>1</sup> Metabolic equivalent. One MET is equivalent to a VO<sub>2</sub> of 3.5 mL/kg/minute

others showing even smaller gains. While adherence was reportedly high in the lab based study, exercise intensity was moderate (i.e. 50% of HRR), and no complementary psychological programming was utilized. The above trials were well-managed, large-scale interventions, and yet they fell short of producing the cardiorespiratory gains needed to significantly decrease health risks (Blair et al., 1995; Blair et al., 1989; Hu et al., 1999; Myers et al., 2004; Myers et al., 2002). These studies primarily used moderate intensity prescriptions, despite the superior health findings associated with higher intensity exercise (Swain & Franklin, 2006). One explanation for this relates to the lower adherence rates documented for higher intensity groups (Duncan et al., 2005). A possible solution could be addressing the psychological and/or behavioral origins precluding adequate engagement in and adherence to this cardioprotective regimen.

### **Contextual Cognitive Behavioral Therapies**

Recently, cognitive-behavioral therapies (CBTs) have shifted into what some consider a “third wave”, focusing on alternative therapeutic constructs such as acceptance, awareness, defusion, motivation, cognitive flexibility, commitment, mindfulness, and many others (Hayes, 2004a). New contextual CBTs, such as Acceptance and Commitment Therapy (ACT; Hayes, Stroschal, & Wilson, 1999), are inherently different from their predecessors, with five distinct characteristics being identified (Hayes, Villatte, Levin, & Hildebrant, 2011). The first of these is their focus on the context or function of a problematic cognition, behavior, emotion, or sensation, rather than its content, form, or frequency (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Stroschal, & Wilson, 2004; Hayes et al., 2011). Second, these therapies are broad and flexible, allowing for a transdiagnostic approach to presenting mental health issues. Third, these therapies often recommend or even require that the therapist engage in and explore the same therapeutic processes as the client; for example, by working to contact their own values, or enhancing their

mindfulness practice. Additionally, contextual therapies build on previous empirically supported approaches, including strategies such as exposure and self-monitoring. Finally, contextual approaches often are used in arenas that have not traditionally been the focus of traditional CBTs, such as spirituality, stigma, prejudice, and sense of self (Hayes et al., 2011).

The overarching goal of ACT is to produce greater *psychological flexibility*, therefore decreasing *experiential avoidance* while increasing *experiential acceptance* of negative internal events (Hayes et al., 2006). Psychological flexibility can be thought of as the ability to peacefully acknowledge the presence of difficult sensations or faulty thoughts in the present moment, and to accept the feelings that may accompany these sensations and thoughts, while continuing to act in a value-based fashion (Hayes, 2004b; Lillis, Hayes, Bunting, & Masuda, 2009). This is achieved through various processes that fall into two categories; the first being commitment and behavior change processes and the second, mindfulness and acceptance processes. Commitment and behavior change processes include contact with the present moment, values, and committed action, whereas the mindfulness and acceptance processes include acceptance, defusion, and self as context. These constitute the six core processes that are typically focused on in ACT. Experiential avoidance, in the ACT paradigm, refers to the ubiquitous nature of humans to avoid or escape negative internal experiences (Hayes et al., 1999, 2004b). However, in our attempt to fix, alter, or restructure these unwanted private experiences we often distract ourselves from our value-based behavioral path, and inundate ourselves with suffering. The six processes described above also help to decrease one's experiential avoidance; not through an attempt to change or reduce these experiences, but rather through a reduction of the effect or influence they have (Harris, 2006; Hayes et al., 1999, 2004b).

**Mindfulness.** Mindfulness is a practice with significant history and roots in Eastern meditative and philosophical traditions; however, recently mindfulness has been growing as a contemporary clinical process and technique for psychotherapy (Dimidjian & Linehan, 2003; Germer, 2005; Rejeski, 2008; Wilson, 2008). In this realm, mindfulness is defined many ways, but with similar conceptualizations. An often cited definition of mindfulness is “paying attention in a particular way: on purpose, in the present moment, nonjudgmentally,” (Kabat-Zinn, 1994, pp.4). Another recommended definition for mindfulness in association with contemporary psychotherapy is “awareness of present experience, with acceptance,” (Germer, 2005, pp.7). Today, numerous empirically supported mindfulness-based therapies exist, including mindfulness based stress reduction (MBSR), Dialectical Behavior Therapy (DBT), and mindfulness-based relapse prevention.

ACT is often referred to as an acceptance based therapy, however there is significant overlap between acceptance and mindfulness interventions (Dimidjian & Linehan, 2003), and mindfulness can be seen in ACT both as a process and as a technique (Harris, 2009; Hayes et al., 2004b; Wilson, 2008). ACT’s originators refer to it as a mindfulness-based therapy due to the conceptualization of mindfulness as a dynamic fusion of the ACT processes of acceptance, defusion, self as context, and contact with the present moment (Hayes et al., 2004b; Wilson, 2008). Many of the experiential techniques and metaphors used in ACT directly involve mindfulness practices, or, as with acceptance and defusion, can be more effectively carried out in a mindful state.

**Acceptance.** Within ACT, the process of acceptance is seen as a willingness to experience uncomfortable or even painful internal events without engaging in avoidance or change strategies (Harris, 2009; Hayes et al., 1999, 2004b). This process involves acceptance of

private experiences (e.g. thoughts, feelings, sensation, and memories), rather than passivity in regards to situational experiences (Harris, 2009). In this process one's thoughts, feelings, and sensations are acknowledged and accepted, unchanged and independent of judgment or desire (Hayes et al., 2004b; Wilson, 2008). Therapeutically, the idea of "expansion" is often used in reference to acceptance, referring to the creation of a space or making room for these uncomfortable experiences. Acceptance work overlaps with other ACT processes, such as mindfulness and defusion. For instance, in order to practice acceptance with a feeling or sensation, we must first be mindful of its presence. Within the ACT model, it is explicitly stated that acceptance is not resignation or tolerance. It does not necessitate that one like or enjoy a particular emotion or sensation, but simply allow it (Harris, 2009; Hayes et al., 1999, 2004).

It is advocated that acceptance be used when it can facilitate actions that are in line with one's values. When coming into contact with painful internal experiences, it should be used in the service of meaningful values and committed behaviors. This is the purpose of acceptance (Harris, 2009). In ACT, acceptance is used to decrease one's experiential avoidance, which is the opposite of acceptance in that it often involves effort and struggle aimed towards eliminating, controlling, or avoiding private experiences (Wilson, 2008). Due to the time and effort one devotes to experiential avoidance, it can often serve as a distraction or barrier to engaging in values-congruent behaviors (Harris, 2009). When space is made for these painful internal events, effort can be directed towards more meaningful practices.

**Cognitive defusion.** Cognitive fusion occurs when one becomes trapped or caught up in his or her own thoughts, forcing one to make behavioral decisions based on a world that is both conceptualized and evaluated verbally rather than one that is based on direct experiences (Harris, 2009; Hayes et al., 1999). When fusion occurs, one's behaviors can become dominated and

directed by these thought traps, and in this way, these beliefs may begin to serve as barriers to value based living (Harris, 2009; Hayes et al., 1999, 2004b). Within the ACT paradigm pain is viewed as an inevitable occurrence in life, while suffering is a factor that can often be subjectively controlled. In their original conceptualization of ACT, Hayes and colleagues (1999) proposed that when fusion occurs suffering increases in two ways. The process of delving into these painful thoughts, evaluating and inspecting them, is often done under the guise of resolving them in order to be restored to optimal health. Therefore, the added suffering caused by this experience is outweighed by the benefit of abolishing these unhealthy thoughts one experiences. However, to attempt to eradicate painful thoughts is to deny the human experience. Hayes and colleagues (1999) assert that certainly a life without the experience of psychological pain is in itself unhealthy. Although, there is no need for increasing one's suffering through the process of overly attending to these painful cognitions. Secondly, it is noted that when we attempt to eliminate painful thoughts, through an overt focus on them, we often succeed only in increasing the frequency, intensity, or duration with which they occur (Hayes et al., 1999).

*Cognitive defusion* refers to the process through which one creates a distance or “space” between themselves and their thoughts, preventing one from becoming tangled up or controlled by them (Harris, 2009; Hayes et al., 2004b). Through a series of techniques, cognitive defusion works to allow one to hold rules, reasons, and judgments about the past, future, and self lightly, increasing their behavioral repertoire (Harris, 2009). When working to increase defusion, one is taught not to judge a thought, challenge its believability, or get rid of it, but rather to notice it, acknowledging it as nothing more than words or pictures. Thoughts, rather, are evaluated not on their validity, but rather on their functionality; how helpful they are in allowing one to live a life based in the service of their values (Harris, 2009). Additionally, by increasing cognitive

defusion, the lack of thought barriers will facilitate engagement in acceptance and present moment awareness as well as value based behaviors (Harris, 2009; Hayes et al., 1999, 2004b).

**Values.** The primary goal of ACT is to help an individual engage in mindful, value-based living (Harris, 2009). Within this model, values are seen as persistent or something that can be enacted on an ongoing basis. Additionally, values are seen as having a global quality, uniting various patterns of action. Finally, valuing is a choice, not a judgment. As such, values never require justification (Harris, 2009; Hayes et al., 1999). Often, values are confused for goals, however, there are key differences; one of the most blatant being that values, again, are ongoing, while goals are sought out to be completed or achieved. Instead, values often provide direction for the development of goals. When working with values in the ACT model, one must often clarify values, and then prioritize when multiple values exist. Once values are clear, they can be used to set concrete goals (Hayes et al., 2004b), to motivate behavior despite aversive barriers (Hayes et al., 1999), and to direct behaviors for value-based living (Stroschal, Hayes, Wilson, & Gifford, 2004). Given that the aim of values work is often value directed behaviors, the final process of committed action is often paired with or follows it.

**Committed action.** In the ACT model, committed action is guided and motivated by identified values (Harris, 2009; Hayes et al., 1999). Once values have been clarified, value-based goals are made, which are carried out through mindful, committed patterns of purposive action (Harris, 2009). At this point, various traditional behavioral interventions (e.g. problem-solving, exposure and desensitization, behavioral activation, conflict resolution training, etc.) may be utilized. These techniques are considered consistent with the ACT model so long as they are in the service of value-based living, and are not used as avoidance, distraction, or control techniques (Harris, 2009). Naturally, when engaging in novel and flexible patterns of behavior,

psychological (and perhaps physical) barriers are likely to arise. At this point, persistence is advocated, with the aid of previous processes such as acceptance and defusion (Hayes, 2004; Hayes et al., 2006; Stroschal et al., 2004). In this way, the dynamic nature of ACT is fully displayed. While committed action is the culmination of ACT, it also engenders the use of previously addressed processes (Hayes et al., 2006). Fear of failure may deter an individual from engaging in a committed value-based pattern of behavior; however, coming into contact with this painful internal event can also produce the valued outcome being sought (Hayes et al., 1999; Stroschal et al., 2004).

### **Mindfulness and Acceptance Based Behavioral Therapies and Physical Activity**

A considerable amount of research exists regarding the efficacy and effectiveness of contextual CBTs in the area of mental health (Hayes et al., 2006; 2011). There has also recently been growing empirical support for its applicability in the field of behavioral medicine, specifically with issues such as chronic pain (McCracken, MacKichan, & Eccleston, 2007; Vowles & McCracken, 2008), type 2 diabetes management (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), smoking cessation (Gifford et al., 2004), epilepsy (Lundgren, Dahl, Melin, & Kies, 2006), obesity (Lillis et al., 2009), weight management (Forman, Butryn, Hoffman, & Herbert, 2009; Tapper et al., 2009), and physical activity (Butryn, Forman, Hoffman, Shaw, & Juarasio, 2011). These health behavior studies utilizing ACT techniques have focused on the principles of mindfulness, acceptance, and values in order to reduce experiential avoidance, leading to positive behavior change (Gregg et al., 2007; Lillis et al., 2009; Tapper et al., 2009).

While data is not yet available regarding the impact of ACT related principles on CRF gains, recent research trials for weight loss and PA directed behaviors have shown promising results for its impact on exercise behaviors (Butryn et al., 2011; Forman et al., 2009; Tapper et

al., 2009). In Tapper and colleagues (2009) exploratory randomized control trial of a mindfulness-based weight loss intervention, various ACT components were utilized in order to make participants more aware of how thoughts may sabotage planned health behaviors, such as exercise and healthy eating, to encourage participants to adhere to and maintain their exercise and healthy eating behaviors, and to tolerate negative feelings and sensations regarding these behaviors. The intervention treatment showed a significant effect ( $p = .05$ ) on PA, and qualitative data suggesting that participants found the cognitive defusion component particularly useful in relation to exercise behaviors supports this finding. Butryn et al's randomized control trial investigated the effects of a brief ACT based intervention on the frequency with which female college students visited an on-campus gym. When compared to a physical education intervention, the ACT intervention was significantly more effective at increasing the frequency of participant's gym visits. While this intervention trial did not specifically monitor the duration, type, or intensity of the PA occurring, it serves as preliminary support for the usefulness of mindfulness and acceptance in promoting exercise directed behaviors.

Furthermore, the usefulness of mindfulness and acceptance based practices to increase PA behaviors and performance has been recommended with multiple populations ranging from competitive athletes to geriatrics (Dutton, 2008; Gardner & Moore, 2004; Kaufman, Glass, & Arnkoff, 2009; Rejeski, 2008). The Mindfulness-Acceptance-Commitment (MAC) based approach to athletic performance enhancement emphasizes both a mindful awareness, which can facilitate the necessary self-regulation to perform in a competitive environment, as well as the value-based and goal-directed committed pattern of behavior necessary to undergo the training and development to become a successful competitive athlete (Gardner & Moore, 2004). It has been suggested that mindfulness and acceptance based strategies in relation to PA or exercise

behaviors can alleviate performance anxiety (Dutton, 2008) and increase attentional focus on the valued behavior, leading to enhanced athletic performance (Gardner & Moore, 2004). It has also been proposed that while mindfulness may be useful in promoting PA, engaging in PA may also offer a unique opportunity for an individual to engage in and practice holding a mindful state (Rejeski, 2008).

### **Current Project Rationale**

Increasing CRF, particularly in sedentary adults, could have a direct and significant effect on morbidity and mortality rates. Previous research has demonstrated difficulty in successfully engaging participants in vigorous levels of PA, therefore falling short of attaining optimal fitness gains. Mindfulness and acceptance based therapies such as ACT have proven effective in fostering a psychological flexibility towards negative internal events that can be associated with engaging in health behavior change. To promote adherence to a fitness walking intervention targeting CRF in a sedentary sample, this project focused on the development and implementation of a complementary treatment intervention based on mindfulness and acceptance based therapies. Study 1 consisted of a theoretically driven manual development process, through which mindfulness and acceptance based concepts were directly related to behavioral engagement of fitness directed walking at vigorous intensity levels (see Table 1). Study 2 evaluated the initial efficacy and feasibility of this manualized treatment through an open trial.

## **Methods**

### **Study 1**

**Participants.** Individuals recruited for this manual development study were deemed experts (i.e. >3 peer-reviewed publications and proof of external funding regarding research in the area of manual development for and/or implementation of mindfulness and/or acceptance

based treatment interventions) within the field of Acceptance and Commitment Therapy (ACT), many with particular expertise in the implementation of ACT in the domain of health behavior change and manual development. Eligible men and women had also previously obtained a doctorate of philosophy in the field of Clinical Psychology. No exclusionary criteria were established regarding further demographic characteristics. Initial recruitment materials were sent out via targeted and personalized e-mails to six field area experts. Three individuals agreed to serve as expert manual reviewers and were provided with the manual draft, as well as a semi-structured interview form (Expert Reviewer Feedback Form; see Appendix A). Two participants returned their completed interview forms with manual revision feedback.

**Procedures.** The procedures used for the development of the treatment manual followed a three phase process based on expert systems analysis (Olson & Rueter, 1987), and have been previously used in the development of clinical psychology treatment manuals in the field of behavioral medicine (e.g. Morely, Shapiro, & Biggs, 2004). During the first phase an extensive literature review was conducted, including both published and non-published work, on ACT and its application to various topics in psychology. This review included not only theoretical and empirical papers, but various ACT treatment manuals as well. The organizational structure for the current manual was derived from Carroll and Nuro's (2002) stage model for psychotherapy manual development. In this model, the purpose of manual development during its first stage is for initial evaluation of feasibility and efficacy. The general outline provided by Carroll and Nuro (2002) for a stage I manual was used as a guide for the initial structural organization of the current manual.

In phase two, topic experts were recruited, each with experience in the application of ACT. Experts read the draft manual and completed a semi-structured interview to provide

revision feedback (see Appendix A). Experts were asked to review the current exercises and strategies used in each of the 8 modules of the manual, and to offer possible alternatives for executing the aims of the module that may be more effective or appropriate. Additionally, for each module, experts were asked to provide any indication of problems and/or difficulties that were likely to occur during the implementation of the protocol, and possible solutions to these issues. Expert participants were asked to provide in a non-structured format, any other relevant feedback for each portion of the manual. Interviews were conducted in a written format and returned to the current author. Finally, each of the two authors of the current manual independently reviewed the expert analysis and feedback. After independent review, the authors conferred and relevant revisions were accepted.

## **Study 2**

Individuals recruited for this pilot study were sedentary adults, ages 18-64. As shown in the Consort Diagram (see Figure 1), 129 individuals were successfully recruited through local advertising in various forms of print and electronic media (i.e. The Roanoke Times “New River Valley” Section, see Appendix B), posted fliers, and listserv ads. Individuals responding to these ads were assessed for eligibility using a standardized telephone screening Eligibility Questionnaire (see Appendix C). After the initial telephone screening process 40 individuals were identified as eligible and were scheduled for an initial baseline appointment. Thirty-eight of these individuals attended their initial session, met further eligibility criteria, and were scheduled for an initial fitness test. Twenty-eight of these individuals were found to be eligible based on their fitness testing criteria and were invited to be randomized into a treatment group. Twenty-four individuals initiated participation in the treatment, 20 individuals completed the 10-

week treatment program, and 19 individuals provided post-intervention data. The attrition rate for this study was 20.8%.

**Participants.** Men and women eligible for this study were between the ages of 18-64 years, had a BMI that was between 18.5 to 39.9, and were sedentary at least one year prior to the study (i.e. <30 minutes of moderate PA, 5 days a week or < 20 minutes vigorous PA, 3 days a week; American College of Sports Medicine [ACSM], 2010). Participants were excluded from the study if they were smokers, meaning that they engaged in any habitual cigarette smoking, or had done so in the past 6 months. Further exclusionary criteria included a diagnosis of a cardiovascular, pulmonary (e.g. chronic obstructive pulmonary disease), or metabolic disease (e.g. diabetes mellitus type I or type II), or the presence of a physical condition that restricted the individual's ability to engage in fitness testing or vigorous PA (i.e. orthopedic injuries or musculoskeletal disabilities). Additionally, those individuals determined to be "high risk" as defined by the ACSM guidelines (2010) were not eligible. Individuals taking frequently prescribed medications were eligible so long as they reported maintaining a stable dose of the medication for an extended period of time (i.e. >1 year). Individuals with uncontrolled hypertension were not eligible; however, if blood pressure was managed (i.e. <140/<90 mmHg) with antihypertensive medications, and express permission was attained from their personal physician, they were allowed to participate in the intervention. Finally, participants could not have been pregnant during the intervention, and had to have regular Internet access.

The sample (N = 24) yielded 19 participants providing complete fitness and psychological data at both baseline and follow-up. Two participants discontinued after week 2 of the 10-week treatment, one citing an increase in work, and the other indicating that they no longer had time to participate. Two participants also discontinued after week 3 of the 10-week

treatment, one indicating that personal circumstances had impacted their ability to attend sessions, and the other discontinuing communication and attendance without giving notification to the author. Finally, a single participant completed the 10-week treatment program, but indicated that she did not want to be evaluated at post-intervention for fear that she had not made significant improvements.

At baseline, the “completer” sample of 19 participants had a mean age of 50.47 ( $SD = 10.92$ ), an average weight of 81.45 kg ( $SD = 19.14$ ), were 78.95% female, 89.47% Caucasian, 5.26% Latino, 5.26% Asian/Indian, and 68.42% reported a household annual income above \$60,000 (see Table 2). Again, all participants were classified as sedentary to qualify for the study. The average one-mile walk time at baseline was 980.95 seconds ( $SD = 99.34$ ), and the average estimated  $VO_{2max}$  was 24.43 ml/kg/min ( $SD = 6.71$ ; see Table 3).

### **Procedures.**

**Enrollment.** Enrollment for this study took place from February to March of 2011. Recruitment materials targeted sedentary adults who did “not engage in any regular physical activity” but were “willing to start”. The advertisements also indicated “mindfulness practices” would be used to “help increase” participants’ “adherence to a fitness-based walking program”. Interested individuals were instructed to directly contact the Mindful Steps project director at the Center for Research in Health Behavior (CRHB) via telephone or e-mail in order to receive a brief description of the study (see Appendix C). Individuals who remained interested in participating were asked to provide verbal consent to undergo a telephone eligibility screening process with the project director (see Appendix C). In the event that a participant reported a medical condition, such as medically controlled hypertension, they were then electronically sent a medical consent form to be completed by their physician and returned to the project director

prior to scheduling of their initial baseline assessment session (see Appendix D). Upon scheduling of their initial baseline assessment session, each participant was given an appointment time, directions to the CRHB, and was instructed to wear lightweight clothing and shoes that could be easily removed for the measurement of their weight and height.

***Assessment session 1: Initial baseline assessment.*** After a participant's arrival at the CRHB, they were given the informed consent document to complete, which included a more in depth description of the study as well as participant rights and responsibilities (see Appendix E). Upon completion of the informed consent document a photocopy was made, and given to the participant. Participants also completed a more extensive Health History Form (see Appendix F), which was reviewed by the project director. Measures of psychological flexibility/experiential acceptance (see Appendices G and H), weight, and height were taken from all participants. If all eligibility criteria were met (i.e. BMI), participants were then scheduled for their baseline fitness assessment. A brief description of the Rockport One Mile fitness walking task was given, as well as a demonstration of the electronic heart rate monitor used during the walking test. This was done to increase participants' familiarity with the testing apparatus, and to decrease anxiety regarding its use. These sessions last approximately 45 minutes.

***Assessment session 2: Baseline fitness assessment.*** Baseline fitness assessments occurred at Virginia Polytechnic Institute and State University's (Virginia Tech) Rector Field House. Participants were met in the parking lot located adjacent to the field house by either the project director or a research assistant. If needed, participants were then given a visitor's parking pass for on-campus parking. Once participants had entered the field house a separate informed consent document for the fitness walking test was completed (see Appendix I). Participants were

then instructed on how to appropriately put on their Omron HR 100C electronic heart rate monitor. Participants were allowed to use the restrooms in the field house for privacy while putting on their heart rate monitors. Participants were given a brief description of the walking course, directions and safety information regarding the walking test, and were instructed to walk (i.e. having contact with the ground at all times) as fast as they could around the 1-mile course. The one-mile course at the field house had a clean safe surface, and was measured for accuracy with the use of a measuring wheel prior to testing.

At the end of the fitness assessment, participants were informed that they would be contacted via e-mail regarding their continued eligibility status. Participants who were eligible were then randomly assigned into one of four mindfulness groups. This session lasted approximately one hour.

***Intervention sessions 1-8.*** The mindfulness and acceptance based group intervention sessions occurred on weeknights (i.e. Monday through Thursday), weekly for the first six sessions, and then biweekly for the remaining two sessions. Intervention sessions lasted for approximately 90 minutes, and all sessions were held at the Department of Psychology's Psychological Services Center (PSC). Groups consisted of approximately five to eight participants. Upon their arrival at the first session, participants were given an Omron HR-100C electronic heart rate monitor and a participant manual. This intervention utilized key concepts, metaphors, and exercises previously applied in various ACT based interventions. As in previous research (e.g. Tapper, 2009), these concepts were adapted to be relevant to the context of the research; namely, increasing CRF through adoption, adherence, and maintenance of a fitness walking program. The primary ACT-based processes employed in this intervention included

values, committed action, mindfulness, and acceptance, with additional focus on cognitive defusion.

***Assessment session 3: Post-intervention fitness assessment.*** The post-intervention fitness assessment session was also held at the Rector Field House. Procedures used were identical to those used in the initial baseline fitness assessment.

***Assessment Session 4: Post-intervention assessment and exit interview.*** The post-intervention assessment session was held at the CRHB. Procedures used were identical to those used in the initial baseline assessment session, with the exception of the administration of the Health History Form and the demonstration of the electronic heart rate monitor. Additionally, at the end of the session, a semi-structured exit interview was given in order to assess treatment acceptability and comprehension (see Appendix J).

***Fitness walking program.*** All participants were asked to engage in a fitness-based walking program. The walking program consisted solely of brisk, fitness-directed walking. This mode of cardiorespiratory exercise requires minimal skill, equipment, or physical fitness (ACSM, 2010). Participants were asked to engage in this form of exercise at a vigorous intensity level, which is  $\geq 70\%$  of aerobic capacity that results in considerable increases in both breathing and heart rate (ACSM, 2010). Typically, to qualify as a vigorous activity, walking must occur at a brisk pace (i.e. 4.5mph; USDHHS, 2006). Following ACSM guidelines (2010) it was recommended that participants engage in this behavior at least three days a week, for a minimum total of 25 minutes per occasion, in increments no shorter than 10 minutes. The walking program provided weekly exertion and heart rate goals for participants (see Table 4). Participants recorded their progress on a weekly walking log, which was returned to the project director at the start of each group intervention session (see Appendix K).

*Ratings of perceived exertion.* Participants were asked to monitor and gradually increase their maximum rating of perceived exertion (RPE; Nobel, Borg, & Jacobs, 1983) during the walking program. All participants were instructed to start at (13) somewhat hard, and increase to an exertion level of (17) very hard during the 10-week intervention time. Participants began week one walking at a 13, progressed to 14 the second, 15 the third and fourth week, 16 the fifth week, and then continued on for the second half of the intervention period reaching 17 on the rating scale.

*Heart rate.* Participants used Omron HR 100C electronic heart rate monitors to monitor their heart rate during their fitness walking to gauge whether or not they were reaching their target heart rate. Participants initial maximal heart rates were calculated using the following formula:  $220 - \text{age} = \text{HR}_{\text{max}}$ . (ACSM, 2010). While this formula is commonly used, it also has a high degree of variability, decreasing its accuracy. The decision to use this formula was based primarily on its ease of use in a layperson sample, despite its relative inaccuracy. During vigorous PA, an individual's target heart rate should be between 70-85% of their maximum heart rate ( $\text{HR}_{\text{max}}$ ). Participants were asked to gradually increase their target heart rate, beginning at the pulse rate (or beats per minute [bpm]) associated with 70%  $\text{HR}_{\text{max}}$  and moving up to 85%  $\text{HR}_{\text{max}}$  during the course of the 10-week treatment intervention (see Table 4).

## **Measures.**

### ***Primary outcome measures.***

*Cardiorespiratory fitness.* Cardiorespiratory fitness was measured with the Rockport one-mile walk test (Kline et al., 1987). Participants were required to walk one mile at their “best effort” at an indoor track facility. Participants wore an Omron HR-100C electronic heart rate

monitor during the walk test, which provided an estimate of their heart rate at the end of the walk test.

Two measures of physical fitness were derived from the walk test. First, *walk test time* was calculated using a stopwatch, and was estimated in total minutes and seconds needed for the participant to complete the one-mile track. Second, estimated aerobic capacity, or estimated  $VO_{2max}$ , was calculated using a gender specific formula, which included the participant's estimated heart rate during the test, weight, age, and time of completion<sup>2</sup>. Validity for this estimation equation was initially established with a validation and cross-validation group (Kline et al., 1987). The correlations between the predicted  $VO_{2max}$  and actual  $VO_{2max}$  were high for both the validation group ( $n = 174$ ;  $r = .93$ ) and for the cross-validation group ( $n = 169$ ;  $r = .92$ ).

*Psychological flexibility/experiential acceptance.* Two separate measures of psychological flexibility (experiential acceptance) were used in the trial. The Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., in press) is a general measure of psychological flexibility/experiential acceptance, consisting of seven items, measured on a 7-point likert scale ranging from (1) never true to (7) always true (see Appendix G). The scale is scored by summing the seven items, with higher scores indicating lower levels of experiential acceptance. Initial psychometrics for this measure were derived from six samples, consisting of 2,816 total participants. This measure demonstrates good structure (i.e. unidimensional), reliability ( $\alpha = .84$  [.78-.88]), and validity.

The extent to which participants engaged in experiential acceptance of exercise-related internal experiences was measured using the Physical Activity-Acceptance and Action Questionnaire (PA-AAQ; see Appendix H). The PA-AAQ was adapted from the Chronic Pain

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<sup>2</sup>  $VO_{2max} = 132.853 - (0.1692 \times \text{body weight in kg}) - (0.3877 \times \text{Age}) + (6.315, \text{ for men}) - (3.2649 \times \text{time in min}) - (0.1565 \text{ HR})$

Acceptance Questionnaire (CPAQ), a 20-item measure assessing experiential acceptance of chronic pain (McCracken, Vowles, & Eccleston, 2004). The modified PA-AAQ (mean alpha = .79; Butryn et al., 2011) contains five items (e.g. “I can have the thought that I don’t want to exercise, and exercise anyway,”), which are rated on a 7-point Likert scale. Higher scores indicate greater acceptance of internal barriers for PA (Butryn et al., 2011; Forman et al., 2009; Goodwin, 2010).

***Secondary outcome measures.***

*Walking program adherence and group attendance.* Adherence to the fitness based walking program was evaluated by information obtained through the weekly submission of walking logs (see Appendix K) by all participants. Adherence was first calculated as “total adherence” by dividing the number of walking sessions completed during the 10-week intervention by the number of requested sessions (30 sessions total). Adherence was also calculated as “weekly adherence” by summing the number of weeks participants completed 3 or more days of walking 25 minutes or more (10 weeks total) reaching a vigorous intensity. Finally, group attendance was calculated by summing the number of attended sessions (8 total).

*Weight and body mass.* Weight was measured for all participants at baseline and post-intervention in kilograms using a high capacity digital weight scale, the Detecto® High-Capacity Digital Weight Scale (Model 6855). Height will be measured in inches using a calibrated Detecto® Dual Reading Eye-Level Physician Scale (Model 338). Measurements were obtained with subjects wearing light indoor clothing, and without shoes. Body mass index was calculated as  $\text{weight (lb)/height (in)}^2 \times 703$ .

***Program evaluation.***

*Treatment acceptability.* Treatment acceptability was evaluated at post-intervention using the following two questions (see Appendix J), each measured on a five point Likert-scale (1 = Not at all, 3 = Somewhat, 5 = Very): “How helpful did you find the strategies (e.g. acceptance, values, and defusion) for responding to urges or desires pushing you to make unhealthy choices regarding your physical activity?” and “How satisfied were you with the approach we used to help you make changes in your physical activity level?” These items were originally developed by Forman et al. (2009) in order to evaluate participant acceptability of an acceptance based behavioral treatment for weight-loss, and have since been used to evaluate other acceptance based behavioral medicine treatments (e.g. Goodwin, 2010). There is no psychometric data available for these items.

*Treatment comprehensibility.* Treatment comprehension regarding ACT variables was also evaluated at post-intervention. Similar to previous ACT based behavioral health interventions (e.g. Goodwin, 2010), treatment comprehension was measured both through self-report and objective assessment. Self-reported comprehension difficulty with ACT concepts (e.g. values, mindfulness, acceptance, and cognitive defusion) was evaluated on a five-point Likert scale, ranging from (1) extremely difficult to (5) not difficult at all. An open-response questionnaire also provided the opportunity for objective evaluation of participants’ comprehension. This questionnaire asked participants to explain the various concepts used in treatment, and to provide examples of how they had used these concepts in their everyday life (see Appendix J). A standardized rubric was developed in order to systematically score the questionnaire (see Appendix L). Responses were evaluated based on the extent to which a participant was able to describe the concept or process in the context of the treatment intervention.

## **Hypotheses**

In regards to primary outcomes, it was hypothesized that participants would demonstrate an increase in CRF by comparison of baseline and post-intervention measurements of total one-mile walk time and estimated aerobic capacity. Additionally, it was hypothesized that participants would demonstrate an increase in general psychological flexibility/experiential acceptance by baseline and post-test measurements of the AAQ-II as well as physical activity related experiential acceptance as measured by the PA-AAQ. In regards to program evaluation, it was hypothesized that treatment acceptance and comprehension would evidence feasibility for the intervention.

## **Results**

### **Study 1**

The final version of the treatment manual included treatment introduction sections for the therapist and the participant, as well as eight topic modules (see Table 1). In accordance with Carroll and Nuro's (2002) outline for a stage I manual, the therapist's introduction includes content related to the description and rationale of the approach, treatment goals, specification of defining interventions, session content, and general format. Conception of the disorder was not included, as suggested in Carroll & Nuro's (2002) model, given that this manual was not directly related to a diagnosable disorder. Other manual modules include the following: Introduction & Education, Active Movement & Valued Living, Committed Action & Barriers, Mindfulness, Acceptance & Control, Acceptance Through "De-Fusion", Review, and Maintenance.

The manual revision process based on the expert feedback consisted of both structural and content-related changes to the manual. It should be noted that one expert reviewer provided substantially more revision feedback than the other, however, revision feedback never conflicted

between reviewers. In terms of structural revision data, it was recommended that the Mindfulness module be presented prior to the Acceptance-based modules. This revision was accepted based on the reviewer's recommendation that the introduction of mindfulness-based techniques could help facilitate participant understanding of the concepts of acceptance and cognitive defusion. Both expert reviewers recommended content related revisions. Generally, these recommendations including the following: suggestions for additional/alternative metaphors or techniques (n = 8), increased clarification for participants regarding therapy concepts through both additional explanation (e.g., giving an overview of ACT, discussing the experiential nature of the techniques used) and use of layperson terminology (e.g., removing/replacing the word "defusion"; n = 5), and directions to help the therapist better facilitate a particular process, technique, or topic (n = 4).

Recommendations were generally accepted and integrated; however, content recommendations that were not accepted were done based on a mutual consensus between both manual authors. Generally, recommendations not accepted often fell into one of the following categories: (1) manual authors felt the recommendation was already included in the manual draft (n = 4), (2) the time limited nature of the sessions prevented the addition (n = 6), or (3) reviewer's recommendation was unclear or outside of the knowledge base of the manual authors (n = 2). Finally, it should be noted that all revision data related directly to the therapeutic content of the manual; neither expert reviewer provided revision recommendations regarding the educational material provided for the walking intervention.

## **Study 2**

**Power analysis and sample size.** To determine the total sample size needed to reach statistical power, a power analysis was conducted using G\*Power (Faul, Erdfelder, Lang, &

Buchner, 2007). For a paired samples t-test where  $p < .05$ , a total sample size of 21 was needed for a power of .80. With an expected attrition rate of 20%, 27 participants were needed in order to assure sufficient power. While 28 participants qualified, only 24 initiated treatment, with 19 completing the 10-week program and post-test measures. This resulted in an achieved power of .78.

**Primary analyses.** No significant differences were found between participants who completed the intervention and post-intervention assessment and those who did not for the following variables: age, baseline walk time, baseline weight (kg), baseline estimated  $V_{O2max}$ , baseline AAQ-II, baseline PA-AAQ, ethnicity, income, education, gender, or marital status. Missing data did not exceed 5.3% for any item. Listwise deletion was used for the primary and secondary analyses. Paired sample t-tests were used to compare mean change (baseline to post-intervention) for both measures of estimated cardiorespiratory fitness. Analyses indicated a significant and large-sized (Cohen, 1988) decrease of 64.69 seconds in total walk test time [ $t(18) = 4.61, p = .0002, d = 0.64^3$ ], and a significant and medium-sized increase of 2.9 ml/kg/min in estimated  $V_{O_{2max}}$  [ $t(18) = -4.05, p = .0007, d = -0.43$ ]. For both measures of psychological flexibility/experiential acceptance, paired sample t-test were also used to compare mean change (baseline to post-intervention). Analyses indicated a non-significant, medium-sized increase in general psychological flexibility/experiential acceptance as measured by the AAQ-II [ $t(18) = 1.18, p = .26, d = 0.37$ ], and a significant and large-sized increase in psychological flexibility/experiential acceptance of exercise-related internal experiences as measured by the PA-AAQ [ $t(18) = -9.19, p < .0001, d = -2.09$ ].

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<sup>3</sup> Effect sizes were calculated as the difference between the means,  $M1-M2$ , divided by standard deviation,  $s$ , of either group. Dunlop and colleagues (1996) suggest that this takes into account any correlation that may exist between the measures, correcting for an overestimated effect size.

**Secondary analyses.**

***Walking program adherence and group attendance.*** “Total” adherence was calculated by dividing the number of walking sessions completed during the 10-week intervention by the number of requested sessions (30 sessions total). The average total adherence to the walking program was 26.79 sessions,  $SD = 9.59$ , or 89.30%. Adherence was also calculated as “weekly” adherence, by summing the number of weeks participants completed 3 or more days of walking 25 minutes or more (10 weeks total) reaching a vigorous intensity. The average weekly adherence to the walking program was 6.90 weeks,  $SD = 2.96$ , or 69%. Group attendance was calculated by summing the number of attended sessions (8 total). The average group attendance was 6.84 sessions,  $SD = 0.08$ , or 85.50%.

***Weight and BMI.*** Paired sample t-tests were used to compare mean change (baseline to post-intervention) for measures of weight (kg) and body mass index (BMI). Analyses indicated a non-significant and small-sized decrease in weight (kg) [ $t(18) = 0.56, p = .58, d = 0.02$ ], and a non-significant and small-sized increase in estimated BMI [ $t(18) = -0.78, p = .45, d = -0.04$ ].

***Exploratory Analyses.*** Exploratory analyses were done to investigate the possible relationships existing between the primary outcome measures. The average base-line, post-test, and weekly measures of the PA-AAQ and AAQ-II were fit to a regression line as a function of time (Venter & Maxwell, 1999). The unstandardized beta coefficients were then used as predictors in models looking at the post-test measures of total walk time and estimated  $VO_{2max}$ , as well as the change scores of these variables as the dependent variables. None of the exploratory regression models were significant, and neither measure of psychological flexibility/experiential acceptance was found to be a predictor of post-test estimated cardiorespiratory fitness or change in estimated cardiorespiratory fitness. Exploratory analyses

were also conducted to evaluate possible between group differences that may have occurred for CRF and psychological flexibility/experiential outcomes between the four therapy groups. Specifically, one-way ANOVAs were used to investigate if significant between group differences occurred for change in total walk test time, estimated CRF, or psychological flexibility/experiential acceptance as measured by the AAQ-II and the PA-AAQ. No significant between group differences were found.

### **Program evaluation.**

***Treatment acceptability.*** When asked “How helpful did you find the strategies (e.g. acceptance, values, and defusion) for responding to urges or desires pushing you to make unhealthy choices regarding your physical activity?” participants reported finding the strategies used in the treatment to be mostly helpful ( $M = 3.84$ ,  $SD = 0.68$ ). Additionally, when asked “How satisfied were you with the approach we used to help you makes changes in your physical activity level?” participants reported feeling mostly satisfied ( $M = 4.32$ ,  $SD = 0.58$ ).

***Treatment comprehension.*** At post-intervention treatment comprehension was measured in two ways. Participants were first asked to self-report ease of comprehension of treatment constructs (e.g. values, mindfulness, acceptance, and cognitive diffusion) on a scale of (1) very difficult to (5) very easy. Participants then completed an objective measure of treatment construct comprehension, which asked participants to define the above constructs and provide examples of each in their own lives. Self-reported ease in comprehension of constructs used in the Mindful Steps program ranged from somewhat easy to very easy. More specifically, ease of comprehension for the construct of values was rated as very easy ( $M = 4.63$ ,  $SD = 0.68$ ), as was the ease of comprehension for mindfulness ( $M = 4.53$ ,  $SD = 0.61$ ). Ease of comprehension for the constructs of acceptance and cognitive diffusion was, on average, rated as somewhat easy for

each construct ( $M = 4.42$ ,  $SD = 0.61$ ;  $M = 3.68$ ;  $SD = 1.00$ ). These results indicate some differential levels of difficulty in ease of construct comprehension, but overall, minimal difficulty in self reported comprehension. Objective measures of comprehension demonstrated lower levels of understanding overall. More specifically, on a 100-point comprehension quiz with 25-point subcomponents for each construct, participants scored an average of 79.56% ( $M = 19.89$ ,  $SD = 6.14$ ) for values, 77.04% ( $M = 19.26$ ,  $SD = 6.17$ ) for mindfulness, 76.32% ( $M = 19.08$ ,  $SD = 7.03$ ) for acceptance, and 61.36% ( $M = 15.34$ ,  $SD = 10.30$ ) for cognitive defusion. Scores for the objective measures of construct comprehension were not commensurate with what would be expected for treatment constructs based on self-reported comprehension, indicating an over-estimate by participants of construct comprehension. Across constructs, differences between self-reported and objective measure of comprehension were consistent. Descriptive statistics pertaining to acceptance and comprehension of intervention constructs can be found on Table 5.

## **Discussion**

### **Manual Development**

The manual development portion of this project produced a theoretically based, peer-reviewed treatment manual. The manual was written and revised based on Carroll and Nuro's (2002) Stage Model for Psychotherapy Manual Development, which purports that the purpose of the manual at this stage is to conduct a preliminary evaluation of the feasibility and efficacy of the treatment. A critical concern regarding the development of manualized treatments is a lack of flexibility and a rigid standardization that may add validity to initial efficacy trials but makes clinical application difficult. In response to this concern it has been suggested that inherent flexibility be added to manuals in their development phases (Eifert, Schulte, Zvolensky, Lejuez,

& Lau, 1997; Wilson, 1997). This manual acknowledges these concerns for flexibility in three ways. First, like Linehan's (1993) manual for dialectical behavioral therapy, treatment constructs are presented in module format to allow for flexibility in the sequence of the presentation according to identified treatment priorities. Additionally, as with Fairburn, Marcus, and Wilson's (1993) manualized CBT treatment for binge eating and bulimia nervosa, therapeutic techniques, tools, and strategies are presenting in a flexible manner allowing a therapist to delay, accelerate, or even drop techniques based on the patient's response and comprehension. Thirdly, this manual is problem focused (e.g. increasing physical activity) rather than diagnostically focused, allowing for flexibility in its application. Indeed, diagnostically focused treatment manuals have been criticized for adhering to a syndromal system that does not adequately allow room for the variance in presentation or the frequent presence of comorbidities that often occurs for many diagnoses (Eifert, et al., 1997; Iwamasa & Orsillo, 1997).

### **Intervention Effects**

Results from this study indicate that this intervention may be an efficacious method of increasing CRF in sedentary adults. Participants who completed the intervention showed a significant increase in estimated CRF for both outcome measures (i.e. total decrease in walk time and increase in estimated  $VO_{2max}$ ). It should be noted that these primary outcomes demonstrated both statistical and clinical significance. On average, participants increased their  $VO_{2max}$  from 24.43 ml/kg/min to 27.34 ml/kg/min demonstrating almost a full MET gain (i.e. > 4/5ths of a MET). When considered in the context of previous large scale randomized controlled trials, where typically less than a half of a MET gain was found (e.g. Church et al, 2007; Dunn et al., 1999), this increase is notable. From a public health perspective, this gain is indicative of a significant health benefit; with a 1 MET increase being associated with between 8-20% reduction

in cardiovascular and all-cause mortality for men and women (Myers et al. 2004; Myers et al., 2002; Swain & Franklin, 2006).

Significant changes in psychological flexibility/experiential acceptance were also demonstrated. Specifically, PA related experiential acceptance significantly increased, demonstrating a decrease in participants' engagement in experiential avoidance of exercise-related internal experiences and greater acceptance of internal barriers for PA. While changes in general measures of psychological flexibility (i.e. AAQ-II) did not reach significance, the change trended in the correct direction, corroborating changes shown by the PA-AAQ-II. It is possible that the more behavior specific version of the psychological flexibility measure was better able to capture the domain specific psychological change that the treatment targeted. Modules and constructs discussed in the group treatment sessions were specifically presented in a way that related to PA behaviors, although generalization to other aspects of daily living (i.e. eating behaviors) was encouraged.

### **Feasibility and Acceptability**

Feasibility and acceptability for the treatment were demonstrated through participant retention, attendance, compliance, self-report, and comprehension. The dropout rate for this trial was estimated at 20% based on previous trials (e.g. Dunn et al., 1999). Attrition remained near expected levels at 21%. Additionally, no significant differences were identified between completers and drop-outs, indicating no significant or systematic indications for participant loss. It should also be noted that a short recruitment period with moderate efforts was successful in producing a sufficient number of suitable participants, indicating a need and interest in the treatment topic within the given sample. Participants attended an average of 85.5% of group sessions, indicating both feasibility and acceptability of the therapeutic intervention portion of

the trial. For “weekly compliance” to the walking intervention, participants engaged in 3 or more walks per week, for at least 25 minutes, reaching the identified target heart rate, for approximately 7 out of the 10 intervention weeks (69%). However, “total compliance” was at 89.30%, meaning that out of the 30 fitness directed walks participants were asked to complete during the ten weeks, an average of 27 were completed. This difference between weekly and total compliance indicates that participants may have been walking notably more or less than 3 walks per week some weeks.

Acceptability for the treatment was indicated through self-report by participants, who on average, indicated being mostly satisfied with the treatment approach, and found it mostly helpful in assisting them to make healthy choices in regards to their PA. Likewise, self-reported comprehension of the therapeutic intervention constructs was also high, although somewhat variable. Both concepts of values and mindfulness were rated as being very easily comprehended by participants’ self-reports, while the construct of acceptance was, on average, rated slight lower by participants (e.g. “easy” vs. “very easy”). Cognitive defusion received the lowest self-reported comprehension rating. Objective measures of comprehension were notably lower, possibly indicating an overestimation of comprehension by participants. However, this difference could also be due to the recall nature of the objective comprehension quiz (versus recognition). Interestingly both subjective and objective measures of construct understanding demonstrate a linear relationship of decreased comprehension for concepts that were presented later in the intervention protocol. Therefore, it is possible that the order in which the constructs were presented to participants could have affected their comprehension. Given the nature in which the treatment manual was designed constructs presented earlier in the intervention were built upon with those presented in later sessions. Therefore a practice effect based on repeated

presentation could have impacted comprehension. However, the order in which modules were presented in the groups was based on clinical judgment of the authors as well as theoretical input from the expert reviewers. To date, no research has been done regarding the comparative effectiveness of presenting these ACT based constructs in a particular order; in fact theoretically, concepts are to be used flexibly, allowing the therapist to “dance” around the ACT hexaflex in order to provide the most relevant treatment for the patient.

### **Limitations**

Given the nature of this trial, as a small initial efficacy pilot of an innovative therapy, a number of limitations were inherent to its design. Perhaps the most notable limitation was the lack of a control group, which limits the causal claims that can be made from this open trial. Another critical limitation relates to the measure used for primary outcome variables. More specifically, a field test was used to measure estimated  $VO_{2max}$ , rather than a measure of direct gas exchange. While the validation studies for the Rockport One Mile walk test show high correlations between estimated and actual measures of  $VO_{2max}$ , direct gas exchange continues to be the gold standard in terms of measuring CRF. Furthermore, the behavior specific measure of psychological flexibility/experiential acceptance used (the PA-AAQ) has yet to be supported with rigorous psychometric testing. To address this limitation a psychometrically sound measure of general psychological flexibility/experiential acceptance was added to the study; however, its general rather than targeted measurement focus was also limited in terms of sensitivity to the behavior specific avoidance.

Limited access to qualified staff also resulted in limitations in terms of intervention administration and evaluation. Specifically, while the treatment manual was revised based on consensus between two ACT trained therapists, only one was available for intervention

administration. Therefore, the same therapist facilitated all groups and therapist effects could not be controlled for. Similarly, a single rater scored the objective measures of participant comprehension. While a standardized rubric was used to score participants' responses, an additional rater was not available. A specific knowledge of both ACT, as well as the intervention content was necessary; therefore inter-rater agreement for objective comprehension of the therapeutic constructs could not be computed.

Finally, given that the goals for this study were to evaluate preliminary feasibility and efficacy of the intervention, an in-depth analysis of the processes of change (i.e. mediational analyses) was not conducted. A larger trial could allow for a better understanding of the possible interaction between the change found in the primary constructs of CRF and psychological flexibility/experiential acceptance.

### **Future Directions**

This open trial has demonstrated initial feasibility and efficacy for the use of a mindfulness and acceptance based contextual treatment approach for increasing fitness directed walking in a sedentary adult sample. Carroll and Nuro (2002) suggest that the purpose of the second stage of manual development includes randomized clinical trials to build further efficacy for the treatment. During this phase a clear differentiation of the treatment condition from the control/comparison condition is necessary to establish treatment efficacy. Randomized control trials using previously or commonly used therapy techniques for health behavior change, such as CBT would help to further secure the efficacy of the intervention. Given some of the key differences that exist between more traditional CBT and contextually based CBT's such as ACT, a randomized control trial comparing these approaches may help to better understand the

importance that cognitive restructuring/change may play in initiating health behavior changes such as increasing PA.

Additionally, Carroll and Nuro (2002) emphasize that during stage II of manual development a greater focus should be placed on therapists' adherence and competence in administering the treatment. This goal could be achieved through standardized training of multiple therapists to eliminate the impact of therapist effects, as well as through objective evaluation and rating systems of the actual group facilitation to increase the fidelity of the trial.

Finally, further study should be done to understand the mechanisms of change in this intervention. While Hayes and colleagues (1999) indicate that many constructs may be used as therapeutic techniques to target psychological flexibility and increase experiential acceptance, this trial found differences in the acceptability and comprehension of the constructs used. In future studies individual measures of the constructs utilized in therapy protocol (i.e. mindfulness, acceptance, cognitive defusion, values) could help better understand the differential impact each one may be having on the behavior change process. Additionally, the manual was designed specifically in a modular format to allow for some flexibility in the order in which constructs are presented. Therefore modifying the protocol to change the order in which constructs are presented may impact the level of comprehension for participants or possibly shed light on the importance of the various constructs at differing times in the behavior change process.

Consistent with previous trials (e.g. Butryn et al., 2001; Forman et al., 2009; Gifford et al., 2004; Gregg et al., 2007), this study demonstrates the usefulness of mindfulness and acceptance based contextual therapies in the field of behavioral medicine, particularly within health behavior change. Future studies may focus not only on one particular type of PA (i.e. vigorous fitness based walking), but on a participant's overall level of engagement in PA. Finally, this trial

demonstrates efficacy in a sedentary sample, which supports a focus on identified at risk populations. This type of intervention may be especially relevant in at risk populations where experiential avoidance may be high, such as those experiencing chronic pain or progressing disability (Gregg et al., 2007; McCracken et al., 2007).

## References

- American College of Sports Medicine. (2001). ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription. Philadelphia, PA: Lippincott, Williams, & Wilkins.
- Bassett, D.R., Wyatt, H.R., Thompson, H., Peters, J.C., Hill, J.O. (2010). Pedometer-measured physical activity and health behaviors in United States adults. *Medicine and Science in Sports and Exercise*, 42(10), 1819-1825.
- Blair, S. N., Kohl, H. W., 3rd, Barlow, C. E., Paffenbarger, R. S., Jr., Gibbons, L. W., & Macera, C. A. (1995). Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men. *Journal of the American Medical Association*, 273(14), 1093-1098.
- Blair, S. N., Kohl, H. W., 3rd, Paffenbarger, R. S., Jr., 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.
- Blair, S. N. & Church, T.S. (2003). The importance of physical activity and cardiorespiratory fitness for patients with type 2 diabetes. *Diabetes Spectrum*, 16, 236-240.
- Bond, F.W., Hayes, S.C., Baer, R.A., Carpenter, K.M., Guenole, N., Orcutt, H.K., Waltz, T., & Zettle, R.D. (in press). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological flexibility and experiential avoidance. *Behavior Therapy*.
- Braith, R. W., Pollock, M. L., Lowenthal, D. T., Graves, J. E., & Limacher, M. C. (1994). Moderate- and high-intensity exercise lowers blood pressure in normotensive subjects 60 to 79 years of age. *American Journal of Cardiology*, 73(15), 1124-1128.

- Butryn, M.L., Forman, E., Hoffman, K., Shaw, J. & Juarascio, A. (2011). A pilot study of Acceptance and Commitment Therapy for promotino of physical activity. *Journal of Physical Activity and Health*, 8 (4), 516-522.
- Carroll, K.M. & Nuro, K.F. (2002). One size cannot fit all: A stage model for psychotherapy manual development. *Clinical Psychology: Science and Practice*, 9, 396-406.
- Church, T. S., Earnest, C. P., Skinner, J. S., & Blair, S. N. (2007). Effects of different doses of physical activity on cardiorespiratory fitness among sedentary, overweight or obese postmenopausal women with elevated blood pressure: A randomized controlled trial. *Jounral of the American Medical Association*, 297(19), 2081-2091.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.
- Crouse, S. F., O'Brien, B. C., Grandjean, P. W., Lowe, R. C., Rohack, J. J., Green, J. S., et al. (1997). Training intensity, blood lipids, and apolipoproteins in men with high cholesterol. *Journal of Applied Physiology*, 82(1), 270-277.
- Dimidjian, S., & Linehan, M. M. (2003). Mindfulness practice. In W. O'Donohue, J. E. Fisher, S. C. Hayes, & K.D. Stroschal (Eds.), *Cognitive Behavior Therapy: Applying empirically supported techniques in your practice* (pp. 229-237). Hoboken, NJ: John Wiley & Sons, Inc. .
- Dorough, A. E. (2009). *DASH 2 Wellness: Effects of a multi-component lifestyle modification program on nutrition, physical activity, and blood pressure in prehypertensive middle-aged adults: A randomized controlled trial*. (Unpublished doctoral dissertation)l. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

- Duncan, G. E., Anton, S. D., Sydeman, S. J., Newton, R. L., Jr., Corsica, J. A., Durning, P. E., et al. (2005). Prescribing exercise at varied levels of intensity and frequency: A randomized trial. *Archives of Internal Medicine*, *165*(20), 2362-2369.
- Dunlap, W.P., Cortina, J.M., Vaslow, J.B., & Burke, M.J. (1996). Meta-analysis of experiments with matched groups or repeated measures designs. *Psychological Methods*, *1*, 170-177.
- Dunn, A. L., Marcus, B. H., Kampert, J. B., Garcia, M. E., Kohl, H. W., 3rd, & Blair, S. N. (1999). Comparison of lifestyle and structured interventions to increase physical activity and cardiorespiratory fitness: A randomized trial. *Journal of the American Medical Association*, *281*(4), 327-334.
- Dutton, G. R. (2008). The role of mindfulness in health behavior change. *ACSM's Health & Fitness Journal*, *12*(4), 7-12.
- Fairburn, C.G., Marucs, M.D., & Wilson, G.T. (1993). Cognitive behaviour therapy for binge eating and bulimia nervosa: A comprehensive treatment manual. In C.G. Fairburn and G.T. Wilson (Eds). *Binge eating: Nature, assessment and treatment*, (pp. 361-404). New York: Guilford Press.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191.
- Forman, E. M., Butryn, M., Hoffman, K. L., & Herbert, J. D. (2009). An open trial of an acceptance-based behavioral treatment for weight loss. *Cognitive and Behavioral Practice*, *16*, 223-235.

- Gardner, F. L., & Moore, Z. E. (2004). A mindfulness-acceptance-commitment-based approach to athletic performance enhancement: Theoretical considerations. *Behavior Therapy*, 35, 707-723.
- Germer, C. K. (2005). Mindfulness: What is it? What does it matter? . In C. K. Germer, R. D. Siegel & P. R. Fulton (Eds.), *Mindfulness in psychotherapy* (pp.3-27). New York: The Guilford Press.
- Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-Hall, M. L., et al. (2004). Acceptance-based treatment for smoking cessation. *Behavior Therapy*, 35, 689-705.
- Gifford, E. V., Ritscher, J. B., McKellar, J. D., & Moos, R. H. (2006). Acceptance and relationship context: a model of substance use disorder treatment outcome. *Addiction*, 101(8), 1167-1177.
- Goodwin, C. L. (2010). *A pilot study examining the initial effectiveness of acceptance based behavior therapy for modifying diet, physical activity levels, and smoking status in a cardiac population* (Unpublished Master's thesis). Drexel University, Philadelphia, Pennsylvania.
- Gregg, J. A., Callaghan, G. M., Hayes, S. C., & Glenn-Lawson, J. L. (2007). Improving diabetes self-management through acceptance, mindfulness, and values: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 75(2), 336-343.
- Harris, R. (2006). Embracing your demons: An overview of Acceptance and Commitment Therapy. *Psychotherapy in Australia*, 12, 2-8.
- Harris, R. (2009). *ACT Made Simple*. Oakland, CA: New Harbinger Publications.

- Hayes, S. C. (2004). Acceptance and Commitment Therapy and the new behavior therapies: Mindfulness, acceptance, and relationship. In S. C. Hayes, V. M. Follette & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 1-29). New York: Guilford.
- Hayes, S.C. (2004). Acceptance and Commitment Therapy, Relational Frame Theory, and the third wave of behavior therapy. *Behavior Therapy*, 35, 639-65.
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, 44(1), 1-25.
- Hayes, S. C., Stroschal, K. D., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy*. New York: The Guilford Press.
- Hayes, S. C., Stroschal, K. D., & Wilson, K. G. (2004). What is Acceptance and Commitment Therapy? . In S. C. Hayes, & K. D. Stroschal (Ed.), *A practical guide to Acceptance and Commitment Therapy* (pp. 3-29). New York: Springer.
- Hayes, S.C. Villatte, M., Levin, M., Hildebrandt, M. (2011). Open, aware, and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology*, 7, 141-168.
- Heyward, V. H. (2006). *Advanced fitness assessment and exercise prescription* (5th ed.). Champaign, IL: Human Kinetics.
- Hu, F. B., Sigal, R. J., Rich-Edwards, J. W., Colditz, G. A., Solomon, C. G., Willett, W. C., et al. (1999). Walking compared with vigorous physical activity and risk of type 2 diabetes in women: A prospective study. *Journal of the American Medical Association*, 282(15), 1433-1439.

- Iwamasa, G.Y. & Orsillo, S.M. (1997). Individualizing treatment manuals as a challenge for the next generation. *Behavior Therapy*, 28, 511-515.
- Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York: Hyperion.
- Kang, H. S., Gutin, B., Barbeau, P., Owens, S., Lemmon, C. R., Allison, J., et al. (2002). Physical training improves insulin resistance syndrome markers in obese adolescents. *Medicine and Science in Sports and Exercise*, 34(12), 1920-1927.
- Kaufman, K. A., Glass, C. R., & Arnkoff, D. B. (2009). Evaluation of Mindful Sport Performance Enhancement (MSPE): A new approach to promote flow in athletes. *Journal of Clinical Sports Psychology*, 4, 334-356.
- Kline, G. M., Porcari, J. P., Hintermeister, R., Freedson, P. S., Ward, A., McCarron, R. F., et al. (1987). Estimation of VO<sub>2</sub>max from a one-mile track walk, gender, age, and body weight. *Medicine and Science in Sports and Exercise*, 19(9), 253-259.
- Kodama, S., Saito, K., Tanaka, S., Maki, M., Yachi, Y., Asumi, M., et al. (2009). Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women: A meta-analysis. *Journal of the American Medical Association*, 301(19), 2024-2035.
- Lee, D. C., Sui, X., Ortega, F. B., Kim, Y. S., Church, T. S., Winett, R. A., et al. (2010). Comparisons of leisure-time physical activity and cardiorespiratory fitness as predictors of all-cause mortality in men and women. *British Journal of Sports Medicine*.
- Lee, I. M., Sesso, H. D., Oguma, Y., & Paffenbarger, R. S., Jr. (2003). Relative intensity of physical activity and risk of coronary heart disease. *Circulation*, 107(8), 1110-1116. Doi: 10.1136/bjism.2009.066209

- Lillis, J., Hayes, S. C., Bunting, K., & Masuda, A. (2009). Teaching acceptance and mindfulness to improve the lives of the obese: A preliminary test of a theoretical model. *Annals of Behavioral Medicine, 37*(1), 58-69.
- Linehan, N.M. (1993). *Skills training manual for treating borderline personality disorder*. New York: Guilford Press.
- Lundgren, T., Dahl, J., Melin, L., & Kies, B. (2006). Evaluation of acceptance and commitment therapy for drug refractory epilepsy: A randomized controlled trial in South Africa--a pilot study. *Epilepsia, 47*(12), 2173-2179.
- MacKinnon, D. P., Fritz, M. S., Williams, J., & Lockwood, C. M. (2006). Distribution of the product confidence limits for the indirect effect: Program PRODCLIN. *Behavior Research Methods, 39*, 384-389.
- McCracken, L. M., MacKichan, F., & Eccleston, C. (2007). Contextual cognitive-behavioral therapy for severely disabled chronic pain sufferers: Effectiveness and clinically significant change. *European Journal of Pain, 11*(3), 314-322.
- McCracken, L. M., Vowles, K. E., & Eccleston, C. (2004). Acceptance of chronic pain: Component analysis and a revised assessment method. *Pain, 107*, 159-166.
- Medicine, A. C. o. S. (2010). *ACSM's guidelines for exercise testing and prescription*. Philadelphia: Lippincott, Williams, & Wilkins.
- Mora, S., Redberg, R. F., Cui, Y., Whiteman, M. K., Flaws, J. A., Sharrett, A. R., et al. (2003). Ability of exercise testing to predict cardiovascular and all-cause death in asymptomatic women: A 20-year follow-up of the lipid research clinics prevalence study. *Journal of the American Medical Association, 290*(12), 1600-1607.

- Morley, S. , Shapiro, D.A., & Biggs, J. (2004). Developing a treatment manual for attention management in chronic pain. *Cognitive Behaviour Therapy*, 33(1), 1-11.
- Myers, J., Kaykha, A., George, S., Abella, J., Zaheer, N., Lear, S., et al. (2004). Fitness versus physical activity patterns in predicting mortality in men. *American Journal of Medicine*, 117(12), 912-918.
- Myers, J., Prakash, M., Froelicher, V., Do, D., Partington, S., & Atwood, J. E. (2002). Exercise capacity and mortality among men referred for exercise testing. *New England Journal of Medicine*, 346(11), 793-801.
- Nobel, B. J., Borg, G. A. V., & Jacobs, I. (1983). A category-ratio perceived exertion scale: Relationship to blood and muscle lactates and heart rate. *Medicine and Science In Sports and Exercise*, 15, 523-528.
- Olson, J.R. & Rueter, H.R. (1987). Extracting expertise from experts: Methods for knowledge acquisition. *Expert Systems*, 4, 152-168.
- Rejeski, W. J. (2008). Mindfulness: Reconnecting the body and mind in geriatric medicine and gerontology. *The Gerontologist*, 48(2), 135-141.
- Rovniak, L. S. (2003). *Operationalizing mastery experiences in e-mail based fitness walking programs* (Unpublished Doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- Sandvik, L., Erikssen, J., Thaulow, E., Erikssen, G., Mundal, R., & Rodahl, K. (1993). Physical fitness as a predictor of mortality among healthy, middle-aged Norwegian men. *New England Journal of Medicine*, 328(8), 533-537.
- Sesso, H. D., Paffenbarger, R. S., Jr., & Lee, I. M. (2000). Physical activity and coronary heart disease in men: The Harvard Alumni Health Study. *Circulation*, 102(9), 975-980.

- Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc. .
- Stroshal, K. D., Hayes, S. C., Wilson, K. G., & Gifford, E. V. (2004). An ACT primer: Core therapy processes, intervention strategies, and therapist competencies. In S. C. Hayes & K. D. Stroshal (Eds.), *A practical guide to Acceptance and Commitment Therapy* (pp.31-58). New York: Springer.
- Swain, D. P., & Franklin, B. A. (2006). Comparison of cardioprotective benefits of vigorous versus moderate intensity aerobic exercise. *American Journal of Cardiology*, 97(1), 141-147.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education, Inc.
- Tanasescu, M., Leitzmann, M. F., Rimm, E. B., Willett, W. C., Stampfer, M. J., & Hu, F. B. (2002). Exercise type and intensity in relation to coronary heart disease in men. *Journal of the American Medical Association*, 288(16), 1994-2000.
- Tapper, K., Shaw, C., Ilsley, J., Hill, A. J., Bond, F. W., & Moore, L. (2009). Exploratory randomised controlled trial of a mindfulness-based weight loss intervention for women. *Appetite*, 52(2), 396-404.
- U.S. Department of Health and Human Services (2008). *2008 Physical Activity Guidelines for Americans*. Retrieved from <http://www.health.gov/paguidelines/pdf/paguide.pdf>
- U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. (2010). *Health, United States, 2009: With special feature on medical technology* (DHHS Publication NO. 2010-1232). Retrieved from <http://www.cdc.gov/nchs/data/hs/hs09.pdf>

- U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2010). *Healthy people 2020*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=33>.
- U.S. Department of Health and Human Services, National Institute of Health, National Heart, Lung and Blood Institute. (2006). *Your guide to physical activity and your heart* (NIH Publication No. 06-5714). Retrieved from [http://www.nhlbi.nih.gov/health/public/heart/obesity/phy\\_active.pdf](http://www.nhlbi.nih.gov/health/public/heart/obesity/phy_active.pdf)
- Venter, A., & Maxwell, S. E. (1999). Maximizing power in randomized designs when N is small. In R. H. Hoyle (Ed.), *Statistical strategies for small sample research* (pp. 31-58). Thousand Oaks, CA: Sage Publications, Inc.
- Vowles, K. E., & McCracken, L. M. (2008). Acceptance and values-based action in chronic pain: A study of treatment effectiveness and process. *Journal of Consulting and Clinical Psychology, 76*(3), 397-407.
- Wei, M., Gibbons, L. W., Mitchell, T. L., Kampert, J. B., Lee, C. D., & Blair, S. N. (1999). The association between cardiorespiratory fitness and impaired fasting glucose and type 2 diabetes mellitus in men. *Annals of Internal Medicine, 130*(2), 89-96.
- Williams, P. T. (2001). Physical fitness and activity as separate heart disease risk factors: A meta-analysis. *Medicine and Science in Sports and Exercise, 33*(5), 754-761.
- Wilson, K. (2008). *Mindfulness for two*. Oakland: New Harbinger Publications.

Figure 1

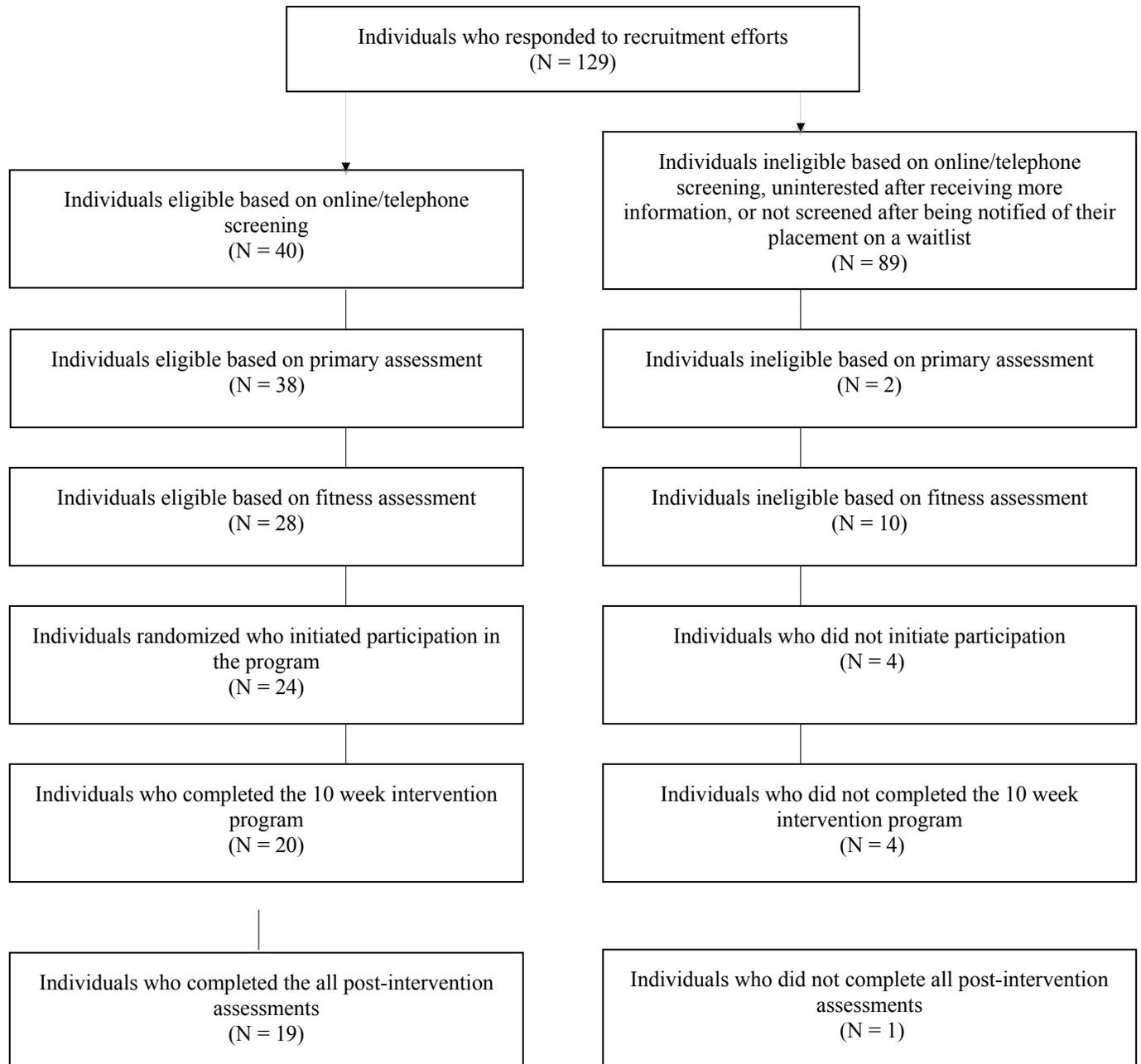
*Consort Diagram*

Table 1

*Mindful Steps Manual Protocol*

| Session (Week) | Topic/Targeted Component               | Suggested Exercise  | Aims/application to fitness intervention   |
|----------------|--|---|--|
| 1 (1)          | Introduction                           | Magic Wand Activity   | Familiarize participants with the concept of CRF and the fitness walking program protocol (i.e. RPE, HR monitor)   |
| 2 (2)          | Values                                 | The Compass Metaphor<br>Skiing Metaphor<br>Values Identification  | Identify and Clarify personal values<br>Identify how increasing your fitness supports such values<br>Enhance motivation to increase fitness  |
| 3 (3)          | Values, Committed Action, and Barriers | Skiing Metaphor<br>Two Kids in the Car Metaphor<br>Values, Goals, Action Activity<br>Demons on a Boat Metaphor  | Identify goals consistent with individual's values<br>Help participants increase awareness of and achieve fitness goals, despite internal and external barriers<br>Encourage adherence to interval training/exercise strategies over the long term<br>Bringing awareness to day to day choices and the connection to one's goals<br>Enable negative internal events (i.e. thoughts) to flow without attachment |
| 4 (4)          | Mindfulness                            | Extended Mindfulness Practice: Sweet Spot Exercise<br>Sunset vs. Math Problem Metaphor<br>Monitoring of bodily reactions and feelings before, during, and after physical exercise to explore responses to acute bouts of activity | Engaging in non-judgmental contact with psychological and physical events that are occurring<br>Increasing awareness during PA   |
| 5 (5)          | Acceptance (Willingness)               | Barriers in your Backpack Metaphor<br>Path Up the Mountain  | Distress Tolerance<br>Acknowledging vs. avoiding internal discomfort (i.e. negative emotions,  |

|        |   |                               |   |
|--------|---|-------------------------------|---|
|        |   | Metaphor                      | cognitions, or bodily sensations)           |
|        |   | The Swamp Metaphor            | Recognition that modifying aversive         |
|        |   | Polygraph Metaphor            | states often results in the delay/cessation |
|        |   | Chocolate Cake Metaphor       | of a goal directed behavior                 |
|        |   | Two Scales Metaphor           |   |
|        |   | The Struggle Switch           |   |
|        |   | Metaphor                      |   |
|        |   | The Choice to Feel            |   |
|        |   | Tug of War with a Monster     |   |
|        |   | Metaphor                      |   |
|        |   | Passengers on a Bus           |   |
|        |   | Metaphor                      |   |
| 6 (6)  | Acceptance through<br>Cognitive Diffusion | Leaves on a Stream Activity   | Breaking the link between thoughts and      |
|        |   | Milk, Milk, Milk exercise     | behavior (fitness related)                  |
|        |   | Passengers on a Bus           | Thoughts are simply that... not             |
|        |   | Metaphor                      | necessarily ideas that need to be believed  |
|        |   | Thought distancing            | or acted upon                               |
|        |   | techniques- Pushing Against   | To be more aware of when thoughts may       |
|        |   | a Clipboard Exercise          | sabotage exercise plans                     |
| 7 (8)  | Review                                    | Review of selected exercises  | Review of key concepts                      |
|        |   | from above                    | Answering questions from participants       |
| 8 (10) | Maintenance                               | Identification of negative    | Continued values clarification              |
|        |   | internal experiences related  | Renewal of commitment                       |
|        |   | to lapses in fitness directed |   |
|        |   | activity                      |   |

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Table 2

*Demographics*

| Demographic Characteristic         | Participant Data (N= 19) |
|------------------------------------|--------------------------|
| Age                                | 50.47 years (SD = 10.92) |
| Gender                             |                          |
| Female                             | 15                       |
| Male                               | 4                        |
| Weight (kg)                        | 81.45 (SD = 19.14)       |
| BMI (kg/m <sup>2</sup> )           | 29.02 (SD = 4.28)        |
| Marital Status                     |                          |
| Married                            | 17                       |
| Single                             | 1                        |
| Divorced                           | 1                        |
| Ethnicity                          |                          |
| Caucasian                          | 17                       |
| Asian American or Pacific Islander | 1                        |
| Latino                             | 1                        |
| Education                          |                          |
| High School                        | 2                        |
| Some College                       | 4                        |
| 4 Year College                     | 6                        |
| Masters Degree                     | 6                        |
| Post Masters                       | 1                        |
| Income                             |                          |
| 10,0001-20,000                     | 1                        |
| 20,001-30,000                      | 0                        |
| 30,001-40,000                      | 0                        |
| 40,001-50,000                      | 1                        |
| 50,001-60,000                      | 2                        |
| 60,001-70,000                      | 1                        |
| 70,001-80,000                      | 2                        |
| 80,001-90,000                      | 10                       |
| N/A                                | 2                        |

Table 3

*Baseline and Post-Intervention Measures for Primary and Secondary Outcomes*

| Measure                                     | Baseline |       | Post-Intervention |        | Paired t-test (df=18) |        |       |
|---|----------|-------|-------------------|--------|-----------------------|--------|-------|
|   | M        | SD    | M                 | SD     | T                     | $\rho$ | $d$   |
| One-Mile Walk<br>Time (seconds)             | 980.95   | 99.34 | 916.26            | 102.54 | 4.61                  | <.01   | 0.64  |
| Estimated VO <sub>2max</sub><br>(mL/kg/min) | 24.43    | 6.71  | 27.34             | 6.83   | -4.05                 | <.01   | -0.43 |
| AAQ II                                      | 17.84    | 7.45  | 10.53             | 27.25  | 1.18                  | .26    | 0.37  |
| PA-AAQ                                      | 3.14     | 0.92  | 5.04              | 0.90   | -9.19                 | <.01   | -2.09 |
| Weight (kg)                                 | 81.45    | 19.14 | 81.10             | 19.59  | 0.56                  | .58    | 0.02  |
| BMI (kg/m <sup>2</sup> )                    | 29.02    | 4.28  | 29.18             | 4.57   | -0.78                 | .45    | 0.04  |

*Note.* Higher scores on the AAQ-II indicate greater psychological inflexibility, while higher scores on the PA-AAQ indicate greater psychological flexibility.

Table 4

*Weekly Fitness Walking Protocol*

| Week | Maximum RPE | %HRmax  |
|------|-------------|---------|
| 1    | 13          | 70%     |
| 2    | 14          | 70%-75% |
| 3    | 15          | 75%-80% |
| 4    | 15          | 75%-80% |
| 5    | 16          | 75%-85% |
| 6    | 17          | 75%-85% |
| 7    | 17          | 75%-85% |
| 8    | 17          | 75%-85% |
| 9    | 17          | 75%-85% |
| 10   | 17          | 80-85%  |

Table 5

*Treatment Acceptability and Comprehension*

|   | %     | M     | SD    |
|---|-------|-------|-------|
| <b>Acceptability</b>  |       |       |       |
| How helpful did you find the strategies (e.g. acceptance, values, mindfulness, and defusion) for responding to urges or desires pushing you to make unhealthy choices regarding your physical activity? |       | 3.84  | 0.68  |
| How satisfied were you with the approach we used to help you make changes in your physical activity level?  |       | 4.32  | 0.58  |
| <b>Comprehension (Self Reported)</b>  |       |       |       |
| Values Score  |       | 4.63  | 0.68  |
| Mindfulness Score   |       | 4.53  | 0.61  |
| Acceptance Score  |       | 4.42  | 0.61  |
| Cognitive Defusion Score  |       | 3.68  | 1.00  |
| <b>Comprehension (Objective)</b>  |       |       |       |
| Values Score  | 79.56 | 19.89 | 6.14  |
| Mindfulness Score   | 77.04 | 19.26 | 6.17  |
| Acceptance Score  | 76.32 | 19.08 | 7.03  |
| Cognitive Defusion Score  | 61.36 | 15.34 | 10.30 |
| Total Score   | 72.26 | 72.26 | 20.17 |



















**XI. Weekly Walking Logs:**

- a. In the space below, please provide any feedback you may have regarding the design of the Weekly Walking Logs Appendix.

- XII. Please include any additional feedback you have regarding the manual in the space below.

## Appendix B

## Print Advertisement



VIRGINIA POLYTECHNIC INSTITUTE  
& STATE UNIVERSITY



## **PARTICIPANTS NEEDED:**

### Virginia Tech Research Study

We are conducting a study aimed at increasing cardiorespiratory fitness in adults through a fitness walking program. Participants must be in good health (e.g. non-smoker, no history of diabetes, heart, liver, or pulmonary disease, no orthopedic injury or musculoskeletal disability), between the ages 18-64, and not engage in regular physical activity (but willing to start!). Participation will involve weekly group workshop sessions over a 10-week period. These workshops will use mindfulness practices to help increase your adherence to a fitness-based walking program. These weekly sessions will occur at a Virginia Tech facility located approximately 5 minutes from the Blacksburg Campus. For more information, please call Emily Martin, MS at the Center for Research in Health Behavior with the Department of Psychology at Virginia Tech, 231-8746 or email at [mindfulwalking@gmail.com](mailto:mindfulwalking@gmail.com).

## Appendix C

**Telephone Eligibility Screening Form:  
Mindful Steps**

Script:

Hello is Mr/Mrs. \_\_\_\_\_ available?

My name is \_\_\_\_\_ and I am calling from the Center for Health Behavior Research at Virginia Tech. We received your message regarding your interest in our Mindfulness based fitness project. If you are still interested I can tell you a little more about the study.

We are conducting a study aimed at increasing cardiorespiratory fitness and overall health in sedentary adults. Participation will involve weekly group workshop sessions over a 10-week period. These workshops will use mindfulness practices to help increase your adherence to a fitness-based walking program. The weekly sessions will occur at a Virginia Tech facility located approximately 5 minutes from the Blacksburg Campus. Participants must also engage in a fitness based walking program and be willing to monitor their heart rate during their walking sessions. You will be asked to complete 2 initial and 2 follow-up assessments at the Center for Research in Health Behavior at Virginia Tech. One of these will involve a One-Mile fitness walk test, in order for us to evaluate your current level of fitness. We will also be measuring your height and weight, and you will be asked to fill out a questionnaire regarding your feelings about physical activity. All testing and workshop sessions are free of charge.

Does this sound like something you would be interested in?

If participant is still interested ask for verbal consent to collect preliminary screening information.

(If yes.... ) Great, well then if it is okay with you I'd like to ask you some questions about your current health status to make sure you can qualify for the project. Is that okay?

Was verbal consent given?    Yes    No

Name \_\_\_\_\_ Date \_\_\_\_\_ Interviewer \_\_\_\_\_

Address \_\_\_\_\_ Phone (H) \_\_\_\_\_ E-mail: \_\_\_\_\_

Age \_\_\_\_\_ (C)  
\_\_\_\_\_ \*must be 18-64 Male / Female

Height \_\_\_\_\_ (in) x 2.54 = \_\_\_\_\_ (cm) / 100 = \_\_\_\_\_ (m)    **BMI** \_\_\_\_\_ kg/m<sup>2</sup>

Weight \_\_\_\_\_ (lbs) / 2.2 = \_\_\_\_\_ (kg)    \*must be  $\geq 18.5$  &  $\leq 39.9$

Do you exercise more than 3-5 days a week? (<30 minutes of moderate PA, 5 days a week or < 20 minutes vigorous PA, 3 days a week) Y\_\_\_\_\_ N\_\_\_\_\_

Are you a smoker? N\_\_\_ Y\_\_\_\_\_ ***\*must be sedentary and nonsmoker to participate***

Current Medications (including over the counter):

|  |
|--|
|  |
|--|

Do you have a history of diabetes, hypertension, heart, liver, or lung (pulmonary) disease?  
N\_\_\_\_\_ Y\_\_\_\_\_

(explain) \_\_\_\_\_

\* If hypertension is reported ask if blood pressure is managed with medication

Y\_\_\_\_\_ N\_\_\_\_\_

\*If yes, still eligible, but must receive written permission from their personal physician to be in the intervention

Do you have asthma? Y\_\_\_\_\_ N\_\_\_\_\_

Do you have a orthopedic injury or musculoskeletal disability that would prevent you from engaging in a vigorous walking program? : Y\_\_\_\_\_ N\_\_\_\_\_

(explain) \_\_\_\_\_

\_\_\_\_\_

Do you feel pain in your chest when you do physical activity? Y\_\_\_\_\_ N\_\_\_\_\_

In the past month, have you had chest pain when you were not doing physical activity?

Y\_\_\_\_\_ N\_\_\_\_\_

Do you lose balance because of dizziness or do you ever lose consciousness?

Y\_\_\_\_\_ N\_\_\_\_\_

Do you know of any other reason why you should not do physical activity?

Y\_\_\_\_\_ N\_\_\_\_\_

Women Only: Are you pregnant or planning to become pregnant in the next 3 months?

Schedule initial visit \_\_\_\_\_

## Appendix D

Dear Health Care Professional,

Your patient \_\_\_\_\_ would like to participate in a dissertation research project being conducted by Virginia Tech researchers in the Departments of Psychology (Emily Martin, MS). The study protocol has been reviewed and approved by the Institutional Review Board at Virginia Polytechnic Institute and State University.

The major purpose of this research project is to investigate the feasibility and efficacy of a psychologically based intervention for increasing cardiorespiratory fitness and physical activity in sedentary adults. We will enroll ~ 30 individuals in this 10 week protocol.

People will be eligible for this study if they are between the age 18 and 64, have a body mass index that is between 18.5 to 39.9 (normal weight to obese, but not under weight or morbidly obese), and are not regularly physically active, such as performing moderate intensity physical activity or exercise 5 or more days per week for 30 minutes.

People will be excluded from participation if they are smokers. People will also be excluded if they have a diagnosis of a cardiovascular, pulmonary (e.g. chronic obstructive pulmonary disease), or metabolic disease (e.g. diabetes mellitus type I or type II), the presence of a physical condition that restricts the individual's ability to engage in fitness testing or vigorous physical activity (i.e. orthopedic injuries or musculoskeletal disabilities). Additionally, those determined to be "high risk" as defined by the ACSM guidelines will not be eligible. People taking medications known to impact energy metabolism or body weight/composition will also be excluded (e.g. thyroid replacement). Individuals taking other frequently prescribed medications, such as those used to treat dyslipidemia and hormone replacement therapy, will be eligible so long as they have maintained a stable dose of the medication for an extended period of time. People with hypertension whose blood pressure is adequately controlled (i.e. <140/<90 mmHg) with antihypertensive medications will be permitted to participate provided that you, their health care professional, provides written permission for them to do so.

This program will require individuals to participate in a field test to evaluate cardiorespiratory fitness (The Rockport One-Mile Walk Test), twice during a 12-15 month period. Additionally, participants will be engaging in a fitness based walking program for a 10 week period, during which they will be asked to engage in a vigorous level of physical activity 3 or more days per week, for a minimum of 25 minutes.

All participants will attend a psychoeducational workshops and receive a fitness based walking program manual; both including information on how to monitor exercise intensity using ratings of perceived exertion and pulse rate. Participants will also be provided with information on how to safely engage in this behavior (i.e. extreme weather conditions and appropriate equipment), although it should be noted that walking is a fairly low-skill exercise behavior. Participants will be encouraged to discontinue the walking program should they encounter any adverse health

experiences, and to contact either their health care professional, or 911 in the case of an emergency.

**If you are able to provide medical clearance for your patient to participate in this program, please provide your signature and contact information below,** in the event we need to contact you regarding your patient. If you have questions about this project and would like to contact us, we may be reached at: Emily Martin (540- 231-8746 or [ecmartin@vt.edu](mailto:ecmartin@vt.edu)).

**Please return this form to your patient, so that they may send it to us.** We greatly appreciate your support for our project.

**Health care provider's name** \_\_\_\_\_

**Health care provider's Signature:** \_\_\_\_\_

**Clinic Name:** \_\_\_\_\_

**Clinic Phone Number:** \_\_\_\_\_

## Appendix E



**Informed Consent for Participants in Research  
Projects Involving Human Subjects**

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**Center for Research in Health Behavior**

VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

Department of Psychology  
Mail Code: 0274  
Blacksburg, Virginia 24061  
(540) 231-8746

Feasibility Testing of a Mindfulness and Acceptance Based Intervention for Increasing  
Cardiorespiratory Fitness in Sedentary Adults

Principle Investigator: Richard Winett, PhD  
Co-Investigator: Emily Martin, MS

This is an experimental research study. We are investigating the helpfulness of various therapeutic techniques in helping people engaging in a fitness based walking program. Before you agree to be a volunteer in this study, it is important you understand what your participation will involve. Please read this form thoroughly prior to your first visit and let us know if you have any questions about its contents.

**What should I know about this study?**

You will be asked to engage in a 10-week fitness based walking program. During this time you will also be asked to participate in regular educational therapeutic workgroups regarding your physical activity

**Who is allowed to participate?**

To participate in this study you must be between the ages of 18 and 64, be within our body weight guidelines (not too heavy or too thin), and inactive- not exercising or walking regularly. This study will include between 20-30 participants.

Additionally, you cannot be a smoker, or have a diagnosis of heart disease, lung disease, diabetes, or a physical condition that would prevent you from engaging in physical activity. Finally, you may not be pregnant.

**What else do I have to do to participate?**

Below is a detailed account of the various assessment and group workshop sessions you will be asked to attend as a participant of this study.

**Session 1 (45 minutes):** This session will occur at the Center for Research in Health Behavior. First we will explain the study to you, and have you read this information sheet. If you choose to participate, the following screening tests will be done:

Health History – You will be asked to complete a medical history questionnaire. This procedure is used to screen for pre-existing disease and other reasons you should not participate in this study. Your height and weight will also be measured at this time. Your body weight will be measured on a standard balance scale and will include the weight of light indoor clothing without your shoes.

Physical Activity Acceptance and Action Questionnaire- You will complete this short 5-item measure indicating the extent to which various statements about physical activity apply to you.

**Session 2 (1 hour):** This session will occur at the Virginia Tech field house fitness track facility. During this session, participants will undergo the Rockport One-Mile walk test. During the walk test, participants are required to walk as fast as they can around a flat course for exactly one mile. Participants' one-mile time will be recorded, as will their heart rate prior and after the fitness test. Participants will be asked to wear an electronic heart rate monitor during the test.

**Intervention (10 weeks):** During the intervention period you will be asked to attend 90-minute group workshop sessions including educational and therapeutic information to help you engage in your fitness based walking program. These sessions may occur at either the Center for Research in Health Behavior or that the Psychological Services Center. The time commitment you would be asked to engage in would be 12 hours (1 weekly or biweekly 90 minute session over the 10 week period) over a span of 10 weeks. For this study, you must be willing to participate in these weekly sessions.

**Session 4 (45 minutes):** This will be similar to session 1; however you will not be asked to fill out the Health History Form again.

**Session 5 (1 hour):** This session will be similar to session 2, where you will perform the Rockport One-Mile Walk Test.

**Session 6 (1 hour):** You may be asked to complete an exit interview session during which interview type information regarding the intervention will be elicited from you either in person or via survey.

### **What are my responsibilities as a research participant?**

The subject should:

- Provide an accurate history of any health problems or medications you use before the study begins.
- Obtain consent from a health care professional for your participation in this study if necessary
- Inform the experimenters of any discomfort or unusual feelings before, during or after fitness testing assessment sessions (sessions 2 and 5).
- Inform the experimenters of any discomfort, unusual feelings, or adverse experiences encountered while engaging in the fitness based walking program or that may preclude you from completing the walking program in a safe and healthy manner.

- Be on time and attend all of the scheduled sessions.
- Maintain weekly reporting of walking diaries.
- Adhere to walking program guidelines.

### **What are the risks associated with being in this study?**

*Fatigue and Soreness.* You may feel tired or sore from being more active. This should get better with time and continued activity.

*Injuries.* You may fall or strain a muscle as you become more active. These injuries are not likely to need medical treatment.

It is not possible to identify all potential risks in an experimental study; however the project director and research staff will take all possible safeguards to minimize any known and potential risks to your well-being. For example, those for whom this study would be considered “high-risk” have been deemed ineligible. We believe the overall risks of participation are minimal. However, side effects are possible in any research study despite high standards of care, and could occur through no fault of your own or the study staff.

### **What are the benefits of being in this study?**

Your participation will provide you with:

- Information on a fitness based walking program
- The opportunity to improve your physical activity habits, which could also improve your health and decrease your risk of diseases.
- Educational and therapeutic information to help you increase your chances of maintaining a successful exercise program

### **Your information will be kept confidential!**

The data from this study will be kept strictly confidential. No data will be released to anyone but those working on the project without your written permission. Data will be identified by subject numbers, without anything to identify you by name. It is possible that the Institutional Review Board (IRB) may view this study’s collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

### **What if I decide I don’t want to be a part of the study anymore?**

You are free to withdraw from the study at any time for any reason. Simply inform the experimenters of your intention to cease participation. Circumstances may arise causing the researcher to determine that you should not continue as a subject in the study. For example, lack of compliance to instructions, failure to attend on-site sessions and/or illness could be reasons for the researchers to stop your participation in the study.

### **Note: Injury during participating in this study**

Neither the researchers nor the university have money set aside to pay for medical treatment that would be necessary if injured as a result of your participation in this study. Any expenses that you incur including emergencies and long-term expenses would be your own responsibility. You should consider this limitation before you consider participating in this study.

### **Approval of Research**

This research has been authorized, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Tech, and by the Department of Psychology. You will receive a copy of this form to take with you.

**Do you agree to participate?**

I have read the informed consent and fully understand the procedures and conditions of the project. I have had all my questions answered, and I hereby give my voluntary consent to be a participant in this research study. I agree to abide by the rules of the project. I understand that I may withdraw from the study at any time.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

If you have questions, you may contact:

Principal Investigator: Richard Winett, Professor, Center for Research in Health Behavior,  
Department of Psychology. (540) 231-8747

Co-Investigator: Emily Martin, Graduate Researcher, Center for Research in Health Behavior,  
Department of Psychology (540) 231-8747

Chairman, Human Subject Committee: David Harrison, Department of Psychology, [dwh@vt.edu](mailto:dwh@vt.edu)

Chairman, Institutional Review Board for Research Involving Human Subjects: David Moore,  
(540) 231-4991

Name of Subject (please print)  
\_\_\_\_\_

Signature of Research Staff \_\_\_\_\_

Date \_\_\_\_\_

Appendix F

Virginia Tech  
Center for Research in Health Behavior  
Department of Psychology

HEALTH HISTORY QUESTIONNAIRE

STUDY \_\_\_\_\_

DATE \_\_\_\_\_

SUBJECT ID # \_\_\_\_\_

PLEASE PRINT

**1. GENERAL Demographic Information:** Age: \_\_\_\_\_  
Sex: \_\_\_\_\_  
Marital Status: \_\_\_\_\_

**Race and/or Ethnic Origin:**

- American Indian or Alaskan Native
- Black, not of Hispanic Origin
- Hispanic
- Asian or Pacific Islander
- White, not of Hispanic Origin
- Other

**How many adults, age 18 or older live in your home?** \_\_\_\_\_

**How many children, under age 18 live in your home?** \_\_\_\_\_

**Please list the ages of the children living in your home:**

- Child #1 Age \_\_\_\_\_
- Child #2 Age \_\_\_\_\_
- Child #3 Age \_\_\_\_\_
- Child #4 Age \_\_\_\_\_
- Child #5 Age \_\_\_\_\_
- Child #6 Age \_\_\_\_\_

**How many years of school have you completed? (Circle One)**

1 2 3 4 5 6 7 8 9 10 11 12 Some College 4 year college Masters Degree Post- Masters

**What is your specific occupation?** If you work at a plant or a factory, or if you are in the military, please list the job you do there. If you are retired, disabled or unemployed, please list your most recent job.

**What is the annual income of your household?** (include all *adults* working)

- |                          |                        |                        |
|--------------------------|------------------------|------------------------|
| a. \$10,000 or less/year | b. \$10,001 - \$20,000 | c. \$20,001 - \$30,000 |
| d. \$30,001 - \$40,000   | e. \$40,001 - \$50,000 | f. \$50,001 - \$60,000 |
| g. \$60,001 - \$70,000   | h. \$70,001 - \$80,000 | i. \$80,001 - \$90,000 |

## **2. GENERAL MEDICAL HISTORY**

Do you have any current medical conditions?      YES                       NO   
If Yes, please explain:

Are you allergic to any medications?              YES                       NO   
If Yes, please explain:

Have you had any major illnesses in the past?      YES                       NO   
If Yes, please explain:

Have you ever been hospitalized or had surgery?      YES                       NO   
If Yes, please explain: (include date and type of surgery, if possible)

Are you currently taking any medications or supplements, including aspirin, hormone replacement therapy, or other over-the-counter products?

YES                       NO

If Yes, please explain:

| <b>Medication/Supplement</b> | <b>Reason</b> | <b>Times taken per Day</b> | <b>Taken for how long?</b> |
|------------------------------|---------------|----------------------------|----------------------------|
|------------------------------|---------------|----------------------------|----------------------------|

Have you ever had an EKG?                              YES                       NO

If Yes, please explain:

Have you been diagnosed with diabetes?

YES

NO

If Yes, please explain:

Age at diagnosis \_\_\_\_\_

**3. FAMILY HISTORY**

|                  | Age (if alive) | Age of Death | Cause of Death |
|------------------|----------------|--------------|----------------|
| Father           | _____          | _____        | _____          |
| Mother           | _____          | _____        | _____          |
| Brothers/Sisters | _____          | _____        | _____          |
|                  | _____          | _____        | _____          |
|                  | _____          | _____        | _____          |
|                  | _____          | _____        | _____          |

Do you have a family history of any of the following: (Blood relatives only, please give age at diagnosis if possible)

|                            | YES                      | NO                       | Relation | Age at Diagnosis |
|----------------------------|--------------------------|--------------------------|----------|------------------|
| a. High blood pressure     | <input type="checkbox"/> | <input type="checkbox"/> | _____    | _____            |
| b. Heart Attack            | <input type="checkbox"/> | <input type="checkbox"/> | _____    | _____            |
| c. Coronary bypass surgery | <input type="checkbox"/> | <input type="checkbox"/> | _____    | _____            |
| d. Stroke                  | <input type="checkbox"/> | <input type="checkbox"/> | _____    | _____            |
| e. Diabetes                | <input type="checkbox"/> | <input type="checkbox"/> | _____    | _____            |
| f. Obesity                 | <input type="checkbox"/> | <input type="checkbox"/> | _____    | _____            |

**4. TOBACCO/ALCOHOL HISTORY** (check one)

**CURRENT TOBACCO USE**

(if applicable)

|              |                          |              |
|--------------|--------------------------|--------------|
| None         | <input type="checkbox"/> |              |
| Quit         | <input type="checkbox"/> | (when) _____ |
| Cigarette    | <input type="checkbox"/> |              |
| Cigar        | <input type="checkbox"/> |              |
| Pipe         | <input type="checkbox"/> |              |
| Chew Tobacco | <input type="checkbox"/> |              |
| Snuff        | <input type="checkbox"/> |              |

|              | <u># per day</u> |
|--------------|------------------|
| Cigarette    | _____            |
| Cigar        | _____            |
| Pipe         | _____            |
| Chew Tobacco | _____            |
| Snuff        | _____            |

Total years of tobacco use \_\_\_\_\_

Do you consume alcohol? Drinks per day \_\_\_\_\_ Drinks per week \_\_\_\_\_

### **5. CARDIORESPIRATORY/METABOLIC HISTORY**

|  | <b>YES</b>               | <b>NO</b>                |
|--|--------------------------|--------------------------|
| Are you presently diagnosed with heart disease?        | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have any history of heart disease?              | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have a heart murmur?                            | <input type="checkbox"/> | <input type="checkbox"/> |
| Occasional chest pain or pressure?                     | <input type="checkbox"/> | <input type="checkbox"/> |
| Chest pain or pressure on exertion?                    | <input type="checkbox"/> | <input type="checkbox"/> |
| Episodes of fainting?                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| Daily coughing?  | <input type="checkbox"/> | <input type="checkbox"/> |
| High blood pressure?                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| Shortness of breath?                                   |                          |                          |
| At rest?   | <input type="checkbox"/> | <input type="checkbox"/> |
| lying down?  | <input type="checkbox"/> | <input type="checkbox"/> |
| After 2 flights of stairs?                             | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have asthma?                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have a history of bleeding disorders?           | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have a history of problems with blood clotting? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have high total cholesterol?                    | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have low good (HDL) cholesterol?                | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have thyroid problems?                          | <input type="checkbox"/> | <input type="checkbox"/> |

*If you checked YES to any of the above, you will be asked to clarify your response by an investigator so we can be sure to safely determine your ability to participate.*

### **6. MUSCULOSKELETAL HISTORY**

|   | <input type="checkbox"/> | <b>YES</b>               | <input type="checkbox"/> | <b>NO</b>                |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| Any current muscle injury or illness?                   | <input type="checkbox"/> |                          | <input type="checkbox"/> |                          |
| Any muscle injuries in the past?                        |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Do you experience muscle pain at rest?                  |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Do you experience muscle pain on exertion?              | <input type="checkbox"/> |                          | <input type="checkbox"/> |                          |
| Any current bone or joint (including spinal) injuries?  |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Any previous bone or joint (including spinal) injuries? |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Do you ever experience painful joints?                  |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Do you ever experience swollen joints?                  |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Do you ever experience edema (fluid build up)?          |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |
| Do you have pain in your legs when you walk?            |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |

*If you checked YES to any of the above, you will be asked to clarify your response by an investigator so we can be sure to safely determine your ability to participate.*

## **7. NUTRITIONAL HABITS**

Have you ever dieted? YES  NO

If YES, have you dieted within the past 12 months or are you currently on a diet?

YES  NO

If YES, please describe the diet:

a). Name (if applicable): \_\_\_\_\_

b). Prescribed by a Physician/nutritionist? YES  NO

c). Have you lost weight? YES  NO

d). Duration of diet \_\_\_\_\_

What was your weight 24 months ago? \_\_\_\_\_ 12 months ago? \_\_\_\_\_ 6 months ago? \_\_\_\_\_

Have you dieted other than in the past 12 months? YES  NO

If YES, please answer the following:

- a). How many times have you dieted?
- b). How old were you?
- c). Weight loss (amount)?

*You may be asked to complete a more detailed diet survey if you are volunteering for a research study.*

## **8. PHYSICAL ACTIVITY SURVEY**

Compared to a year ago, how much regular physical activity do you get? (Check one)

- Much less
- Somewhat less
- About the same
- Somewhat more
- Much more

Have you been exercising regularly for the past three months? YES  NO

If YES, what type of exercise do you regularly participate in? (check those that apply)

|                  | <b>Days per week</b>     | <b>Minutes per session</b> | <b>Intensity</b><br>(1=easy, 10=very hard) |
|------------------|--------------------------|----------------------------|--|
| Walking          | <input type="checkbox"/> | _____                      | _____                                      |
| Running          | <input type="checkbox"/> | _____                      | _____                                      |
| Cycling          | <input type="checkbox"/> | _____                      | _____                                      |
| Swimming         | <input type="checkbox"/> | _____                      | _____                                      |
| Aerobics         | <input type="checkbox"/> | _____                      | _____                                      |
| Weight Training  | <input type="checkbox"/> | _____                      | _____                                      |
| Martial Arts     | <input type="checkbox"/> | _____                      | _____                                      |
| Other (describe) |                          | _____                      | _____                                      |

## **9. OBSTETRIC/GYNECOLOGICAL HISTORY**

Do you have a normal menstrual cycle (1 menses each ~1 month)?  YES  NO

If no, please indicate frequency \_\_\_\_\_

Do you take any kind of contraceptive (oral, injectable, implant)?  YES  NO

If yes, please indicate type and name \_\_\_\_\_

How many full term pregnancies have you had? \_\_\_\_\_

How long ago was your more recent pregnancy? \_\_\_\_\_

Have long since you have last breast fed? \_\_\_\_\_

## **10. SLEEP HISTORY**

Please answer yes/no or circle appropriate answer.

Do you snore?

**YES**

**NO**

**Don't Know**

Snoring loudness

- Loud as breathing
- Loud as talking
- Louder than talking
- Very loud. Can be heard in nearby rooms.

Snoring frequency

- Almost every day
- 3-4 times per week
- 1-2 times per week
- 1-2 times per month
- Never or almost never

Does your snoring bother other people?

**YES**

**NO**

Has anyone told you that you quit breathing during your sleep?



How often have your breathing pauses been noticed?

- Almost every day
- 3-4 times per week
- 1-2 times per week
- 1-2 times per month
- Never or almost never

Are you tired after sleeping?

- Almost every day
- 3-4 times per week
- 1-2 times per week
- 1-2 times per month
- Never or almost never

Are you tired during waketime?

- Almost every day
- 3-4 times per week
- 1-2 times per week

- 1-2 times per month
- Never or almost never

Have you ever fallen asleep while driving?

- Almost every day
- 3-4 times per week
- 1-2 times per week
- 1-2 times per month
- Never or almost never

**Sleepiness Assessment**

- 0 (zero) = would never doze off
- 1 (one) = slight chance of dozing
- 2 (two) = moderate chance of dozing
- 3 (three) = high chance of dozing

| <b>Situation:</b>  | <b>Chance of Dozing</b> |
|--|-------------------------|
| Sitting and reading  | ___                     |
| Watching TV  | ___                     |
| Sitting, inactive in a public place (e.g., a theatre or meeting) | ___                     |
| As a passenger in a car for an hour without a break              | ___                     |
| Lying down to rest in the afternoon when circumstances permit    | ___                     |
| Sitting quietly after lunch without alcohol                      | ___                     |
| Sitting and talking to someone                                   | ___                     |
| In a car, while stopped for a few minutes in traffic             | ___                     |

*If your values are out of expected ranges, or if you are pregnant, we will indicate this to you and suggest that you discuss this with your personal physician.*

Reviewer: \_\_\_\_\_  
Print Name
Signature

Date: \_\_\_\_\_

## Appendix G

## AAQ-II

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

| <b>1</b>          | <b>2</b>                | <b>3</b>           | <b>4</b>              | <b>5</b>               | <b>6</b>                  | <b>7</b>           |
|-------------------|-------------------------|--------------------|-----------------------|------------------------|---------------------------|--------------------|
| <b>never true</b> | <b>very seldom true</b> | <b>seldom true</b> | <b>sometimes true</b> | <b>frequently true</b> | <b>almost always true</b> | <b>always true</b> |

|  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
| 1. My painful experiences and memories make it difficult for me to live a life that I would value. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I'm afraid of my feelings.  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I worry about not being able to control my worries and feelings.                                | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. My painful memories prevent me from having a fulfilling life.                                   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Emotions cause problems in my life.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. It seems like most people are handling their lives better than I am.                            | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. Worries get in the way of my success.   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## Appendix H

## Physical Activity Acceptance and Action Questionnaire

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

| 1          | 2                | 3           | 4              | 5               | 6                  | 7           |
|------------|------------------|-------------|----------------|-----------------|--------------------|-------------|
| never true | very seldom true | seldom true | sometimes true | frequently true | almost always true | always true |

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 1. I can have the thought that I don't want to exercise, and exercise anyway.   | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
| 2. My urges to not exercise make it impossible for me to stick to my exercise plan.   | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
| 3. I'm afraid of the way I feel when I exercise (such as getting bored or being physically uncomfortable).  | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
| 4. The thoughts and feelings I have when I exercise keep me from being more physically active.  | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
| 5. When I have the feeling that I want to spend my time doing something other than exercise, it gets in the way of my success at being physically active. | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |

## Appendix I

Informed Consent for Fitness Testing-  
The One-Mile Walk Test

## Center for Research in Health Behavior

VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

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I, \_\_\_\_\_, have been told that I will perform the Rockport One-Mile Walk Test, a cardiorespiratory fitness test, designed to aid in my understanding of my own health and physical fitness. I understand that I have the freedom to withdraw from the testing at any time with no penalty. However, I also understand, that for my own safety, I cannot participate in the research study relevant to this testing without completing it. I also understand that I am free to ask any questions that may arise at any time and will have those questions answered to my satisfaction. Should any emergency arise during the testing, I understand that there is an emergency plan to follow.

There are few risks associated with these procedures and tests. I understand that it is my responsibility to have completed the Health History Questionnaire truthfully in my previous sessions. I understand that if I have done this, I will not be questioned on other health related issues to ensure my safety. The measurement of my cardiorespiratory fitness will require brief exertion on my part. However, there is little reported risk associated with the procedures for this test. The most likely event to occur immediately after or within the first few hours after testing is local muscle soreness in the lower legs and knees, and possibly some fatigue. This should subside with time. I will report any excessive symptoms that I may have to Emily Martin, Co-Investigator. I understand that all of my personal health and physical fitness data will be kept confidential. I am volunteering for these procedures and tests. I have read this form and understand both the form and the explanations given to me.

**Do you agree to participate?**

I have read the informed consent and fully understand the procedures and conditions of the project. I have had all my questions answered, and I hereby give my voluntary consent to be a participant in this research study. I agree to abide by the rules of the project. I understand that I may withdraw from the study at any time.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

If you have questions, you may contact:

Principal Investigator: Richard Winett, Assistant Professor, Center for Research in Health Behavior, Department of Psychology. (540) 231-8747

Co-Investigator: Emily Martin, Graduate Researcher, Center for Research in Health Behavior, Department of Psychology (540) 231-8746

Chairman, Human Subject Committee: David Harrison, Department of Psychology, [dwh@vt.edu](mailto:dwh@vt.edu)

Chairman, Institutional Review Board for Research Involving Human Subjects: David Moore, (540) 231-4991

Name of Researcher (please print) \_\_\_\_\_

Signature of Researcher \_\_\_\_\_

Date \_\_\_\_\_

## Appendix J

## Mindful Steps Completion Questionnaire

**Section 1:**

We would like to understand how helpful you found the strategies used in the Mindful Steps program. Please use the following rating scale to respond to the questions below.

|  | 1          | 2           | 3        | 4      | 5    |
|--|------------|-------------|----------|--------|------|
|  | Not at all | very little | somewhat | Mostly | Very |
| <sup>1</sup> How helpful did you find the strategies (e.g. acceptance, values, mindfulness, and defusion) for responding to urges or desires pushing you to make unhealthy choices regarding your physical activity? | ①          | ②           | ③        | ④      | ⑤    |
| <sup>2</sup> How satisfied were you with the approach we used to help you make changes in your physical activity level?  | ①          | ②           | ③        | ④      | ⑤    |

**Section II:**

We would like to know how difficult it was for you to understand some of the concepts used in the Mindful Steps program. Please use the following rating scale to indicate the level of difficulty you experienced in understanding each concept.

|                                 | 1              | 2                  | 3       | 4             | 5         |
|---------------------------------|----------------|--------------------|---------|---------------|-----------|
|                                 | Very difficult | Somewhat difficult | Neutral | Somewhat easy | Very easy |
| <sup>1</sup> Values             | ①              | ②                  | ③       | ④             | ⑤         |
| <sup>2</sup> Mindfulness        | ①              | ②                  | ③       | ④             | ⑤         |
| <sup>3</sup> Acceptance         | ①              | ②                  | ③       | ④             | ⑤         |
| <sup>4</sup> Cognitive Defusion | ①              | ②                  | ③       | ④             | ⑤         |

**Section III:**

Please answer the following questions.

1. Please explain your understanding of values:

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2. Please provide an example of how you have used or could in the future use the concept of values in your every day life:

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3. Please explain your understanding of mindfulness:

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4. Please provide an example of how you have used or could in the future use the concept of mindfulness in your every day life:

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5. Please explain your understanding of acceptance:

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6. Please provide an example of how you have used or could in the future use the concept of acceptance in your every day life:

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7. Please explain your understanding of cognitive defusion:

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8. Please provide an example of how you have used or could in the future use the concept of cognitive defusion in your every day life:

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Appendix K

| WEEKLY STEP COUNT AND WALKING DIARY   |     |      |     |     |     |     |     |
|---|-----|------|-----|-----|-----|-----|-----|
| Use this log to keep track of your daily step-counts.                               | MON | TUES | WED | THU | FRI | SAT | SUN |
| <b>End of Day Step Count</b><br><i>(Reset your step counter every day).</i>         |     |      |     |     |     |     |     |
| WALKING LOG   |     |      |     |     |     |     |     |
| Use this portion of the diary to track your weekly fitness walking                  | MON | TUES | WED | THU | FRI | SAT | SUN |
| <b>Total time spent engaging in fitness directed walking</b><br><i>(minutes)</i>    |     |      |     |     |     |     |     |
| <b>Maximum Rating of Perceived Exertion (RPE)</b><br><i>(see scale for details)</i> |     |      |     |     |     |     |     |
| <b>Monitored Heart Rate</b>   |     |      |     |     |     |     |     |

| Exertion               |                 |   |            |    |                          |                          |               |    |                           |    |           |    |                |              |
|------------------------|-----------------|---|------------|----|--------------------------|--------------------------|---------------|----|---------------------------|----|-----------|----|----------------|--------------|
| 6                      | 7               | 8 | 9          | 10 | 11                       | 12                       | 13            | 14 | 15                        | 16 | 17        | 18 | 19             | 20           |
| No exertion (Watch TV) | Extremely light |   | Very light |    | Light<br>(Can sing/walk) | Moderate (Can talk/walk) | Somewhat hard |    | Hard<br>(Can't talk/walk) |    | Very hard |    | Extremely hard | Max Exertion |

## Appendix L

## Exit Interview Quantitative and Qualitative Scoring Rubrics

## Quantitative Scoring Rubric

|   |             |
|---|-------------|
| <b>Concept</b>                                      |             |
| <b>Values</b>                                       |             |
| One correct definition or description is provided   | /18         |
| More than one definition or description is provided | /2          |
| Use of a metaphor/story/strategy                    | /2          |
| Appropriate Example was provided                    | /3          |
|   | <b>/25</b>  |
| <b>Mindfulness</b>                                  |             |
| One correct definition or description is provided   | /18         |
| More than one definition or description is provided | /2          |
| Use of a metaphor/story/strategy                    | /2          |
| Appropriate Example was provided                    | /3          |
|   | <b>/25</b>  |
| <b>Acceptance</b>                                   |             |
| One correct definition or description is provided   | /18         |
| More than one definition or description is provided | /2          |
| Use of a metaphor/story/strategy                    | /2          |
| Appropriate Example was provided                    | /3          |
|   | <b>/25</b>  |
| <b>Cognitive Defusion</b>                           |             |
| One correct definition or description is provided   | /18         |
| More than one definition or description is provided | /2          |
| Use of a metaphor/story/strategy                    | /2          |
| Appropriate Example was provided                    | /3          |
|   | <b>/25</b>  |
| <b>Total Points</b>                                 | <b>/100</b> |

## Qualitative Scoring Rubric:

The following responses qualify as a definition or description of the relevant construct

|  |   |
|--|---|
| Explain your understanding of values:            | Direct our goals<br>Our way of life<br>Something you can put into action (about how you want to act or behave)<br>Are Infinite (we are never done with a value, we never achieve it, we live it)<br>Is multifaceted (there are often multiple things we can do to live our values, not just one)<br>It is a choice (not what you should do)<br>It is here and now (not in the future)<br>Not a goal<br>Not a virtue<br>Not rigid<br>What you want to be about |
| Explain your understanding of mindfulness:       | Present moment awareness (other words that indicate awareness include awake, conscious, etc)<br>Non judgemental<br>Can help you focus<br>Experiencing   |
| Explain your understanding of acceptance:        | Alternative to control<br>A choice<br>Allowing<br>Making room for<br>Not wanting<br>Not liking<br>Not trying to avoid<br>Not tolerating   |
| Explain you understanding of cognitive defusion: | Distancing from our thoughts<br>Not getting wrapped up in thoughts<br>Realizing thoughts aren't literal   |