A Mindfulness and Acceptance-based Intervention for Increasing Physical Activity and Reducing Obesity

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Abstract

The benefits of physical activity are well documented and are especially relevant for the physical and psychological difficulties associated with obesity. Physical activity is not only critical for weight loss and maintenance; regular exercise can also reduce the impact of many physical health problems, such as high blood pressure, heart disease, and Type II diabetes. Physical activity is a potent treatment for the prevention and alleviation of depression, and depression is twice as common in obese clients presenting for weight loss. Despite the benefits of exercise, only 25% of Americans meet the minimum recommended levels of physical activity. While behavioral approaches have shown to be effective for increasing physical activity, these changes are not maintained.

Psychological barriers to regular exercise are the inability to persist despite discomfort (task persistence), fear of judgments from oneself and others (stigma), and a lack of enduring commitment (motivation). These are even greater for obese individuals who experience greater discomfort associated with exercise, more stigma, and a history of broken commitments, leading to inactivity, depression, and weight gain.

The current study evaluated an intervention based on an empirically based behavioral approach known as Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) that targeted three psychological barriers to exercise by promoting acceptance, mindfulness, and values. Seventy-two current and former patients in a weight loss clinic were randomized to a one-day ACT intervention or a waitlist control group. They were assessed pre- and post-intervention and at follow-up three months later.

While membership in the ACT group was associated with significant positive changes in physical activity, weight loss, loss of body fat, gains in muscle mass, and performance on a fitness test, there were no significant differences on outcomes between the ACT and control groups. Similarly, participants in the ACT group displayed significant improvements on measures of acceptance, distress tolerance, stigma, and values, although there were no between-group differences. The control group showed greater improvements on a measure of mindfulness, contradicting the proposed model. Thus, improvements on outcome and process measures could not be attributed to the ACT workshop. Participation in the weight loss program from which subjects were recruited may have diminished any differences between the two groups in this sample.
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Background and Significance

It is well established that exercise is important for maintaining physical health. A report from the Surgeon General stated that regular physical activity is beneficial for every United States citizen (U.S. Department of Health and Human Services, 1996). Sedentary lifestyles are responsible for increased rates of mortality (Kaplan, Strawbridge, Cohen, & Hungerford, 1996; Kujala, Kaprio, Sarna, & Koskenvuo, 1998; Paffenbarger et al., 1993). There is an inverse correlation between the volume of physical activity and all-cause mortality, with minimal adherence to exercise guidelines resulting in a 20-30% reduction in the risk of all-cause mortality (Lee & Skerrett, 2001). Low levels of physical activity are inversely correlated to rates of coronary heart disease and death when compared to men with moderate to high levels of physical activity (Leon, Connett, Jacobs, & Rauramaa, 1987). Regular physical activity decreases the risk of many diseases, including type 2 diabetes (Knowler et al., 2002), osteoporosis, obesity, breast cancer, colon cancer, and falls in older adults (Marcus et al., 2006). In addition to weight loss, regular exercise has been shown to result in improvements in many physical markers of health, including inflammation, blood pressure, and a biological marker of aging (Arroll & Beaglehole, 1992; Bruunsgaard, 2005; Cherkas et al., 2008). Physical activity also results in many other health benefits, even when controlled for weight loss. For example, overweight individuals who engage in physical activity lower their risk for cardiometabolic abnormalities (Wildman et al., 2008). It has been estimated that
increasing activity levels in sedentary adults would save $76 billion in lowered medical costs (Pratt, Macera, & Wang, 2000).

Physical Activity and Obesity

Sedentary lifestyles are partly to blame for the rising obesity epidemic (Manson, Skerrett, Greenland, & VanItallie, 2004). Rates of obesity in the U.S. have been growing rapidly, with 65.4% of adults considered overweight or obese in recent surveys (Hedley et al., 2004). Obesity is associated with a range of health problems, including heart disease, hypertension, hyperglycemia, hypercholesterolemia, ischemic stroke, and Type 2 diabetes mellitus (Manson et al., 2004). Furthermore, obesity-related health costs comprise approximately 12%, or $51.6 billion, of the nation’s annual health care budget.

Physical activity is crucial for long-term weight maintenance. Weight regain is at least partly due to lack of maintenance of behavioral changes (McGuire et al., 1999). In a review of 25 years of weight loss research, programs that included diet and exercise were superior at one-year follow-up to those that targeted diet alone, despite similar weight loss at the end of treatment (Dishman, 2003; Miller, Koceja, & Hamilton, 1997).

Furthermore, while dieters are successful at losing weight in the short-term, they will inevitably gain back all if not more, of the weight lost (Mann et al., 2007). Data from the National Weight Loss Registry revealed that those who maintained significant weight loss were highly active, engaging in about 1 hour of physical activity per day (Klem et al., 1997). In an 18-month trial comparing different modes of a weight loss intervention, participants who maintained high levels of physical activity (at least 190 minutes of exercise per week) maintained their weight loss, and those who did not maintain at least 150 minutes of physical activity per week regained 15-30% of the lost weight (Jakicic,
Winters, Lang, & Wing, 1999). In a review of behavioral treatments for obesity, Brownell and Jeffrey (1987) state that “exercise is central to the treatment of obesity” because it is “correlated with long-term success (Brownell, 1984), if not for metabolic reasons, then for psychological reasons”.

Physical Activity and Depression

Weight loss clients are at higher risk for depression. The rate of depression is over twice as high for obese individuals seeking treatment for weight loss (35%; Pagoto, Bodenlos, Schneider, Olendzki, & Spates, 2008) than in the general population (16%; Kessler et al., 2003). Furthermore, depressed patients have been found to lose half as much weight as non-depressed patients in behavioral weight loss programs (Pagoto et al., 2008). The high rates of comorbidity with depression and obesity may be explained by maladaptive behaviors that facilitate both conditions, namely inactivity and overeating as coping methods for negative mood states.

Physical activity is effective in preventing and treating depression (Brosse, Sheets, Lett, & Blumenthal, 2002; Martinsen, 2008). Exercise has been shown to be as effective as an antidepressant medication in alleviating depression (Babyak et al., 2000) and regular exercise reduces the risk for developing depression (Martinsen, 2008). A recent study addressed depression and obesity simultaneously with Behavioral Activation, a treatment that aims to facilitate increases in healthy behaviors and reduce depressive behaviors (Pagoto et al., 2008). This small open trial resulted in reductions in depression, weight, and daily caloric intake, and increases in physical activity. In another weight loss study, one third of weight loss was accounted for by exercise. In addition, attendance at exercise sessions was mediated by effects of the exercise program on a
range of psychological factors, including depression and body satisfaction (Annesi & Unruh, 2008).

Thus, exercise may facilitate weight loss not only by expending calories, but also by alleviating depression and improving mood, which leads to further exercise. This positive feedback loop may also be supportive of weight maintenance. Exercise has been shown to improve other mental health problems, for example, in patients with psychosis (Ellis et al., 2007) and as an adjunct to smoking cessation (Prochaska et al., 2008; Ussher, Taylor, & Faulkner, 2008).

Despite the benefits of exercise, only 32% of adults engage in regular leisure time activity (Barnes & Schoenborn, 2003). The American College of Sports Medicine (ACSM) define the minimum standard as 30 minutes of moderate exercise five days or more per week, 20 minutes of vigorous exercise on three days or more or a combination of moderate- and vigorous-intensity exercise to reach a weekly energy expenditure of at least 500-1000 MET-minutes (Garber et al., 2011). The guidelines also include training in cardiorespiratory, resistance, flexibility, and neuromotor exercise. Only 25% of Americans meet this minimum standard and 29% report no leisure time activity (Kahn et al., 2001). The problem is even worse for women, ethnic minorities, and older adults who are less likely to regularly exercise than white males (U.S. Department of Health and Human Services, 2000). Given the importance of physical activity for weight maintenance and psychological health, it is imperative that we develop effective interventions for increasing physical activity among overweight individuals.
Physical Activity Adherence and Maintenance

Despite positive results of many physical activity interventions, high drop out rates are common. The average drop out rates for exercise programs are 50% within six months (Dishman & Buckworth, 1996) and one review found participant drop out rates as high as 87% (see Marcus et al., 2007). Furthermore, when gains in physical activity are made they are generally not maintained. Half or more of all participants in physical activity interventions fail to continue to exercise over time (Marcus et al., 2006). These results are similar to that of comprehensive weight loss interventions, which show that 80% of participants regain lost weight by 5 years due to lack of compliance in diet and physical activity plans (Perri, 1998; Wadden, Sternberg, Letizia, Stunkard, & Foster, 1989; Wing, 1998).

Interventions for Increasing Physical Activity

Leading governmental agencies have called for the development of effective physical activity interventions. A report of the Surgeon General was published with the intention to spur theoretically based research programs to increase physical activity and bring attention to what the authors considered one of the most important health problems in our country (USDHHS, 1999). In Healthy People 2010, a report by the U.S. Department of Health and Human Services, physical activity was promoted as a leading health indicator and behavior health providers were encouraged to develop and provide more effective programs to promote and maintain physical activity (USDHHS, 2000). The 1995 NIH Consensus Conference on Physical Activity and Cardiovascular Health recommended that research be conducted on the psychological factors that influence the adoption and maintenance of physical activity (NIH Consensus Development Panel on
Physical Activity and Human Health, 1996).

A variety of programs have been developed and delivered in schools, primary care settings, and worksites. These physical activity interventions typically show short-term gains (Dishman & Buckworth, 1996). More successful interventions tend to be brief (Dishman & Buckworth, 1996), target a specific population, be delivered in groups (Carlson, Johnson, Franklin, & VanderLaan, 2000), and include a behavior therapy component (Conn, Hafdahl, Brown, & Brown, 2008a; Dishman & Buckworth, 1996; Hillsdon, Foster, & Thorogood, 2005). It is also beneficial to use some combination of media and face-to-face intervention (Dishman & Buckworth, 1996) and provide continuing contact of some form (Simons-Morton et al, 1998).

The largest variance in exercise by intervention type is accounted for by behavioral and cognitive behavioral treatments (Dishman & Buckworth, 1996) and these are effective at increasing the frequency of physical activity by 10-25% (Dishman, 1991). The most effective behavioral interventions for increasing physical activity are based on social cognitive theory, the transtheoretical model, relapse prevention, and classical learning theories.

Social Cognitive Theory. Many interventions that are theoretically based draw on social learning theory, later renamed social cognitive theory, developed by Albert Bandura (Bandura, 1997). Social cognitive theory posits that a person’s ability to change their behavior is dependent on the interplay of the environment, personal factors, and characteristics of the behavior (USDHHS, 1996). A central construct is self-efficacy, or the belief in one’s own ability to change the behavior of interest and perceive an incentive to do so, that is, they believe that the benefits will outweigh the negative
consequences (Bandura, 1997). The person must also value the perceived outcome of the behavior, which refers to short-term or long-term consequences.

Substantial research evidence indicates that self-efficacy predicts physical activity levels among healthy adults (McAuley & Blissmer, 2000). Self-efficacy also predicts changes in physical activity levels in adults with diabetes (Allen, 2004). Only one study shows mediational effects of self-efficacy, where the intervention lead to increases in self-efficacy and this accounts for changes in exercise behavior (Luszczynska & Tryburcy, 2008). In this study, self-efficacy mediated outcomes only for those participants with diabetes or cardiovascular disease. Two additional studies showed that self-efficacy partially mediated increases in physical activity (Dishman et al., 2004; Lewis et al., 2006). In sum, while self-efficacy appears to be an important variable in predicting physical activity, interventions that target self-efficacy have not consistently led to increases in self-efficacy and exercise behavior over time (Allen, 2004; Lewis et al., 2006).

**Transtheoretical Model.** The Transtheoretical Model identifies five stages of change: precontemplation, contemplation, preparation, action, and maintenance (J. O. Prochaska & Diclemente, 1983). Each stage is associated with a different process of change. The model states that it is necessary to tailor interventions based on the individual’s stage of change and that progression through the stages is necessary for change to occur. However, movement back and forth between stages may occur a number of times before changes are maintained. The stages are thus thought of as cyclical rather than linear.
One application of the transtheoretical model in primary care is the Physician-based Assessment and Counseling for Exercise (PACE) (Prochaska, Zabinski, Calfas, Sallis, & Patrick, 2000; Sallis, & Patrick, 2000). PACE+ has an additional nutrition component and has resulted in improvements in physical activity and nutrition four months after a brief intervention with school children (Prochaska & Sallis, 2004). A review of the application of this model to exercise concluded that while the model is supported because core constructs differ by stage and changes in behavior tend to progress in a manner consistent with the model, it is unknown how to move participants from one stage to the next (Marshall & Biddle, 2001). A review of health behavior interventions in general suggested that matching the intervention to the stage of change is not supported (Bridle et al., 2005). Similar to social cognitive theory, while stage of change predicts exercise behavior, interventions that effectively move participants from one stage to the next are lacking (Bridle et al., 2005).

*Relapse Prevention Model.* The relapse prevention model was developed for treating substance abuse and addiction (Marlatt & George, 1984). As the name implies, this approach focuses on the prevention of relapse through different strategies, and this approach has been applied to exercise adherence. Interventions based on this model identify risk factors for lapses in exercise, such as negative emotional or physiologic states, limited coping skills, social pressure, and interpersonal conflict. Strategies are devised for how to deal with high-risk situations (USDHHS, 1996).

Interventions based on relapse prevention have received mixed support. One study found a positive effect of a relapse prevention intervention on days of exercising up to three months after treatment ended compared to a control group (Belisle, Roskies, &
Another study compared three conditions - relapse prevention, reinforcement strategies, and an exercise-only control - and found no difference between them (Marcus & Stanton, 1993). Two studies examined the use of coping skills among regular exercisers and their findings supported the model (Simkin & Gross, 1994; Stetson et al., 2005). No studies were found that examined the processes of change as mediators of outcome.

Classic Learning Theories. Learning theories based on B.F. Skinner’s (1953) principles of reinforcement guide many physical activity interventions. Operant conditioning examines the antecedents and consequences of the behavior of interest. Through a shaping process, behaviors approximating the goal are reinforced until the goal is achieved and maintained. Reinforcement may take the form of physical consequences (e.g., looking better), extrinsic rewards (e.g., praise from others), and intrinsic rewards (e.g., more energy or a feeling of accomplishment) (USDHHS, 1996). While extrinsic rewards may help to create short-term changes, these reinforcers are most often removed at some point, as when treatment ends and contact with a treatment provider is lost. Intrinsic rewards may be necessary to maintain the changes over longer periods of time (Glanz, 1997). Intervention studies support this, showing that short-term gains result from immediate reinforcers, such as phone calls (e.g., Calfas et al., 1996) or self-monitoring (e.g., Conn et al., 2008), yet these gains are not maintained once the reinforcer is removed (Calfas et al.; Conn, Hafdahl, Brown, & Brown; Dishman & Buckworth, 1996).

Summary of Physical Activity Interventions. The theories reviewed here are not entirely distinct from each other. Social cognitive theory and the transtheoretical model
both focus on thoughts about exercise and perceptions of the ability to make changes, as well as the expectations for the outcome. Interventions based on these theories target changes in cognitions in order to bring about overt changes in exercise behavior. Mediational analyses to assess whether the proposed processes of change are responsible for the outcomes have provided some support for these models. Relapse prevention and classic learning theories focus on modifying the overt behavior, by targeting the antecedents for relapse (relapse prevention) or the consequences of the behavior (learning theories).

There is a dearth of studies showing that a particular intervention results in increases in physical activity and that the purported processes of change mediate these outcomes. In addition, many behavioral interventions use a combination of theoretical approaches, making evaluation of an individual theory difficult. Other theories that have been developed for addressing the problem and that have minimal empirical support are the health belief model, theory of planned behavior, social support, and ecological perspective (USDHHS, 1996).

Processes of Change and Physical Activity

It has been argued that we will not make progress in developing more effective physical activity interventions without also developing theories to guide this research (Baranowski, Anderson, & Carmack, 1998; Dishman, 1991; Marcus et al., 2006). A recent reviewer declared: “[i]t is crucial that more intervention researchers construct and adequately test specific hypotheses about what theoretical factors will be changed and at what times during the course of the intervention” (Marcus et al., 2006). Mediating variables are frequently not identified in the physical activity literature, and where
mediators are examined, they often are not adequately targeted by the intervention (Rejeski, Brawley, McAuley, & Rapp, 2000). For example, a review of social cognitive theory and diabetes exercise research found that while self-efficacy was predictive of exercise initiation and maintenance, the data was inconclusive for the success of interventions in increasing self efficacy and exercise behavior (Allen, 2004). Many interventions include components from different theoretical approaches, making an assessment of the theoretical aspect impossible. An intervention called ProActive delivered in the UK to increase physical activity in those at risk for type 2 diabetes was evaluated post hoc to see what behavioral theories may have accounted for changes (Michie et al., 2008). The authors found that four theories informed the treatment: the theory of planned behavior, self-regulation theory, operant learning theory, and relapse prevention. While these four approaches may overlap, tying these components together within one coherent theoretical framework would likely strengthen such a treatment and allow for evaluation of active processes. Furthermore, meditational analyses are needed to determine which components accounted for the outcome.

*Psychological Barriers to Exercising*

Various psychological processes function as barriers to engaging in and maintaining high levels of physical activity. The following three seem to have particular empirical support.

*Avoidance of discomfort.* Experiential avoidance is the attempt to change or avoid unwanted private experiences by avoiding situations and behaviors that evoke negative thoughts, emotions, or bodily sensations, even when doing so has negative effects. Experiential avoidance is associated with a wide range of psychological and health-
related problems (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Beginning an exercise program requires the ability persist in the face of boredom, pain, fatigue, and even feelings of sadness and regret in order to do something of benefit in the long-term. The reinforcing properties of exercise, such as increased energy, come with time and persistence (Puetz, O'Connor, & Dishman, 2006). The ability to tolerate exercise-induced discomfort has been shown to be correlated with length of adherence to an exercise program (Annesi, 2004) and individuals who report higher levels of physical exhaustion after exercising are less likely to maintain a physical activity regimen (Annesi, 2002).

**Stigma and self-judgment.** Negative attitudes regarding obesity are widespread, socially acceptable, and develop as early as three years of age (Falkner et al., 1999; Puhl & Brownell, 2001). People who are obese endure discrimination in every area of their lives, including employment, education, healthcare, and romantic relationships (Puhl & Brownell, 2001) leading to a pervasive and debilitating experience of stigma (Brownell et al., 2005). Weight stigma consists of internalized self-critical thoughts and negative beliefs about one’s own worth and abilities. As negative and self-critical thoughts become entangling, they can function as barriers to healthy behaviors via depressive symptoms, isolation, and inactivity (Puhl & Brownell, 2001). In one survey, college women who had experienced stigma regarding their weight were more likely to avoid exercise (Vartanian & Shaprow, 2008). Stigmatized individuals can see themselves as weak-willed, self-indulgent, incapable, aesthetically displeasing, or even emotionally impaired. This can lead to behaviors that are consistent with these beliefs, such as continued poor eating and inactivity, or can result in avoidance of behaviors and situations that trigger these beliefs, such as going to the gym, walking in public, or simply
donning workout clothing. In a study with children, depression and loneliness mediated the link between peer victimization and decreased physical activity (Storch et al., 2007).

*Lack of long-term motivation.* While individuals are able to increase their levels of physical activity in the short term, maintaining those changes over time is rare (Dishman, 1991; Dishman & Buckworth, 1996). From a behavioral point of view, the problem is a lack of positive reinforcement at a level that would maintain changes over time. There is usually some sense of purpose that motivates an individual to begin a fitness program such as health, appearance or feeling better physically and mentally. Reinforcement from the social community can lead to initiation of exercise, such as when a doctor gives instructions to a patient (Ostfeld et al., 2008). However, these initial motivators may not be powerful enough to offset the negative reinforcement that exercise may induce for staying sedentary because they are not continuously present. If an individual finds an activity intrinsically reinforcing, then the behavior is more likely to be maintained (Glanz, 1997). This is true for weight loss clients; people with more autonomous motivation are more likely to remain in treatment, lose more weight, and to keep it off (Williams, Grow, Freedman, Ryan, & Deci, 1996). Sedentary women who engaged in a 10-week exercise program and experienced elevated mood states after exercising also benefited from global decreases in mood disturbance over the course of the intervention (Annesi & Westcott, 2004). The acute affective response to physical activity predicts adherence up to one year later (Willlams et al., 2008). Therefore, an intervention may be successful that emphasizes creative ways to increase intrinsic positive reinforcement for exercise.
Acceptance, Mindfulness, and Values for Increasing Physical Activity

An intervention targeting acceptance, values, and mindfulness may yield an effective intervention for increasing physical activity among overweight and obese patients. Based on the model presented above, these three processes are crucial for maintenance of high levels of physical activity. The theoretical models that have informed physical activity interventions focus either on modification of beliefs about exercising, as in social cognitive theory and the theory of planned behavior, or on direct changes in overt behavior, as in classical learning theories (Dishman & Buckworth, 1996; USDHHS, 1996). The constructs of self-efficacy and the intention-behavior relationships that are part of these theories have been targeted and changing them is thought to be necessary for producing changes in exercise behavior (Dishman & Buckworth, 1996; USDHHS, 1996). However, basic research has shown that attempting to change thoughts directly can lead to a rebound effect in which the avoided thought becomes even more persistent (Wenzlaff & Wegner). Here we present an intervention based on acceptance, mindfulness, and values that targets the proposed barriers in a different way. The key process is a change in the relationship to one’s thoughts and feelings in the context of exercise, rather than changing the content of the thoughts directly.

*Increase willingness to experience discomfort and self-stigma with acceptance.*

Experiential avoidance is undermined by teaching acceptance, or a willingness to experience unpleasant thoughts, feelings, and sensations. Acceptance is the process of opening up to what is happening in the moment without trying to change it (Fletcher & Hayes, 2005). Distress tolerance is a closely related construct that is defined as the capacity to experience and withstand negative psychological states (Simons & Gaher,
With regard to an exercise program, acceptance, or distress tolerance, translates as the willingness to embrace physical pain from burning muscles during exercise or sore muscles afterwards, a pounding heart, sweating, gasping for breath, and all the other uncomfortable experiences that accompany exercising. Acceptance also applies to emotions such as boredom and sadness, which may serve as barriers to engaging in exercise. Emotional pain associated with past weight gain or failure to lose weight may also be triggered by engaging in physical activity and targeted with acceptance.

Acceptance-based approaches have been shown to be effective in a range of applications for increasing willingness to endure pain or discomfort. They have been used to treat chronic pain of many types, and these interventions have effectively increased pain patients' quality of life and reduced pain-related disability (Dahl, Wilson, & Nilsson, 2004; McCracken, Vowles, & Eccleston, 2004; Vowles & McCracken, 2008; Wicksell, Renofalt, Olsson, Bond, & Melin, 2008). In the distress tolerance and task persistence literature, several studies have found the Acceptance and Action Questionnaire (AAQ) to moderate participants' ability to persist in difficult tasks, including aversive visual images, cold pressors, and a challenging perceptual-motor task (Cochrane, Barnes-Holmes, Barnes-Holmes, Stewart, & Luciano, 2007; Feldner et al., 2006; Zettle et al., 2005; Zettle, Petersen, Hocker, & Provines, 2007 2007). In addition, studies have found the AAQ to moderate subjective distress and emotional reactivity in distressing tasks (Cochrane et al., 2007; R. D. Zettle et al., 2007). Acceptance has also been shown to be an effective strategy when applied to food cravings. In this study, undergraduates were given a box of chocolates to carry around with them and told not to eat any. For those who reported difficulties with cravings, acceptance-based coping strategies were effective
for not eating the chocolates, compared to control-based strategies and a no intervention control (Forman, Herbert, Moitra, Yeomans, & Geller, 2007).

Decrease the impact of self-judgments with mindfulness. Mindfulness can be defined as the observation and non-judgmental description of experiences in the present moment. There is evidence to suggest that when problematic thoughts are targeted for change, they become more entangling (Wenzlaff & Wegner, 2000). ACT instead uses mindfulness skills to increase awareness of self-judgments, negative thoughts, and beliefs while fostering contact with the process of thinking (Fletcher & Hayes, 2005). By focusing on process, thoughts become less entangling and behavioral flexibility increases, allowing for behavior to be more tied to chosen values. Thus, stigmatizing thoughts such as, “I’m worthless”, self-defeating beliefs such as, “I will never stick with it”, and reasons for not exercising such as, “I’m too tired” are treated as thoughts that arise as a result of a learning history, as automatic and inconsequential to behavior when approached mindfully. The relationship to problematic thoughts, rather than the content of the thoughts, that is targeted for change. This is a different process of change than that targeted by other theoretical models, as discussed above.

Recently, mindfulness has been suggested as a useful tool for intervening to increase physical activity (Rejeski, 2008) and there is some preliminary data to support this assertion. For example, one study found that intentions predicted engagement in leisure time physical activity only for mindful participants (Chatzisarantis & Hagger, 2007) and another study investigating the processes responsible for lapses in an exercise regimen found that more mindful individuals had more coping skills and lower relapse rates to sedentary behavior (Ulmer, 2007).
Increase long-term motivation with values. Although it has been shown that self-motivation predicts adherence to a physical activity regimen (Dishman, 1991), sustaining motivation over time has been an elusive goal (Dishman & Buckworth, 1996). Orienting towards lifelong values, rather than escaping from short-term aversive consequences, may be what is needed to maintain lifelong changes in physical activity. Values are defined as “freely chosen, verbally constructed consequences of ongoing, dynamic, evolving patterns of activity, which establish predominant reinforcers for that activity that are intrinsic in engagement in the valued behavioral pattern itself” (Wilson & DuFrene, 2008). When clients clarify their values related to exercise, then the function of exercise can change from punishment and pleasing others to self-care and life fulfillment. If exercising is about living to see a grandchild graduate from college or get married, then going for a walk becomes the most important (and enjoyable) activity of the day.

Laboratory research links values clarification to significant increases in pain tolerance in conjunction with acceptance strategies (Paez-Blarrina, Luciano, Gutierrez-Martinez, Valdivia, Ortega et al., 2008; Paez-Blarrina, Luciano, Gutierrez-Martinez, Valdivia, Rodriguez-Valverde et al., 2008). Preliminary evidence suggests that identifying and learning to live consistently with personal values (in conjunction with acceptance and mindfulness skills) is related to positive outcomes for patients dealing with chronic pain (Vowles & McCracken, 2008) (Wicksell et al., 2008), trying to lose weight (Lillis, Hayes, Bunting, & Masuda, in press), and managing their diabetes (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007). In addition, values clarification has been identified as a mediator of change when ACT is applied to epilepsy (Lundgren, Dahl, & Hayes, 2008). The use of values as an intervention to increase physical activity was
recently evaluated and yielded promising results, with 73% of participants adhering to their cardiovascular activity program at the end of treatment and improvements in fitness and lipid profiles (Anshel & Kang, 2007). Another study found that personal statements linked to values motivated participants to work harder in a spinning class than participants who focused on instructional statements or values-statements of other participants (Jackson, Williams, & Hayes, 2008).

Acceptance and Commitment Therapy (ACT)

The proposed study will evaluate the efficacy of a behavioral therapy called Acceptance and Commitment Therapy (ACT) for increasing levels of physical activity with obese patients in a weight loss program.

ACT is based on a behavior analytic account of language, called Relational Frame Theory (RFT; Barnes-Holmes et al., 2001). RFT has substantial empirical support in basic research. The important point to make here regarding RFT is that it emphasizes the context of a given behavior in order to appreciate its function in a larger context. This takes the analysis of behavior beyond its form and leads to interventions that target the function instead. Interventions based on cognitive behavior therapy historically focused on changing problematic thoughts while newer, mindfulness-based interventions, including ACT, target the context of thoughts and the way that humans become entangled with their cognitions.

RFT explains the unique role of language that leads to the pervasiveness of human suffering. Because words substitute for external stimuli, we have the ability to live through experiences that are not immediately occurring through our thoughts and verbal language. These experiences may appear from the past, triggered by a smell or picture
that immediately takes us back to the thoughts and feelings of that memory. We may
have experiences that are completely imagined, such as fantasizing about meeting a
romantic partner or dying in a plane crash. In fact, simply reading these sentences, one
can easily create such scenarios with one’s mind. These verbal processes are pervasive
among humans, and an ACT conceptualization of psychopathology points to a
continuum. Pathology occurs when normal verbal processes interfere with living a
functional life by narrowing behavioral repertoires.

**Six Core Processes**

ACT aims to increase psychological flexibility by undermining entanglement with
evaluative verbal processes. Psychological flexibility is the ability to fully contact the
present moment and the psychological reactions it produces as a conscious person and to
persist or change in behavior in the situation in the service of chosen values. Six
interrelated processes foster psychological flexibility: defusion, acceptance, contact with
the present moment, self-as-context, values, and committed action.

*Acceptance.* Acceptance is a moment by moment process of actively embracing
the private events evoked in the moment without unnecessary attempts to change their
frequency or form, especially when doing so would cause psychological harm. For
example, a sedentary person trying to establish an exercise regimen would be encouraged
to feel the physical pain associated with muscle soreness and the psychological pain of
feeling stigmatized by others in a gym. This is not an end by itself but is used to
encourage greater flexibility in acknowledging and acting on the available choices.

*Defusion.* Cognitive defusion techniques are designed to change the functions of
private experiences, even when they have the same form, frequency or situational
sensitivity. This is done by creating contexts that reduce the stimulus functions of the thought. That is, rather than treating thoughts as literally “true”, thoughts are seen as passing events. For example, the thought “I hate exercise” functions as a barrier to engaging in exercise when treated as real. A person might give this thought a shape, color, and weight; watch it like watching TV; label the ongoing processes of thinking itself (“I am having the thought that I hate exercise”); or repeat a word dozens of times (Masuda, Hayes, Sackett, & Twohig, 2004). These techniques reduce the literal believability of thought without necessarily getting rid of the thought or attacking its form logically.

*Contact with the present moment.* Contact with the present moment involves shifting attention to what is happening here and now. This means contacting both internal stimuli, such as bodily sensations, thoughts, and feelings, and external stimuli, such as sounds, sights, smells, and touch. ACT encourages dispassionate observation of the reactions that are going on occasioned by these events as continuously changing experiences. This allows a person to notice that physical sensations, like pain, are separate from the psychological reactions to them. When in contact with the present moment, a sense of *self as process* is experienced as an ever-changing series of psychological events: thoughts, emotions, and body sensations change continuously in an ongoing process of knowing oneself. With this stance, the thought “I hate exercise” is not a continuously true statement about the self.

*Self as context.* The self as context is the perspective or locus of I/Here/Now, a set of learned relations that leads to the experience of an observer of thoughts, feelings, and sensations without identifying with those experiences. The self as context has always
been present, transcending roles, thoughts, emotions, and the experience of the body. Said in another way, this sense of self is experientially transcendent and formless (said in more Eastern terms, it is no-thing / everything). A transcendent sense of self encourages clients to shift from identifying with the conceptualized self (“I am fat”, “I am depressed”) thus creating a safe context for experiencing thoughts and feelings since they are no longer treated as the core of the self.

Values. Values are chosen life directions. Values differ from goals in that they are not objects to be attained, but rather are directions that integrate ongoing patterns of purposive action. In the case of values, language is useful in that it serves to link actions in the present into a coherent pattern of effective action. In choosing life directions that are meaningful, clients are able to disengage from the verbal processes that drive behaviors based on social compliance, avoidance, or fusion, and shift toward more appetitive forms of behavioral regulation. Valued actions then acquire intrinsic reinforcement.

Committed Action. Committed action involves behavioral changes that move the client toward value-consistent goals. While values can never be fully achieved but only instantiated, committed actions involve concrete short, medium, and long term goals that can be attained. For example, a value might be increasing intimacy, and committed action would be expressing one’s emotions to loved ones or proposing marriage to a partner.

ACT for Psychological Problems

ACT is an efficacious treatment for a range of clinical and social problems, including depression, anxiety, obsessive-compulsive disorder, and schizophrenia (for a review, see Hayes, Luoma, Bond, Masuda & Lillis, 2006).
ACT for Substance Abuse

ACT has been successful in helping people to make changes in addictive behaviors that interfere with health. The following studies show that ACT teaches skills that are necessary for enduring very difficult changes in behavior in favor of a healthier life. When ACT was applied to cigarette smokers, it was shown to be more effective than nicotine replacement therapy for helping people to quit smoking at one year follow up (Gifford et al., 2004). The ACT condition included seven weeks of treatment, with individual and group sessions weekly. A second study collected pilot data for a new approach combing ACT with usual behavior modification for smoking cessation with early relapse smokers. While all 16 participants eventually relapsed, they had much longer periods of abstinence than they had obtained in the previous 10 years (Brown et al., 2008). ACT has also been applied to substance abuse for addicts in a methadone maintenance treatment center. ACT was compared to an Intensive Twelve Step Facilitation program. The ACT condition resulted in greater reductions in opiate use at post and follow-up (Hayes et al., 2004).

ACT for Weight Control

ACT interventions have been shown to be effective for weight loss and related problems. Gregg et al. (2007) applied ACT in a one-day format with patients with Type 2 Diabetes at a community clinic, compared to an education-only control group. At three month follow up, participants in the ACT group improved significantly more than the control group on self-management behaviors, use of acceptance-based coping, and glycated hemoglobin, a physiological measure of diabetes management. These results were mediated by acceptance and self-management (Gregg et al., 2007).
Lillis et al. (2009) randomly assigned people who had completed a weight loss program to a one-day ACT group or a waitlist control group. After three months, those in the ACT condition showed greater improvements in body mass, obesity related stigma, quality of life, and psychological distress. They also showed improvements in distress tolerance, and both general and weight-specific acceptance coping and psychological flexibility. Mediational analyses indicated that changes in weight-specific acceptance coping and psychological flexibility mediated the changes in outcomes (Lillis et al., 2009). A recent 12-week open trial evaluated ACT for weight loss that resulted in an average weight loss of 10% of body weight at six-month follow-up (Forman, Butryn, Hoffman, & Herbert, 2009). The authors also reported changes in acceptance, mindfulness, and motivation in the expected directions. In a third recent study, participants trying to lose weight were randomly assigned to receive four two-hour sessions of ACT or to a control group. Six months after the treatment, participants in the intervention condition had increased their physical activity but did not differ on BMI or mental health measures. However, when participants were excluded who reported that they never used any of the skills taught in the workshop, significant differences were found on BMI and mental health (Tapper et al., 2009).

A preliminary trial recently found that ACT was effective in increasing physical activity after two two-hour sessions when compared to an education group (Butryn et al., 2009). This was a small study with thirty-five participants in the active condition and sixteen in the education condition. This study provides some evidence that applying ACT for physical activity has promise although more research is clearly needed.
The studies reviewed in this section showed significant improvements in health behaviors related to weight and diabetes management after a brief ACT intervention. However, this research is still in the early stages and more work is clearly needed to determine whether this is an effective approach for increasing physical activity.

*ACT for Depression*

Given that depression occurs at higher rates in obese populations, a treatment targeting physical activity may be more beneficial if it is also known to impact depressive symptoms. ACT is efficacious in the treatment of depression. Two small controlled trials have found that ACT is as effective or more effective than cognitive therapy for treating depression (Zettle & Hayes, 1986; Zettle & Rains, 1989). Both studies also found that ACT worked through a different process than cognitive therapy. A reanalysis of Zettle and Rains (1989) shows that ACT produced changes in cognitive fusion, a measure of mindfulness, but not depressogenic thoughts or general dysfunctional attitudes, and these changes mediated the positive outcomes (Zettle, Rains, & Hayes, 2009). ACT was also evaluated as a treatment for distress among parents of children with autism, and was found to reduce depression (Blackledge & Hayes, 2006). Several studies have found positive results for depression as part of other problems, for example chronic pain and obsessive-compulsive disorder (McCracken, Vowles, & Eccleston, 2005; Vowles & McCracken, 2008; Woods, Wetterneck, & Flessner, 2006).

*ACT for Stigma*

Most people who are overweight experience stigma from employers, health care providers, and the social environment. Stigma can also manifest as negative thoughts about oneself, also called self-stigma. In the proposed study self-stigma is conceptualized
as one barrier to physical activity and the intervention will target self-stigma with mindfulness, as discussed earlier. ACT targeted self-stigma with substance abuse clients during a six-hour intervention that was compared to a waitlist control group with inpatients in a substance abuse treatment center (Luoma, Kohlenberg, Hayes, Bunting, & Rye, 2008). Interestingly, an ACT intervention that focused on self-stigma and did not directly promote weight loss resulted in positive effects on both self-stigma and weight loss (Lillis, Hayes, Bunting, & Masuda, 2009).

**ACT and Maintenance of Behavior Change**

An interesting feature of ACT is that it has been shown to produce changes that persist or attenuate over time. In an ACT treatment study for poly-substance abuse and opiate addiction, 52% of individuals in the ACT group tested negative for drug use at post and 50% at 6 month follow up, compared to a change from 32% to 12% in methadone maintenance alone and 50% to 38% in intensive twelve step facilitation (Hayes et al., 2004). New analyses were recently completed on the ACT for self-stigma in a substance abuse treatment population study (Luoma et al., 2008), finding that the brief ACT workshop significantly reduced the chance of relapse after completing treatment at 3 month follow up. Similarly in an ACT treatment study for cigarette smoking, 35% participants in ACT compared to 33% in nicotine replacement therapy reported quitting smoking at post, while 35% in ACT and 15% in nicotine replacement reported quitting at 1-year follow up (Gifford et al., 2004). Similar results have been found in other ACT smoking studies (e.g., Brown et al., 2008). Thus, targeting acceptance, mindfulness, and values reduces the potential for relapse after treatment, and this may apply to lapses in physical activity.
Hypotheses

Our primary outcome hypotheses were that (1) participants in the intervention condition would increase their physical activity, compared to the control participants. Our secondary outcome hypotheses were that (2) participants in the intervention condition would show improvements on measures of physical and psychological health, as compared to the control condition. Our mediational hypothesis was that (3) improvements in the ACT condition would be mediated by improvements in acceptance, mindfulness, and values. We also predicted that (4) depression would moderate physical activity outcomes.

Methods

Recruitment

Participants were recruited from the Center for Nutrition and Metabolism (CNM) at the University of Nevada, Reno Medical School. The CNM offers a meal replacement program (Health Management Resources; HMR®) accompanied by 12-week weight loss classes. HMR is a nation-wide structured weight-loss program that is commonly offered in university research settings. Patients that enroll in the classes are instructed to eat only the HMR meal replacements and five servings of fruits and vegetables each day. All patients are required to obtain written approval to safely engage in physical activity by their doctors prior to commencing the program. The classes are scripted and therefore cover the same educational material regarding nutrition and exercise, with the emphasis on nutrition. The HMR classes represent a diverse population with 76% Caucasian, 15% Hispanic, and 9% Asian/Pacific Islander, 5% African American, and 2% Native American, according a recent census composed of 345 patients.
While the focus of the HMR program is on a specific diet, the participants are also encouraged to engage in regular physical activity using the following techniques. The program includes daily record-keeping with patients counting the estimated kilocalories expended through exercise and reporting these numbers to the class each week. Instructors provide feedback to individuals and may help them with problem-solving in order to help them achieve their activity goals, with a recommendation of at least 2000 kilocalories expended per week. The patients may achieve their goals using any type of activity and the program does not include training for specific exercises.

Patients were recruited in two ways. First, the investigator visited HMR weight loss or maintenance classes, gave a brief description of the study, and handed out fliers. Those who were interested in participating in the study filled out consent forms and provided their contact and screening information on a separate form. See Table 1 for a list of the inclusion and exclusion criteria. Second, fliers were mailed to all past HMR students inviting them to call the investigator if interested in participation. When contacted, the principle investigator described the study and scheduled an appointment to review the consent form. All participants filled out the first assessment shortly after initial contact. Participants were notified of their group assignment (workshop or waitlist) by telephone or before leaving the assessment appointment.
Table 1. *Inclusion and Exclusion Criteria*

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current or past enrollment in HMR weight loss program that included dietary</td>
<td>Age younger than 18 years</td>
</tr>
<tr>
<td>education and self-monitoring</td>
<td>old</td>
</tr>
<tr>
<td>Interest in increasing level of physical activity</td>
<td>Non-English speaking</td>
</tr>
</tbody>
</table>

*Design*

The design of the present study is a randomized, controlled, effectiveness trial. Participants were randomly assigned to one of two groups, the ACT intervention group or a waitlist control group, and evaluated based on these assignments. The study also evaluated the effectiveness of implementing the ACT intervention, compared to the control group, since this has not been done before in this setting and in combination with the HMR program. Participants in both groups completed the pre-, post-, and three-month follow-up assessments at scheduled appointments at the CNM. The ACT group attended a six-hour ACT workshop after completing the first assessment. The workshop was scheduled by giving participants several options for workshop dates and they were then notified when the workshop date had been chosen to accommodate the most people. Both groups completed the post-assessment the week after the workshop. After the control group completed the three-month assessment, they were given the option to attend the same workshop that the intervention group received. The study co-investigator coordinated assessment appointments and trained research assistants conducted the assessments.
Terms

For the purposes of this study, physical activity and exercise are terms that are used interchangeably. Both refer to “any bodily movement produced by skeletal muscles that results in energy expenditure above resting levels. Physical activity broadly encompasses exercise, sports, and physical activities done as part of daily living, occupation, leisure, and active transportation” (Garber et al., 2011).

Incentives

All participants who completed the study were given their choice of HMR food products valued at approximately $100, consisting of two cans of shake mix and fourteen entrees. Participants filled out an order form at the final assessment and the principal investigator placed the order to be sent directly to the participant.
Table 2. *Assessment Schedule*

<table>
<thead>
<tr>
<th>Measures</th>
<th>Baseline</th>
<th>Post</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective outcome measures</strong></td>
<td>Height</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Weight/BMI</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Muscle/Body fat/BMR</td>
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<td>X</td>
</tr>
<tr>
<td></td>
<td>Blood pressure</td>
<td>X</td>
<td>X</td>
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<tr>
<td></td>
<td>Physical fitness</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Self-report outcome measures</strong></td>
<td>IPAQ</td>
<td>X</td>
<td>X</td>
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<tr>
<td></td>
<td>Est. KCAL expended/week</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Diet adherence</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>DASS-21</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>GHQ</td>
<td>X</td>
<td>X</td>
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<tr>
<td><strong>Process measures</strong></td>
<td>Breath holding</td>
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<td></td>
<td>Weight stigma (WSQ)</td>
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<tr>
<td></td>
<td>Acceptance (AAQ2)</td>
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<td></td>
<td>Weight acceptance (AAQ-W)</td>
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<td></td>
<td>Physical Activity Acceptance (PAAQ)</td>
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<tr>
<td></td>
<td>Distress tolerance (DTS)</td>
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<tr>
<td></td>
<td>Mindfulness (FFMQ)</td>
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</tr>
<tr>
<td></td>
<td>Values (Bull’s Eye)</td>
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<td></td>
<td>Motivation (MPAM)</td>
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<tr>
<td></td>
<td>Self-esteem (RSES)</td>
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</tr>
<tr>
<td></td>
<td>Feedback Form</td>
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</tr>
</tbody>
</table>
Measures

Primary Outcomes

International Physical Activity Questionnaire (IPAQ-LS). The IPAQ was developed by the International Consensus Group, which formed in 1998 to develop a measure of physical activity that would provide reliable data in international surveys (Craig et al., 2003). The results were a long-form and a short-form that could be administered by self or interview. The long-form is recommended for research since it provides more detailed information regarding activity across four domains (Craig et al., 2003). For this study, the self-administered long-form was used, which is composed of a set of questions relating to activity in four domains during the past week: work, transportation, domestic and gardening, and leisure time activities. For each domain, the amount of time spent walking and time engaged in moderate or vigorous activity was assessed. Time spent in each of these activities is then multiplied by the estimated METS expended for that activity (i.e., 3 METS for walking, 4 METS for moderate activity, and 8 METS for vigorous activity). The total IPAQ score is then computed by adding the results from the four domains. Results from the IPAQ are expressed in MET-minutes per week, which represents an estimate of metabolic expenditure. One MET corresponds to activity at rest. We used the long version that is designed for self-administration. Activity levels are based on the total score such that fewer than 600 MET-minutes is considered a low level of physical activity, between 600 and 3000 MET-minutes is moderate, and over 3000 is high. This measure has adequate reliability and validity (repeatability,
Spearman’s $\rho=0.8$; criterion validity, $\rho=0.30$) with 22 studies that have tested its validity (Craig et al., 2003).

Weight/ Body mass index (BMI). Weight was measured using a professional-grade digital scale used as part of standard care at the CNM. BMI was calculated using a formula that combines height and weight (weight in pounds * 703 / height in inches $^2$). Height was measured at baseline using a measuring stick attached to the wall.

Fitness assessment. A brief physical fitness battery was administered that has been validated for use in community settings and is used routinely for assessment at the CNM. The test included the following four components (Rickli & Jones, 1999; Mary Sanders, pers. comm.).

1. Sit-to-stands. To begin, the participant is fully seated in a chair with back straight, feet flat on the floor, and arms crossed and held against the chest. The participant was asked to rise to a fully standing position and then to sit back down, as quickly as possible. Each full hip extension (stand) counts as a stand. The numbers of stands participants complete (full and partial) within 30 seconds were recorded.

2. Static balance. Balance for the right and left legs measured the ability of the participant to balance on one leg with eyes open and hands on hips. A perfect score is 30 seconds with time recorded to the nearest hundredth.

3. Bicep curl. While seated in a chair, the participant held a five-pound dumbbell in the dominant hand using the “handshake grip” with the elbow extended. On the signal, the participant gradually turns the palm up while curling the arm through full range of motion and then returned to the fully extended position in a controlled manner. The score
represents the total number of curls (full and partial) completed correctly within 30 seconds.

4. Back scratch. In a standing position, the participant placed the preferred or more flexible hand behind the same shoulder, palm toward back and fingers extended, reaching down the middle of the back as far as possible (elbow pointed up). The participant places the other hand behind the back, palm out, reaching up as far as possible in an attempt to touch or overlap the extended middle fingers of both hands. After demonstration by the evaluator, the participant is asked to determine the preferred hand and is then given two practice trials followed by two assessment trials. The distance of overlap or the distance between the tips of the middle fingers is measured to the nearest .5-inch.

Secondary Outcomes

Percent body fat/ Muscle mass/ Basal metabolic rate. A Tanita MC180 Segmental Body Composition Analyzer provided measures of body composition: percent body fat, muscle mass, and an estimate of Basal Metabolic Rate (BMR).

Blood pressure. Blood pressure was taken with a digital blood pressure cuff used as part of standard care at the CNM.

Estimated Kcal Expenditure based on Reported Daily Physical Activity. Patients in the HMR classes calculate their estimated kilocalories (KCAL) expended each day as part of their curriculum and we asked participants to report these data to provide another measure of physical activity.

Diet adherence. Participants were asked to report their adherence to the HMR diet by documenting how many days they ate “in-the-box” (only eating meal replacements,
fruits, and vegetables), the number of servings of fruits and vegetables consumed, and the
number of meal replacements consumed during the past week.

Depression Anxiety Stress Scales (DASS-21). The DASS was developed to
provide a self-report measure of three distinct negative emotional states (Lovibond &
Lovibond, 1993). A 21-item version has been modified from the original 42-item version
with satisfactory reliability and validity for three scales corresponding to symptoms of
depression (α=.81), anxiety (α=.73), and stress (α=.81; Lovibond & Lovibond, 1995).
This is a widely used measure of psychological symptoms has been validated with
normal adults and is thus appropriate for use with a nonclinical sample (Henry &
Crawford, 2005).

General Health Questionnaire (GHQ). The GHQ is a 12-item, 4-point Likert-type
scaled self-report questionnaire (Goldberg, 1972). It is designed to measure general
health and stress. The GHQ has been determined to be reliable and valid for a range of
populations (e.g., Picardi, Abeni, & Pasquini, 2001). The 12-item version has robust
correlation with the longer version and thus is adequate for the purposes of this study
(Goldberg et al., 1997).

Process Measures

Acceptance and Action Questionnaire (AAQ-2). Acceptance was measured using
the AAQ-2, a 7-item self-report measure (Bond et al., 2011). It was designed to assess
people’s willingness to accept their undesirable thoughts and feelings while acting in a
way that is consistent with their values and goals. High scores on the AAQ-2 correspond
to greater levels of psychological flexibility, whereas lower scores reflect greater use of
experiential avoidance as a coping strategy. It has been shown to have satisfactory
structure, reliability, and validity (e.g. $\alpha=0.84$, and the 3- and 12-month test-retest reliability is .81 and .79, respectively; Bond et al., 2011).

Acceptance and Action Questionnaire for Weight (AAQ-W). The AAQ-W is a 17-item, 7-point Likert-type questionnaire (Lillis & Hayes, 2008). It was adapted from the AAQ to assess psychological flexibility regarding weight-related thoughts and feelings. It has good internal consistency ($\alpha=0.88$) and correlates with weight-related measures, including obesity-related quality of life, binging, and exercise, and with objectively measured body mass (Lillis & Hayes, 2008).

Physical Activity Acceptance Questionnaire (PAAQ). The PAAQ is an 8-item, 7-point Likert type questionnaire that was developed for a pilot study similar to the current study, comparing ACT to an education condition for efficacy in increasing physical activity (Butryn et al, 2011). This measure is an adaptation of the AAQ and was developed to assess acceptance of internal experiences related to exercise.

Distress Tolerance Scale (DTS). Distress tolerance was measured using the DTS (Simons & Gaher, 2005), a 15-item, 5-point Likert type questionnaire. It has high internal consistency ($\alpha=.89$) and appropriate convergence with other measures of distress and regulation. It has demonstrated discriminative and criterion validity, as well as adequate six month test-retest reliability (Simons & Gaher, 2005).

Breath holding. Breath holding is an objective measure of distress tolerance that is measured by asking participants to hold their breath for as long as possible while being timed with a stopwatch. Participants were given three trials and the longest time (in seconds) was used for analysis. It is a measure of task persistence, or distress tolerance,
and has been shown to be a predictor of success for smoking cessation (R. A. Brown, Lejuez, Kahler, & Strong, 2002) and weight loss (Lillis et al., 2009).

*Weight Stigma Questionnaire (WSQ).* Weight-related stigma was measured by the WSQ, a 20-item, Likert-type scale developed for a similar study that targeted stigma among obese individuals with an ACT workshop (Lillis et al., 2009). This single factor scale assesses the degree to which participants experience self and enacted stigma related to their weight, and the perceived influence of stigma on life functioning (e.g. "I became overweight because I'm a weak person"). It has good internal consistency ($\alpha = 0.91$; Lillis et al., 2009).

*Five Facets of Mindfulness Questionnaire (FFMQ).* Mindfulness will be measured using the FFMQ (Baer et al., 2008), a 39-item self-report measure. The measure has five scales, or facets, named observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. This measure has been analyzed with good results for construct validity, internal consistency ($\alpha$ ranges from .75 to .91), and convergent and discriminant validity (Baer, Smith, Hopkins, Krietsmeyer, & Toney, 2006; Baer et al., 2008).

*Bull’s Eye.* The Bull’s Eye is a self-report measure of valued behaviors. The participant reports how well his or her behavior aligned with their personal values during the past week in four domains: work/education, leisure, personal growth/health, and relationships. Each domain is rated from one to seven corresponding to seven rings on the bull’s eye. The Bull’s Eye has been shown to mediate outcomes (Lundgren et al., 2008), has a test–retest reliability of .86, and good criterion related validity (Lundgren et al., 2006).
Motivation for Physical Activity Measure (MPAM-R). The MPAM-R (Ryan, Frederick, Lopes, Rubio, & Sheldon, 1997) is a 30-item self-report measure that assesses reasons for engaging in physical activity and is based on self-determination theory. The measure has five scales reflecting different types of motivation: fitness, appearance, competence, enjoyment, and social. The MPAM-R has good internal consistency (α’s range from .78-.92 for the five scales).

Rosenberg Self-Esteem Scale. The R-SES (Rosenberg, 1993) is a questionnaire with 10 items that are answered on a four-point scale ranging from “strongly agree” to “strongly disagree”. The resulting score provides a measure of self-esteem, or the overall evaluation of one’s self-worth. The scale has high reliability with good test-retest correlations ranging from .82-.88 and Cronbach’s alpha in the range of .77 to .88 (Blascovich & Tomaka, 1993; Rosenberg, 1993). This measure was not expected to respond to the ACT intervention and was included to help test the assumptions of the model.

Feedback Form. The follow-up assessment included a form that asked participants several qualitative questions regarding their success reaching physical activity goals, explanation for their success or lack of success, and feedback regarding the workshop (for ACT condition only).

Intervention

Manual refinement. The ACT manual for the six-hour workshop was based primarily on the manuals used for Lillis, Hayes, Bunting & Masuda (2009) and Gregg et al. (2007) because they are both brief ACT-based workshops directed at weight and
health. The protocol was drafted with the help of Jason Lillis and components were added specifically targeting barriers to exercise. The initial draft was piloted with three patients from the CNM, led by the co-investigator and Jamie Yadavaia. Feedback from the pilot workshop participants and the co-therapist were incorporated to produce the final version.

*Acceptance and Commitment Therapy Workshop.* The six-hour ACT workshop took place on a weekend, beginning at 10 a.m. and ending at approximately 4 p.m. Participants were given thirty minutes for lunch and two five to ten minute breaks during the day.

Six of the eight workshops were led by Lindsay Fletcher, the co-investigator, and Jamie Yadavaia. Jamie Yadavaia and Tami Jeffcoat led the final two workshops. All three of the study therapists are qualified, doctoral level graduate students who were experienced in delivery of acceptance-based treatment. Specifically, they have all participated in weekly group supervision on ACT for at least two years with Steven Hayes, the developer of ACT. They each also had at least two years of experience using ACT with individual clients.

The intervention included the following components (see Appendix A for the complete protocol):

1. Framing the problem: knowing what to do is necessary but not sufficient when it comes to changing one’s own behavior.
2. Values: the “funeral exercise” is led as an eyes-closed meditation on what matters most to participants.
3. Barriers: participants identify barriers to physical activity goals.
4. **Reason-giving**: idea presented that reasons not to exercise need not function as barriers to goals.

5. **Control is the problem**: discussion about the problem of trying to control thoughts and feelings, particularly those that arise as reasons not to exercise, and exploration of where these thoughts come from (programming).

6. **Acceptance**: presented as an alternative to control; includes the “passengers on the bus” metaphor, acting out a “tug of war”, and the “kid in the supermarket” metaphor.

7. **Distress tolerance**: discussion and breath holding exercise.

8. **Defusion and mindfulness**: exercises were introduced to provide participants with new skills for relating to thoughts and feelings that interfere with their goals, such as “Take Your Mind to the Gym”, in which one individual heads to the “gym” rather than responding to the directions of several other participants playing the part of the “mind”, voicing the common thoughts and feelings that arise to interfere with valued goals.

9. **Self-stigma**: focused on how individuals stigmatize themselves and others, especially regarding weight, and how this creates another barrier to value-driven behavior if one is avoiding self-judgment or judgment from others, such as not going to gym for fear of being criticized for one’s weight or performance.

10. **Stand and declare a commitment**: participants are invited to share a commitment with the group that came out of the workshop.

**Analytic Strategy**

*Exploratory Data Analysis.* Before conducting formal statistical analyses, exploratory data analyses were used to test underlying distributional assumptions. We
used graphical methods including box plots, histograms, normal probability plots, and scatter plot matrices. Statistics such as means, standard deviations, skewness, kurtosis, and 95% confidence intervals were calculated. For variables that violated the assumption of normality, based on all of the methods described here, transformations were employed to correct for skewness and kurtosis. The IPAQ, BMI, DASS depression scale, and MPAM fitness scale were transformed by taking the square root of the original values (X) to correct for positive skewness and the square root of K-X (where K is the largest score for that scale) to correct for negative skewness, which yielded normal distribution curves. One extreme outlier was excluded from analysis of the IPAQ when transformation alone did not lead to a normal distribution curve.

**Outcome Analysis Strategy.** A mixed model repeated measures approach (MMRM) that treated time as a categorical factor was used to analyze changes over time from pre to post and pre to 3-month follow-up for process measures and pre to follow-up for outcome measures. Possible statistically significant differences between the ACT and control groups in the study were also examined using this method. An unstructured covariance model was initially used in the MMRM analysis (with parameters for variance at each time point and for the covariance between the two time points) followed by a compound symmetry model (which assumed the same variance at each time point). The compound symmetry model was used if there was no significant difference in the fit of the restricted and unstructured covariance structure as determined by comparison of models through the restricted log-likelihood. MMRM is advantageous because it uses all data for all subjects and fits well with intent to treat analyses. MMRM models reduce somewhat the analytic problems associated with missing data by taking into account
missingness and fixed variables which provides more accurate results than standard analyses of variance (ANOVAs), analyses of covariance (ANCOVAs), or repeated measures (RM) models which require that all missing data are missing completely at random, which is generally not a plausible assumption.

Mediation and Moderation Analyses. Mediational analyses were not conducted because there were no significant time by condition interactions. Furthermore in some areas outcomes were better in the control group and there were no process measures specifically designed to assess the effects of the HMR program per se. Moderational analyses that examined the differential impact of pre-treatment depression scores on the interaction between condition and outcomes (IPAQ and weight) were conducted using a logistic regression. However, only 8.3% of the pre-treatment sample endorsed symptoms of depression on the DASS, which may have underpowered this analysis.

Results

Sample Characteristics

Attrition. Approximately 90 people expressed interest in participating in the study, either by filling out a consent form at an HMR class during recruitment by the investigator or by calling in response to receiving a flier in the mail. Of these, 72 completed an initial assessment, received their randomization assignment (waitlist or ACT), and were thus included in the study. Of the 36 participants randomized to the ACT condition, three were unable to attend a workshop due to scheduling conflicts, two people did not show up for a scheduled workshop, and two dropped out of the study after the initial assessment for unknown reasons. Thus, twenty-nine individuals in the ACT
condition completed all three assessments. Of the 36 participants in the waitlist control condition, one dropped out due to other time commitments, and two dropped out after the initial assessment for unknown reasons. Thirty participants in this condition completed all three assessments, two participants provided the first and last assessments only, and one participant completed the first two assessments only. Table 3 shows the means and standard errors for key variables at baseline for those who completed the study compared to those who dropped out. According to an independent-samples means t-test, there were no significant differences on these variables between those who dropped out and those who completed the study.

Table 3. *Comparison of Completer and Dropout Means on Key Variables at Baseline*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Completers (N=61)</th>
<th>Drop-outs (N=11)</th>
<th>T-test</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
<td>SE</td>
</tr>
<tr>
<td>IPAQ</td>
<td>2213.5</td>
<td>233.2</td>
<td>3530.0</td>
<td>1163.5</td>
</tr>
<tr>
<td>Est. KCAL expended</td>
<td>2005.2</td>
<td>175.7</td>
<td>1565.4</td>
<td>318.1</td>
</tr>
<tr>
<td>Muscle Mass (lbs)</td>
<td>118.4</td>
<td>3.5</td>
<td>114.8</td>
<td>8.6</td>
</tr>
<tr>
<td>Sit-to-Stands</td>
<td>13.6</td>
<td>.5</td>
<td>13.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Weight (lbs)</td>
<td>218.6</td>
<td>7.2</td>
<td>207.7</td>
<td>15.6</td>
</tr>
<tr>
<td>AAQW</td>
<td>95.0</td>
<td>2.4</td>
<td>85.7</td>
<td>5.6</td>
</tr>
<tr>
<td>PAAQ</td>
<td>33.2</td>
<td>1.1</td>
<td>30.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Barriers (Bull’s Eye)</td>
<td>4.6</td>
<td>.2</td>
<td>5.1</td>
<td>.4</td>
</tr>
<tr>
<td>WSQ</td>
<td>34.5</td>
<td>1.1</td>
<td>38.5</td>
<td>2.2</td>
</tr>
</tbody>
</table>

*Final sample.* The final sample was predominantly Caucasian, middle-aged, and female. Approximately 60% of the sample was enrolled in the HMR weight loss classes at the time of initiation into the study, whereas approximately 40% of the participants were former HMR students. There were no notable differences between conditions regarding age, gender, ethnicity, or HMR status. The lack of males and members of
ethnic minority groups could affect the generalizability of the results of the study. Table 4 summarizes the demographic characteristics of the sample by condition. With this sample size of 72 participants, a medium effect size of $d=0.65$ would be detectable with power at 0.8.

Table 4. *Demographic Information by Condition*

<table>
<thead>
<tr>
<th>Demographic</th>
<th>ACT</th>
<th>N</th>
<th>Control</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>53.1</td>
<td>36</td>
<td>52.1</td>
<td>36</td>
</tr>
<tr>
<td>+/-11.1</td>
<td></td>
<td></td>
<td>+/-12.6</td>
<td></td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>80.6</td>
<td>29</td>
<td>86.1</td>
<td>31</td>
</tr>
<tr>
<td>Male</td>
<td>19.4</td>
<td>7</td>
<td>13.9</td>
<td>5</td>
</tr>
<tr>
<td>Ethnicity (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>88.9</td>
<td>32</td>
<td>88.9</td>
<td>32</td>
</tr>
<tr>
<td>Hispanic/ Latino</td>
<td>8.3</td>
<td>3</td>
<td>5.6</td>
<td>2</td>
</tr>
<tr>
<td>African American</td>
<td>2.8</td>
<td>1</td>
<td>2.8</td>
<td>1</td>
</tr>
<tr>
<td>Other/No response</td>
<td>0</td>
<td>0</td>
<td>2.8</td>
<td>1</td>
</tr>
<tr>
<td>HMR status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrolled at initial assessment</td>
<td>58.3</td>
<td>21</td>
<td>58.3</td>
<td>21</td>
</tr>
<tr>
<td>Previously enrolled</td>
<td>41.7</td>
<td>15</td>
<td>38.9</td>
<td>14</td>
</tr>
<tr>
<td>HMR-at-home</td>
<td>0</td>
<td>0</td>
<td>2.8</td>
<td>1</td>
</tr>
</tbody>
</table>

*Baseline Tests of Model*

Correlations between study measures related to the proposed theoretical model at baseline were analyzed using Pearson bivariate correlations. Table 5 displays results from comparing physical activity variables. The IPAQ corresponded with estimated kilocalories expended and number of sit-to-stands. Weight and sit-to-stands were negatively correlated, as expected. However, weight was positively correlated with muscle mass and bicep curls, which was not in the expected direction.
Table 5. Correlations Between Physical Activity Variables at Baseline

<table>
<thead>
<tr>
<th></th>
<th>IPAQ</th>
<th>Est. KCAL</th>
<th>Weight</th>
<th>Muscle Mass</th>
<th>Sit-to-Stands</th>
<th>Bicep Curls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.640**</td>
<td>-.150</td>
<td>.092</td>
<td>.228*</td>
<td>.008</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.000</td>
<td>.106</td>
<td>.225</td>
<td>.028</td>
<td>.473</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-.005</td>
<td>.206*</td>
<td>.157</td>
<td>.185</td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.482</td>
<td>.047</td>
<td>.098</td>
<td>.064</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.762**</td>
<td>-.327**</td>
<td>.196*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.000</td>
<td>.002</td>
<td>.049</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-.030</td>
<td>.318**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.403</td>
<td>.004</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.497**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of correlational analyses comparing key process measures at baseline are found in Table 6. The AAQ-2, AAQ-W, PAAQ, and DTS were all positively correlated with one another and negatively correlated with the WSQ, as expected. Only the PAAQ and the DTS were not significantly related.
Table 6. *Correlations Between Key Process Measures at Baseline*

<table>
<thead>
<tr>
<th></th>
<th>AAQ2</th>
<th>AAQW</th>
<th>PAAQ</th>
<th>DTS</th>
<th>WSQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAQ2</td>
<td>Pearson</td>
<td>.545**</td>
<td>.349**</td>
<td>.565**</td>
<td>-.453**</td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>AAQW</td>
<td>Pearson</td>
<td></td>
<td>.525**</td>
<td>.458**</td>
<td>-.655**</td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>PAAQ</td>
<td>Pearson</td>
<td></td>
<td>.129</td>
<td>-.350**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.140</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>DTS</td>
<td>Pearson</td>
<td></td>
<td></td>
<td>-.310**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td></td>
<td></td>
<td>.004</td>
<td></td>
</tr>
<tr>
<td>WSQ</td>
<td>Pearson</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Correlations between physical activity variables and key process measures at baseline were also calculated. In Table 7, one finds that estimated kilocalories expended corresponds with the AAQ-W and the PAAQ. Weight correlates negatively with the AAQ-W and positively with the WSQ, as expected, and sit-to-stands correspond with breath-holding. These correlations were as expected. However, muscle mass correlated negatively with the AAQ-2 and the AAQ-W, which was not in the expected direction since muscle mass is considered an accurate measure of physical fitness. In addition, sit-to-stands were negatively correlated with the DTS, which contradicts the proposed model.
Table 7. Correlations Between Physical Activity Variables and Key Process Measures at Baseline

<table>
<thead>
<tr>
<th></th>
<th>AAQ2</th>
<th>AAQW</th>
<th>PAAQ</th>
<th>DTS</th>
<th>Breath Holding</th>
<th>WSQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPAQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.011</td>
<td>.151</td>
<td>.171</td>
<td>.035</td>
<td>.182</td>
<td>-.100</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.464</td>
<td>.105</td>
<td>.077</td>
<td>.385</td>
<td>.064</td>
<td>.204</td>
</tr>
<tr>
<td>Est. KCAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.047</td>
<td>.219*</td>
<td>.377**</td>
<td>.062</td>
<td>.111</td>
<td>-.164</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.351</td>
<td>.035</td>
<td>.001</td>
<td>.305</td>
<td>.181</td>
<td>.089</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.142</td>
<td>-.237*</td>
<td>-.172</td>
<td>.033</td>
<td>-.182</td>
<td>.282**</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.117</td>
<td>.022</td>
<td>.074</td>
<td>.393</td>
<td>.063</td>
<td>.008</td>
</tr>
<tr>
<td>Muscle Mass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.291**</td>
<td>-.291**</td>
<td>-.138</td>
<td>-.158</td>
<td>.043</td>
<td>.164</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.007</td>
<td>.007</td>
<td>.128</td>
<td>.096</td>
<td>.363</td>
<td>.087</td>
</tr>
<tr>
<td>Sit-to-Stands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.041</td>
<td>-.042</td>
<td>.065</td>
<td>-.205*</td>
<td>.219*</td>
<td>.064</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.367</td>
<td>.363</td>
<td>.295</td>
<td>.042</td>
<td>.032</td>
<td>.297</td>
</tr>
</tbody>
</table>

Between group changes in outcome measures

Changes in outcome measures were assessed using mixed model repeated measures (MMRM) analyses. The International Physical Activity Questionnaire (IPAQ) during leisure time, estimated kilocalories expended, and results of the fitness assessment were analyzed first as these were the primary outcomes measuring physical activity (Hypothesis 1).

The means, standard errors, change scores from pre to follow-up, and significance values for between- and within-group comparisons are displayed in Table 8 for the physical activity measures. For the two self-report physical activity measures (IPAQ measuring physical activity during leisure time and estimated kilocalories expended during the past week), MMRM analyses with compound symmetry covariance assumptions best fit the data. There were no significant differences within or between
conditions on either measure when comparing pre to follow-up. A brief fitness assessment was composed of four components: sit-to-stands (measures lower body strength), bicep curls (measures upper body strength), back scratches (measures upper body flexibility), and static balance (measures balance). The majority of participants reached the maximum time of 30 seconds for static balance and thus there was no effect for this test. Again, MMRM analyses with compound symmetry covariance assumptions best fit the data. There were no differences between conditions for any of the fitness assessment measures. However, there were significant improvements on the sit-to-stand test from pre- to follow-up in both conditions. The control condition showed improved upper body flexibility for the back scratch test on the left side only.
### Table 8. Physical Activity Outcome Measures

<table>
<thead>
<tr>
<th>Measures</th>
<th>Pre</th>
<th>SE</th>
<th>Follow-up</th>
<th>SE</th>
<th>Change</th>
<th>SE</th>
<th>Pre to FU Sig. (one-tailed)</th>
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<td>Physical Activity (IPAQ; Met-min.)</td>
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<td>Lower body strength (Sit-to-stands, reps)</td>
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The means, standard errors, change scores from pre to follow-up, and significance values for between- and within-group comparisons are displayed in Table 9 for the physiological measures. MMRM analyses with compound symmetry covariance assumptions best fit the data for weight, muscle mass, BMI, body fat, basal metabolic rate, and systolic blood pressure, whereas heterogeneous compound symmetry provided the best fit for diastolic blood pressure. There were no significant between-group differences for any of the physiological measures. The ACT condition showed significant improvements for weight loss and muscle mass, whereas the control condition
did not. Both conditions showed significant losses in percent of body fat. There were no significant within-group differences for body mass index or blood pressure.

Table 9. Physiological Outcomes Measures

<table>
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<tr>
<th>Measure</th>
<th>Pre</th>
<th>SE</th>
<th>Follow-up</th>
<th>Mean</th>
<th>SE</th>
<th>Change</th>
<th>Pre to FU Sig. (one-tailed)</th>
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<td><strong>Muscle mass (pounds)</strong></td>
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<td><strong>Body fat (percent)</strong></td>
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<td>-2.1</td>
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<td><strong>Basal Metabolic Rate</strong></td>
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<tr>
<td><strong>Systolic Blood Pressure</strong></td>
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<tr>
<td><strong>Diastolic Blood Pressure</strong></td>
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<tr>
<td>Sig. for Between Group Diff.</td>
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<td>.334</td>
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The means, standard errors, change scores from pre to follow-up, and significance values for between- and within-group comparisons are displayed in Table 10 for the self-report outcome measures. MMRM analyses with compound symmetry covariance assumptions best fit the data for depression, anxiety, stress, general distress, meal replacements consumed, and diet adherence, whereas MMRM analyses with heterogeneous compound symmetry provided the best fit for fruits and vegetables consumed. There were no between-group differences from pre to follow-up for any of the self-report outcome measures. However, the control group showed a significant improvement for depression and stress on the DASS, while the ACT group did not. It should be noted that the mean scores for the DASS were in the normal range for all three scales, so these improvements may not reflect clinical significance. The ACT group ate significantly fewer meal replacements at follow-up while a similar decrease in the control group did not reach significance. Both groups also reported significantly fewer days when they were adherent to the diet prescribed during the weight loss phase of HMR (referred to as “in the box”) from pre to follow-up. The reduction in diet adherence can be explained based on many participants ending the weight loss classes during the course of the study and either continuing in maintenance classes or discontinuing in HMR.
Table 10. *Self-report Outcome Measures*

<table>
<thead>
<tr>
<th></th>
<th>Pre Mean</th>
<th>Pre SE</th>
<th>Follow-up Mean</th>
<th>Follow-up SE</th>
<th>Change Mean</th>
<th>Change SE</th>
<th>Pre to FU Sig. (one-tailed)</th>
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<td><strong>Depression (DASS)</strong></td>
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<td><strong>Anxiety (DASS)</strong></td>
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<td>3.7</td>
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<td><strong>General Distress (GHQ)</strong></td>
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<td><strong>Fruits &amp; Vegetables Consumed in Past Week</strong></td>
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<td><strong># Meal Replacements Consumed Past Week</strong></td>
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<td><strong>Days Adherent to Diet (“In the Box”) in Past Week</strong></td>
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Between group changes in process measures

Mixed model repeated measures (MMRM) analyses were performed on the process measures to examine changes in acceptance, distress tolerance, breath holding, weight stigma, mindfulness, motivation for physical activity, and values in the ACT condition relative to the control condition at post and follow-up.

The means and standard errors by condition are displayed in Table 11 for measures of acceptance, distress tolerance, breath holding, weight stigma, and self-esteem. MMRM analyses with compound symmetry covariance assumptions best fit the data for the AAQW, breath holding, weight stigma, and self-esteem. MMRM analyses with heterogeneous compound symmetry covariance provided the best fit for the AAQ2, an unstructured covariance model best the data for the PAAQ, and a toeplitz covariance model provided the best fit for the DTS. There were no between-group differences from pre to follow-up for any of the self-report outcome measures.
Table 11. Means and Standard Errors at Pre, Post, and Follow-up for Process Measures: Acceptance, Distress Tolerance, Breath Holding, Stigma, and Self-Esteem

<table>
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<tr>
<th>Measure</th>
<th>Pre Mean</th>
<th>Post Mean</th>
<th>FU Mean</th>
<th>Pre SE</th>
<th>Post SE</th>
<th>FU SE</th>
<th>Sig. for Between Group Diff.</th>
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<td>37.1</td>
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<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>.154</td>
</tr>
<tr>
<td>Control</td>
<td>33.8</td>
<td>36.1</td>
<td>37.1</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>.316</td>
</tr>
<tr>
<td><strong>Distress Tolerance (DTS)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ACT</td>
<td>55.7</td>
<td>58.7</td>
<td>60.2</td>
<td>2.0</td>
<td>2.1</td>
<td>2.1</td>
<td>.377</td>
</tr>
<tr>
<td>Control</td>
<td>56.6</td>
<td>57.3</td>
<td>61.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>.314</td>
</tr>
<tr>
<td><strong>Breath Holding (in seconds)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>42.0</td>
<td>44.6</td>
<td>45.5</td>
<td>2.8</td>
<td>2.9</td>
<td>2.9</td>
<td>.412</td>
</tr>
<tr>
<td>Control</td>
<td>41.1</td>
<td>40.2</td>
<td>41.6</td>
<td>2.8</td>
<td>2.9</td>
<td>2.9</td>
<td>.144</td>
</tr>
<tr>
<td><strong>Stigma (WSQ)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>34.9</td>
<td>32.5</td>
<td>30.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>.415</td>
</tr>
<tr>
<td>Control</td>
<td>35.3</td>
<td>35.6</td>
<td>32.7</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>.074</td>
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<tr>
<td><strong>Self-Esteem (Rosenberg Self-Esteem Scale)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>21.0</td>
<td>21.7</td>
<td>22.6</td>
<td>.9</td>
<td>.9</td>
<td>.9</td>
<td>.276</td>
</tr>
<tr>
<td>Control</td>
<td>21.8</td>
<td>22.8</td>
<td>23.1</td>
<td>.9</td>
<td>.9</td>
<td>.9</td>
<td>.204</td>
</tr>
</tbody>
</table>

Means and significance values for pre to post and pre to follow-up changes by condition are displayed in Table 12 for measures of acceptance, distress tolerance, breath holding, weight stigma, and self-esteem. For the AAQ2, MMRM showed an effect with
both conditions becoming more psychologically flexible (and less experientially avoidant) at follow-up. Both conditions showed dramatic improvements at post and follow-up on the AAQW, indicating greater psychological flexibility regarding weight-related thoughts and feelings. MMRM also shows effects at post and follow-up for both conditions on the PAAQ, with the effect for ACT reacher greater significance (but no significant interaction effect), indicating greater acceptance of physical activity-related thoughts and feelings that may interfere with physical activity. For the DTS, while both conditions improved the same amount by follow-up, only the ACT group showed an effect at post. In the case of breath holding, the MMRM shows an effect from pre to follow-up for ACT but not the control, yet again the interaction is not significant. While both groups displayed reductions in weight stigma at follow-up, there was significant improvement in the ACT condition only at post. This pattern was reversed for self-esteem, which improved at post for the control group, but not ACT, while both groups displayed significant improvements at follow-up.

To summarize, MMRM showed robust effects at follow-up for measures of acceptance, distress tolerance, stigma, and self-esteem for both the ACT and control conditions, and only the ACT condition displaying an effect for breath holding at follow-up. For distress tolerance and weight stigma, the ACT condition improved earlier than the control condition, whereas self-esteem improved earlier for the control condition.
Table 12. Pre to Post and Pre to Follow-up Changes for Process Measures: Acceptance, Distress Tolerance, Breath Holding, Stigma, and Self-Esteem

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-Post Change</th>
<th>Pre-Follow-up Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Sig. (one-tailed)</td>
</tr>
<tr>
<td>Acceptance and Action (AAQ2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>.6</td>
<td>.256</td>
</tr>
<tr>
<td>Control</td>
<td>-.4</td>
<td>.196</td>
</tr>
<tr>
<td>Acceptance and Action-Weight (AAQW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>12.7</td>
<td>.000**</td>
</tr>
<tr>
<td>Control</td>
<td>8.8</td>
<td>.000**</td>
</tr>
<tr>
<td>Physical Activity Acceptance (PAAQ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>5.5</td>
<td>.000**</td>
</tr>
<tr>
<td>Control</td>
<td>2.3</td>
<td>.027*</td>
</tr>
<tr>
<td>Distress Tolerance (DTS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>3.0</td>
<td>.015*</td>
</tr>
<tr>
<td>Control</td>
<td>.7</td>
<td>.301</td>
</tr>
<tr>
<td>Breath Holding (in seconds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>2.5</td>
<td>.090</td>
</tr>
<tr>
<td>Control</td>
<td>-1.0</td>
<td>.298</td>
</tr>
<tr>
<td>Stigma (WSQ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>-2.4</td>
<td>.009**</td>
</tr>
<tr>
<td>Control</td>
<td>.2</td>
<td>.400</td>
</tr>
<tr>
<td>Self-Esteem (Rosenberg Self-Esteem Scale)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>.6</td>
<td>.130</td>
</tr>
<tr>
<td>Control</td>
<td>.9</td>
<td>.036*</td>
</tr>
</tbody>
</table>

The means and standard errors by condition are displayed in Table 13 for the mindfulness measure. MMRM analyses with compound symmetry covariance assumptions best fit the data for all five mindfulness facets. There were significant between-group differences from pre to follow-up for the observe and describe subscales in favor of the control condition as shown in Table 13. This result was not predicted by the model and may indicate that members of the control group had experiences that enhanced mindfulness that were unknown to the investigator. The ACT condition
remained relatively stable across time for observing and describing, indicating that the intervention was neutral for mindfulness or moderated the positive effects of an outside source of mindfulness skills.

Table 13. *Means and Standard Errors at Pre, Post, and Follow-up for Mindfulness*

*Process Measure*

<table>
<thead>
<tr>
<th>Five Facets of Mindfulness (FFMQ) Scales</th>
<th>Pre</th>
<th>SE</th>
<th>Post</th>
<th>SE</th>
<th>Follow-up</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>26.0</td>
<td>1.0</td>
<td>26.1</td>
<td>1.0</td>
<td>26.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Control</td>
<td>28.0</td>
<td>1.0</td>
<td>27.9</td>
<td>1.0</td>
<td>29.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.130</td>
<td></td>
<td>.113</td>
<td></td>
<td>.006**</td>
<td></td>
</tr>
<tr>
<td><strong>Describe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>27.7</td>
<td>1.1</td>
<td>28.8</td>
<td>1.2</td>
<td>28.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Control</td>
<td>30.4</td>
<td>1.1</td>
<td>29.6</td>
<td>1.2</td>
<td>31.4</td>
<td>1.2</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.051</td>
<td></td>
<td>.328</td>
<td></td>
<td>.040*</td>
<td></td>
</tr>
<tr>
<td><strong>Act with Awareness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>26.1</td>
<td>1.0</td>
<td>26.6</td>
<td>1.0</td>
<td>26.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Control</td>
<td>25.0</td>
<td>1.0</td>
<td>24.4</td>
<td>1.0</td>
<td>27.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.221</td>
<td></td>
<td>.066</td>
<td></td>
<td>.301</td>
<td></td>
</tr>
<tr>
<td><strong>Nonjudgmental</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>28.8</td>
<td>1.1</td>
<td>30.5</td>
<td>1.1</td>
<td>30.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Control</td>
<td>29.1</td>
<td>1.1</td>
<td>29.5</td>
<td>1.1</td>
<td>31.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.406</td>
<td></td>
<td>.258</td>
<td></td>
<td>.362</td>
<td></td>
</tr>
<tr>
<td><strong>Nonreactive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>22.7</td>
<td>.7</td>
<td>23.2</td>
<td>.8</td>
<td>23.5</td>
<td>.8</td>
</tr>
<tr>
<td>Control</td>
<td>23.4</td>
<td>.7</td>
<td>23.3</td>
<td>.8</td>
<td>25.1</td>
<td>.8</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.261</td>
<td></td>
<td>.491</td>
<td></td>
<td>.075</td>
<td></td>
</tr>
</tbody>
</table>

Means and significance values for pre to post and pre to follow-up changes by condition are displayed in Table 14 for mindfulness. MMRM shows an effect from pre to follow-up in the control condition only for the observe, act with awareness,
nonjudgmental, and nonreactive scales of the FFMQ. There was an effect for the ACT group only on the nonjudgmental scale from pre to post. Again, the stronger effects for mindfulness in the control condition are inconsistent with the hypotheses of the study and are difficult to explain.

Table 14. *Pre to Post and Pre to Follow-up Changes for Mindfulness Process Measure*

<table>
<thead>
<tr>
<th>Five Facets of Mindfulness (FFMQ) Scales</th>
<th>Pre-Post Change</th>
<th>Pre-Follow-up Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Sig. (one-tailed)</td>
</tr>
<tr>
<td><strong>Observe</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>.1</td>
<td>.456</td>
</tr>
<tr>
<td>Control</td>
<td>-.1</td>
<td>.427</td>
</tr>
<tr>
<td><strong>Describe</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>-.8</td>
<td>.081</td>
</tr>
<tr>
<td>Control</td>
<td>1.1</td>
<td>.147</td>
</tr>
<tr>
<td><strong>Act with Awareness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>.5</td>
<td>.236</td>
</tr>
<tr>
<td>Control</td>
<td>-.6</td>
<td>.194</td>
</tr>
<tr>
<td><strong>Nonjudgmental</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>1.7</td>
<td>.031*</td>
</tr>
<tr>
<td>Control</td>
<td>.4</td>
<td>.347</td>
</tr>
<tr>
<td><strong>Nonreactive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>.5</td>
<td>.203</td>
</tr>
<tr>
<td>Control</td>
<td>-.1</td>
<td>.418</td>
</tr>
</tbody>
</table>

Table 15 displays the means and standard errors by condition for motivation for physical activity. MMRM analyses with compound symmetry covariance assumptions best fit the data for the appearance, social, and fitness subscales of the MPAM. MMRM analyses with heterogeneous compound symmetry covariance provided the best fit for the competence subscale and a toeplitz covariance model provided the best fit for the interest subscale. There were significant differences between groups at pre and post for the
fitness scale with a higher mean score in the control condition. There were no other between-group differences at pre, post, and follow-up for motivation for physical activity.

Table 15. *Means and Standard Errors at Pre, Post, and Follow-up for Motivation for Physical Activity Process Measure*

<table>
<thead>
<tr>
<th>Motivation for Physical Activity (MPAM)</th>
<th>Pre</th>
<th>Post</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
</tr>
<tr>
<td>Interest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>30.6</td>
<td>1.8</td>
<td>32.8</td>
</tr>
<tr>
<td>Control</td>
<td>29.2</td>
<td>1.7</td>
<td>32.1</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.289</td>
<td>.396</td>
<td>.360</td>
</tr>
<tr>
<td>Fitness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>31.5</td>
<td>.7</td>
<td>31.2</td>
</tr>
<tr>
<td>Control</td>
<td>33.0</td>
<td>.5</td>
<td>33.4</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.025*</td>
<td>.011*</td>
<td>.421</td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>20.2</td>
<td>1.3</td>
<td>22.0</td>
</tr>
<tr>
<td>Control</td>
<td>20.2</td>
<td>1.3</td>
<td>20.9</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.496</td>
<td>.287</td>
<td>.334</td>
</tr>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>33.5</td>
<td>1.1</td>
<td>32.7</td>
</tr>
<tr>
<td>Control</td>
<td>35.6</td>
<td>1.1</td>
<td>34.8</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.078</td>
<td>.092</td>
<td>.256</td>
</tr>
<tr>
<td>Competence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>32.4</td>
<td>1.6</td>
<td>34.8</td>
</tr>
<tr>
<td>Control</td>
<td>32.6</td>
<td>1.6</td>
<td>35.2</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.456</td>
<td>.416</td>
<td>.288</td>
</tr>
</tbody>
</table>

Means and significance values for pre to post and pre to follow-up changes by condition are displayed in Table 16 for motivation for physical activity. MMRM shows an effect from pre to post only in both conditions for the interest and competence scales. There was an effect from pre to post for the ACT condition only for the social scale. In
the control condition, there was an effect from pre to follow-up for the fitness and appearance scales.

Table 16. Pre to Post and Pre to Follow-up Changes for Motivation for Physical Activity

Process Measure

<table>
<thead>
<tr>
<th>Motivation for Physical Activity (MPAM)</th>
<th>Pre-Post Change</th>
<th>Pre-Follow-up Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Sig. (one-tailed)</td>
</tr>
<tr>
<td>Interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>2.2</td>
<td>.022*</td>
</tr>
<tr>
<td>Control</td>
<td>2.9</td>
<td>.003**</td>
</tr>
<tr>
<td>Fitness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>-.3</td>
<td>.367</td>
</tr>
<tr>
<td>Control</td>
<td>.4</td>
<td>.313</td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>1.8</td>
<td>.033*</td>
</tr>
<tr>
<td>Control</td>
<td>.8</td>
<td>.205</td>
</tr>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>-.8</td>
<td>.138</td>
</tr>
<tr>
<td>Control</td>
<td>-.9</td>
<td>.105</td>
</tr>
<tr>
<td>Competence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>2.4</td>
<td>.014*</td>
</tr>
<tr>
<td>Control</td>
<td>2.6</td>
<td>.007**</td>
</tr>
</tbody>
</table>

The means and standard errors by condition are displayed in Table 17 for values. MMRM analyses with compound symmetry covariance assumptions best fit the data for the all dimensions of the Bull’s Eye values measure. There were significant between-group difference at pre and post on the rating of barriers to change, with barriers providing less of an obstacle for the ACT condition. Lower scores for the four dimensions are closer to the bull’s eye and thus reflect living more consistently with values. There was a significant between-group difference at follow-up for living
consistently with values related to work and education in favor of the ACT condition.

There was also a significant difference at post in favor of the ACT condition on the health and personal growth dimension.

Table 17. *Means and Standard Errors at Pre, Post, and Follow-up for Values Process Measure*

<table>
<thead>
<tr>
<th>Values (Bull’s Eye)</th>
<th>Pre</th>
<th>Post</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>Barriers to Change</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>4.4</td>
<td>.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Control</td>
<td>5.0</td>
<td>.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.043*</td>
<td>012*</td>
<td></td>
</tr>
<tr>
<td><strong>Work/ Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>3.5</td>
<td>.3</td>
<td>3.0</td>
</tr>
<tr>
<td>Control</td>
<td>3.4</td>
<td>.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.444</td>
<td></td>
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</tr>
<tr>
<td><strong>Leisure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>4.2</td>
<td>.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Control</td>
<td>4.2</td>
<td>.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.459</td>
<td></td>
<td>.358</td>
</tr>
<tr>
<td><strong>Health/ Personal Growth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>4.3</td>
<td>.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Control</td>
<td>4.1</td>
<td>.3</td>
<td>4.1</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.341</td>
<td>.049*</td>
<td></td>
</tr>
<tr>
<td><strong>Relationships</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>3.7</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Control</td>
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<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Sig. for Between Group Diff.</td>
<td>.054</td>
<td></td>
<td>.055</td>
</tr>
</tbody>
</table>

Means and significance values for pre to post and pre to follow-up changes by condition are displayed in Table 18 for the Bull’s Eye values measure. Reported barriers to change were reduced in the ACT condition from pre to post, whereas an effect for the control condition appeared for pre to follow-up. MMRM showed effects for the ACT
group from pre to post and pre to follow-up on three of the four dimensions: work/education, leisure, and health/personal growth. The ACT group also had an effect from pre to follow-up for the fourth dimension, relationships. The only effect for the control condition was from pre to follow-up on the leisure dimension.

Table 18. Pre to Post and Pre to Follow-up Changes for Values Process Measure

<table>
<thead>
<tr>
<th>Values (Bull's Eye)</th>
<th>Pre-Post Change</th>
<th>Pre-Follow-up Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Sig. (one-tailed)</td>
</tr>
<tr>
<td><strong>Barriers to Change</strong></td>
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<td></td>
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<tr>
<td>ACT</td>
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<td>.049*</td>
</tr>
<tr>
<td>Control</td>
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<td>.208</td>
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<tr>
<td><strong>Work/ Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>-.5</td>
<td>.027*</td>
</tr>
<tr>
<td>Control</td>
<td>0</td>
<td>.478</td>
</tr>
<tr>
<td><strong>Leisure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>-.6</td>
<td>.046*</td>
</tr>
<tr>
<td>Control</td>
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<td><strong>Health/ Personal Growth</strong></td>
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<td>ACT</td>
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<td>.002**</td>
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<tr>
<td>ACT</td>
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<td>.094</td>
</tr>
<tr>
<td>Control</td>
<td>-.3</td>
<td>.073</td>
</tr>
</tbody>
</table>

Relationship between process and outcome measures

In order to examine the relationships between process variables and outcomes, Pearson bivariate correlational analyses were conducted comparing baseline process measures with changes in key outcome measures across conditions. The measures were selected based on the proposed model, such that baseline levels of acceptance (AAQ2, AAQW, PAAQ), distress tolerance (DTS, breath holding), stigma (WSQ), and values (Bull’s Eye) were expected to correlate with positive outcomes for physical activity.
(IPAQ, muscle mass, sit-to-stands) and weight. Increases in muscle mass corresponded to baseline scores on the AAQ2 ($r = .278$, $p = .016$, one tailed), the leisure dimension of the Bull’s Eye ($r = -.233$, $p = .038$), and weight stigma ($r = -.237$, $p = .034$). The work/education dimension correlated with changes in number of sit-to-stands ($r = -.225$, $p = .042$). These correlations were all in the predicted direction. Also, the leisure dimension of the Bull’s Eye correlated with changes on the IPAQ ($r = .286$, $p = .031$), which was not in the predicted direction.

Next, correlational analyses were conducted comparing pre to post changes in process measures with changes in outcome measures across conditions. Larger changes in breath holding from pre to post correlated with changes in number of sit-to-stands from pre to follow-up ($r = -.225$, $p = .043$, one-tailed). There were no other significant correlations.

Finally, changes from pre to follow-up for both process and outcome measures were examined in the same way. Weight loss corresponded with changes in breath holding ($r = -.286$, $p = .012$, one-tailed), physical activity acceptance (PAAQ; $r = -.233$, $p = .035$), and weight acceptance (AAQW; $r = -.494$, $p = .000$), reductions in barriers to valued goals ($r = .283$, $p = .021$) and the growth/health ($r = .475$, $p = .000$) dimension of the Bull’s Eye. Increased physical activity measured by the IPAQ corresponded with changes in weight acceptance ($r = .327$, $p = .006$), physical activity acceptance (PAAQ; $r = .233$, $p = .038$), and the leisure ($r = -.363$, $p = .003$) and growth/health ($r = -.328$, $p = .006$) dimensions of the Bull’s Eye. These findings generally comport with the theory. Gains in muscle mass were negatively correlated with general acceptance (AAQ2; $r = -.291$, $p = .013$), which was not in the expected direction.
Effectiveness of the ACT Workshop

The feedback form asked participants in the ACT workshop to report whether they would recommend the workshop to others on a scale from one (“strongly disagree”) to seven (“strongly agree”). All twenty-nine workshop participants provided a rating and the average score was 5.7, indicating that the workshop was highly acceptable overall with this population. Some of the reasons given for what enabled participants to reach their physical activity goals were: sticking to a schedule, time management, “just do it”, taking a class, determination, accountability, appreciating one’s self, commitment, higher intensity exercise, and “made the choice”. Reasons for not reaching physical activity goals were: time management, laziness, other time commitments (e.g., work, social engagements), “me” getting in the way, low intensity exercise, physical pain, motivation, stress, not liking exercise, weather, self-control, personal crises, and giving in to urges to stay home.

Test of Depression as a Moderator

To test the proposed hypothesis that depression would moderate response to treatment, initial levels of depression were entered as a moderator into a Linear Regression model. Depression was not found to moderate the interaction between treatment condition and improvement in physical activity level (IPAQ) from pre to follow-up (p=0.473). Depression also did not moderate the interaction between condition and weight loss from pre to follow-up (p=0.953).

Post-hoc analyses

In order to determine if initial levels of distress moderated the impact of the ACT workshop, baseline GHQ scores were entered as a moderator into a Linear Regression
model. Initial distress was not found to moderate the interaction between condition and changes in physical activity level (IPAQ; p=0.118), nor did it moderate the interaction between condition and weight loss (p=0.616).

Next, physical activity outcomes were compared after dividing the sample into low, moderate, and high activity levels at baseline to see whether initial level of activity moderated the response to treatment. For the low activity group (less than 600 MET-minutes), there were no significant time or condition effects. For the moderate activity group (between 600 and 3000 MET-minutes), both groups had a significant effect for time (ACT, p=0.0345; WL, p=0.013), and there was no difference between the two groups (p=0.459). For the high activity group (greater than 3000 MET-minutes), the ACT group performed significantly better at follow-up than the control group (p=0.003). In addition, the activity level for the control group declined (p=0.008) while the ACT group maintained a high level of activity. Thus, according to this analysis, the ACT workshop may have helped those with high levels of physical activity maintain their rigorous exercise regimens.

Because the participants were recruited in two ways, either directly from HMR classes or from the pool of those who had dropped out of HMR, analyses were conducted to investigate whether there were differences in the way that these two groups responded to the intervention. These two groups were designated “current HMR” or “former HMR”, referring to their status during the initial assessment for the study. When HMR status was entered as a grouping variable to evaluate the effect on the sit-to-stand portion of the fitness test, MMRM analyses revealed a significant interaction effect for HMR and condition (p=0.013), and for HMR, condition, and time (p=0.013). Those participants
who were in the HMR classes and participated in the ACT workshop performed significantly better on the sit-to-stand test than those were in the classes but did not do the workshop. A similar effect was not found for those not currently enrolled in the HMR classes. However, this interaction effect was not found for the self-report physical activity measures (IPAQ or estimated KCAL’s), weight or muscle mass.

Discussion

Physical activity is recognized as a critical component of physical and mental health, yet only 25% of Americans reach the recommended minimum standards (Kahn, Ramsey, Heath, & Howze, 2001). The well-documented effects of exercise include as a preventative measure for a host of physical illnesses or as an effective treatment for alleviating many physical conditions. Physical activity is as effective as antidepressants in treating depression. Sedentary lifestyles are largely responsible for the obesity epidemic, along with poor eating habits, and physical activity is an important component of any weight loss program. Despite the convincing evidence for the benefits of physical activity, helping people to adopt more active lifestyles has been an elusive challenge for behavioral health care workers.

Psychological barriers to physical activity proposed in this study are the inability to persist despite discomfort (task persistence), fear of judgments from oneself and others (stigma), and a lack of enduring commitment (motivation). The current study proposed to address these barriers with a brief intervention based on Acceptance and Commitment Therapy (ACT) designed to increase acceptance, mindfulness, and values, and thus increase physical activity among weight loss clients. In addition to physical activity and
weight loss goals, the intervention also aimed to help individuals improve on psychological dimensions of well-being.

Baseline Models

Because physical activity is difficult to measure accurately, several variables were employed for the main outcome. Baseline scores were compared for two self-report measures, the International Physical Activity Questionnaire (IPAQ) and estimates of kilocalories expended, two physical fitness measures, sit-to-stands and bicep curls, and two physiological measures, weight and muscle mass. The resulting significant correlations between many of these physical activity measures indicate that there was some consistency across measures. In particular, baseline IPAQ values correlated positively with kilocalories burned and the number of sit-to-stands on the fitness assessment. Weight correlated negatively with the number of sit-to-stands. Muscle mass was positively correlated with weight and bicep curls. Thus, muscle mass and bicep curls may not be as useful for measuring physical activity, while the IPAQ, sit-to-stands, weight, and kilocalories burned seem to be more valid measures.

Strong relationships were found between five process variables that were compared at baseline: general acceptance (AAQ-2), weight acceptance (AAQ-W), physical activity acceptance (PAAQ), distress tolerance (DTS), and weight stigma (WSQ). The significant and large correlations between almost all of the process measures support the idea that acceptance, mindfulness, stigma, and distress tolerance are interrelated constructs that apply to weight domains. Only the DTS and the PAAQ were not significantly correlated with each other.
Correlational analyses were also conducted between process measures and physical activity measures at baseline. Weight was negatively correlated with weight acceptance and positively correlated with weight stigma, indicating that psychological flexibility regarding weight and weight-related self-judgments are psychological aspects of weight problems. Sit-to-stands correlated with the distress tolerance measures, indicating the relevance of this process for persisting on a fitness-related task.

Thus, baseline data indicate that the proposed process measures are likely important for weight-related problems, yet relationships were weaker between physical activity and process measures.

Outcomes

While the ACT group showed an effect at follow-up for physical activity, weight loss, increased muscle mass, decreased body fat, and number of sit-to-stands, there were no significant differences between groups on any of these outcomes. The control group also lost a significant amount of body fat and improved on sit-to-stands. The control group improved on the other outcome measures as well, although the changes did not reach significance. For example, the ACT group lost an average of 4.6 pounds and the control group lost 3.9 pounds, showing that both groups were losing weight. Thus, although the intervention group improved on more of the outcome measures than the control group, there is no conclusive evidence that the ACT workshop impacted physical activity.

It is worth noting that the ACT group displayed a large change on the IPAQ of over 1000 MET-minutes from pre to follow-up, which moved the average physical activity level for this group from moderate to high, while the control group did not
change. Due to the large amount of variability in the sample, this result did not reach significance for between-group differences. The trend towards significance on the main outcome implies that the study may have been underpowered to detect the impact of the ACT intervention on physical activity levels. In addition, ACT appeared to have the largest impact with those who had achieved high activity levels at baseline, with those who completed the ACT workshop maintaining the same level of activity three months later while the control group significantly worsened.

Change Processes and the ACT Model

The ACT model predicts that process measures of acceptance, mindfulness, and values will increase after an ACT intervention. The ACT group did show a significant effect from pre to post for the AAQW, the PAAQ, the DTS, and the WSQ. Although the same effect was not discovered for the AAQ-2, previous studies have shown that acceptance measures that reflect the target behavior are more responsive to focused ACT interventions than general acceptance (e.g. Lillis, 2009). However, the control group also showed improvements during this time period on the AAQW and the PAAQ and there were no significant between group differences. Thus there is no reason in this study to attribute the changes in process in the ACT group to the workshop. It is not known if something in the HMR program moved these processes in the control condition, or if these represent background changes unrelated to both groups. Both groups showed even greater changes in process variables at follow-up, again supporting the view that the weight-loss classes were more potent regarding process measures than anticipated by the study.
It was further expected that the changes in process measures would mediate changes in outcomes for physical activity. Because there were no significant differences between groups for any of the post processes or outcome variables, formal meditational analyses were not of interest. Instead, correlational analyses were used to examine the relationships between process variables and change scores for outcomes.

The strongest relationships were found between change scores for process variables and outcomes from pre to follow-up, although it is not clear what they mean given that the direction of the relationship cannot be known. Weight loss corresponded to changes in weight acceptance, physical activity acceptance, distress tolerance (breath holding), and values from pre to follow-up. Increases in physical activity, measured by the IPAQ, corresponded to changes in physical activity acceptance, weight acceptance, and values from pre to follow-up. The only correlation between a process measure pre to post change score and pre to follow up changes in outcome was a significant relationship between changes in breath holding and improvement on the sit-to-stand test. Thus, while there are clearly relationships between the processes of acceptance, distress tolerance, and values and key outcomes (physical activity and weight loss), whether changes in these processes lead to better outcomes remains unclear.

The puzzling performance of the mindfulness measure, the FFMQ, warrants discussion. This was the only measure that showed significantly greater improvements in the control group, and it is difficult to explain this result. One can hypothesize that the extensive self-monitoring required by the weight loss classes resulted in greater skills for observing and describing one’s ongoing experiences, corresponding to the subscales of the FFMQ that showed the biggest change for the control group. However, given that
there were equal numbers of participants in both conditions who were currently enrolled in HMR, it doesn’t compute that there would be such a big difference between groups for this construct. It could be that training in mindfulness decreased background changes in that construct, but it would be hard to fit that idea into the scores of studies suggesting otherwise. While four of the five scales of the FFMQ have been shown to correlate negatively with psychological symptoms and positively with psychological well-being, the observe scale has actually been found to correspond to maladaptive outcomes in non-meditators (Baer et al., 2006; Baer et al., 2008). Researchers have hypothesized that the ability to observe one’s inner experiences can reflect a neurotic self-focus that is not conducive to mental health. Thus, the difference between the ACT and control groups on this scales may not represent a positive outcome for the controls. However, the describe scale has been shown to correspond to positive outcomes, and thus the improvement on this mindfulness facet in the control group represents an advantage over the ACT group.

In the context of the weight loss classes in which observing and describing one’s eating and exercise behavior is built into the program, perhaps the improvements on these scales reflects a narrow self-focus that did not occur for those who participated in the ACT workshop. The ACT group showed significant improvements on health and personal growth-related values at post-treatment, and perhaps contacting these values more fully redirected participants from narrowly focusing on their inner experiences.

A counter explanation for the results of the mindfulness measure is that the interaction of the ACT workshop and the weight loss classes produced a negative effect on mindfulness, and perhaps reduced the effectiveness of the ACT workshop on other processes. It is possible that the two treatments were not compatible, and that learning
mindfulness and acceptance skills detracted from the benefits of the weight loss classes. Alternatively, the structure of the weight loss program, which encourages rule-governed behavior, may not be conducive to reaping the benefits of the ACT workshop.

**Limitations**

The improvements in the control group on many of the psychological measures strongly indicate that interventions besides the ACT workshop produced potent effects and may explain the lack of significant between-group differences for physical activity outcomes. More than half of the participants were participating in the HMR weight loss classes, and all of the participants had participated in this program at some point. There are several aspects of the HMR program that may have impacted measures of psychological health. Those who were participating in the weight loss classes were part of a group that provides weekly social support for shared goals and contact with enthusiastic instructors. The program also includes a high degree of accountability with daily record-keeping of kilocalories expended through physical activity and food choices. From a psychological perspective, the HMR program was designed with behavioral principles in mind, encouraging patients to use record-keeping to foster an empirical, rather than emotional, approach to weight loss. When patients fall short of their goals, they would be encouraged to problem-solve around the barriers that arose in order to increase opportunities for success in the future. Patients are taught to focus on what they can do to change their behavior in positive ways and to acknowledge the gains they achieve. Instructors report that success in making these changes is usually accompanied by increases in self-acceptance. In addition, discussions of personal values that relate to health are not uncommon in HMR classes, although not formally included in the
curriculum. These aspects of the program are certainly active components consistent with a behavioral psychological approach to weight loss that may have produced a stronger effect than anticipated by the study. In addition, while acceptance, mindfulness, values, and stigma are not targeted directly in the HMR program, it is not hard to figure out how these processes could be impacted in their patients.

The current study was similar in design to Lillis et al. (2009), which focused on reducing stigma among participants with weight issues who had completed at least six months of a weight loss program. In addition, the interventions in both studies included many of the same components. However, there were differences in research design, main outcome, and populations that may account for the lack of significant findings in the current study compared to the former. These three differences will each be addressed in turn.

Regarding the research design, the ACT workshop as an additive intervention to the HMR weight loss programs may produce only a small effect size that would require a much larger sample to detect. In addition to increasing the sample size, other alternatives could also increase power in future studies. Some alternatives would be to consider a more intensive ACT intervention or to pair ACT with a less intensive weight loss program. In Lillis et al. (2009), participants were not currently in a weight loss program and the control group was thus inert. It may have been more impactful to test the intervention first with an inert control group before testing ACT in an additive design. In fact, Butryn et al. (2011) compared an even shorter 4-hour ACT intervention with an educational control group and found that participants in the ACT group increased their attendance at a local gym more than the controls.
It is possible that the workshop as it is currently designed does not target the appropriate processes for increasing physical activity. The current study did not clearly show that changes in acceptance, mindfulness, values or stigma are important for changing physical activity levels, and it is possible that other processes were not been considered that would have a larger impact. In a similar study, Butryn et al. (2011) found that measures of physical activity acceptance and mindfulness increased in both the ACT and an educational control group, and group membership did not moderate these changes. A third measure of defusion, which was not specifically measured in the current study, revealed a significant time by group interaction, indicating that this process is helpful for reaching physical activity goals. It will be important in future studies to closely investigate the active mechanisms of change regarding physical activity behavior.

While the literature indicates that a large proportion of participants in weight loss programs are also depressed, this study included a notably non-depressed sample with 8.3% of the pre-treatment sample reporting symptoms of depression, and most of these were unlikely to meet full criteria for a depressive episode, compared to the 16% of the general population who meet criteria for depression (Kessler et al., 2003). The small number of depressed participants makes it difficult to determine whether more depressed or distressed individuals respond differently to the intervention than non-depressed people. It is possible that the intervention would have a stronger impact for those with more significant psychological struggles. In fact, the baseline scores for weight acceptance, weight stigma, and distress tolerance indicated that this sample was less distressed than the participants in Lillis et al. (2009): baseline scores in the ACT group for the AAQW were 85.8 versus 94.5, the WSQ was 59.7 (out of 60 possible) versus
34.9, and breath holding time was 30.9 seconds versus 42.0 in the current study. In addition, the participants in Lillis et al. (2009) improved more on these measures, indicating that they responded more strongly to the intervention. For the AAQW, the ACT group improved 25.8 points versus 12.9, the WSQ decreased by 9.7 versus 4.4, and breath holding time increased by 5.8 seconds versus 3.5. However, results from the Butryn et al. (2011) study indicate that ACT can be effective in increasing physical activity with a nonclinical sample (healthy young women). The protocol used for this study included values and stigma exercises that often elicited high levels of emotion, and it may be that this created a mismatch with the relatively non-distressed sample. It would be interesting to compare this protocol with the one used in Butryn et al. (2011) and to consider a lighter approach with this population.

Another limitation in this study is the problem with physical activity measurement. Activity levels are difficult to capture, and although this study employed several different methods for measuring physical activity, including two self-report measures, a brief fitness assessment, and physical measures such as muscle mass, it was difficult to determine which measure was the most valid. It appeared that the strong social desirability produced by the HMR classes might have inflated self-reports of physical activity, particularly at the initial assessment. It is possible that participants in the ACT condition became more honest in their reports of physical activity at follow-up, which would explain the discrepancy between self-report and more objective measures for this condition.
Experiment-wise Alpha

The current study included a large number of measures, which could potentially increase the chance of finding a significant effect simply due to the amount of data. In other words, there may be an increased risk for a Type I error, which can be corrected by adjusting to a more conservative alpha level. This concern is most acute when a large number of comparisons are of equal relevance. However, the measures used for the current study were carefully chosen with a clearly defined theory that informed the expected outcomes. The measures were arranged hierarchically such that primary outcomes were given the greatest importance, then secondary outcomes, and process outcomes. Given the theoretical specificity of these comparisons, there seems to be no need to protect for Type 1 errors among all possible combinations. In addition, there was a lack of significant findings, rather than too many, and the significant results were not over interpreted. This suggests that Type I errors were not a problem in this case. Thus, rather than a “grab bag” of random measures, this study provided a detailed rationale for the inclusion of each, and thus correcting for experiment-wise alpha is not necessary.

Failure of the model or failure of technology?

An important distinction lies in whether the results of this study indicate a failure of the proposed model or a failure of technology. A model failure results when changes in process and outcome variables do not correspond in the expected direction. In the current study, increases in acceptance, mindfulness, and values, and reductions in stigma were expected to predict changes in physical activity and weight. Because there were no significant differences between groups on the outcome variables, it was not relevant to examine the mediating processes. Correlational analyses comparing changes in processes
at post-treatment and follow-up with changes in outcomes provided partial support for the model, although many of the expected relationships were not confirmed.

Alternatively, a failure of technology is indicated when an intervention does not result in the predicted changes in process variables. In the current study, there were significant changes in the ACT group on measures of acceptance, stigma, and distress tolerance from pre to post-intervention, although there were no significant between-group changes in these processes. It was thus not possible to determine whether the intervention was responsible for the changes. However, there were significant differences between groups in favor of ACT on the growth and personal health-related values at post, and the work and education-related values at follow-up, indicating that the ACT intervention was effective in moving this process. The control group showed greater improvements on the observe and describe facets of mindfulness, indicating that the intervention did impact these processes in the expected.

It thus appears that the current study may represent a partial failure of the model and partial failure of technology. It may be that the proposed processes of change are not sufficient for producing changes in physical activity. It may also be the case that the workshop was not effective in targeting the proposed processes of change, and this accounts for the lack of movement on outcome measures.

Conclusions

The present study did not produce significant differences between groups for physical activity or key process variables, thus it was not possible to assess the impact of the ACT workshop. However, the ACT group improved on more outcome and process variables than the control group, indicating that the lack of significant differences
between groups may be due to a lack of power. The use of ACT in an additive design with a potent weight-loss program may have required a much larger sample than originally accounted for. Relationships between process measures and outcome variables provided some support for the model that acceptance, values, and weight stigma may be important variables to pursue for creating interventions that aim to increase physical activity.
References


Physical Activity); Council on Cardiovascular Disease in the Young; and the Interdisciplinary Working Group on Quality of Care and Outcomes Research. *Circulation, 114*(24), 2739-2752.


Appendix A: Intervention Outline

Acceptance and Commitment Therapy for Physical Activity Workshop Manual

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Jason Lillis, Ph.D.
Steven Hayes, Ph.D

University of Nevada, Reno
Introduction

This protocol is a 1-day workshop that aims to increase physical activity using the principles of Acceptance and Commitment Therapy. The protocol specifically targets task persistence, weight stigma, and motivation, as these are seen as important barriers to physical activity. These barriers are addressed by teaching mindfulness skills that promote a change in the relationship to the thoughts and feelings that function as barriers to exercise. Values clarification allows individual participants to connect with what is deeply important about physical activity as it fits within a larger values set and provides a guide for setting reasonable goals that are reflective of internal motivators.

This is a flexible protocol. This means that modules can be presented out of sequence if later material becomes relevant earlier in the workshop. In addition, examples of principles can be added to illustrate the principle of any ACT idea or module. However, exercises may not be added, and principles not covered in this protocol may not be added.

Each mini-module is organized by a theme or an ACT principle. The bullet points are meant to orient the facilitators to key material that should be covered in some way during the module.

This protocol is based on the treatment manual developed by Jason Lillis called “Obesity Stigma and Weight Management Acceptance and Commitment Therapy Treatment Manual”. It has been adapted for addressing barriers to physical activity.

Required Reading/ Required for workshop facilitation:

**Throughout the protocol, exercises from both books are used. Page numbers are noted and source origin can be determined by the following key:

“GOOYM”= Get out of your mind and into your life (2005)
“ACT”= Acceptance and Commitment Therapy (1999)
Welcome statements
  • Pass out name tags and pens [name tags are in the bottom drawer in my office]

Treatment rationale
  • Thank you for coming and giving me this opportunity to give something to you
  • Each of you is here because you have had goals to be more active and have had trouble meeting those goals, so in one sense this workshop is about helping you become more active
  • We think of physical activity one of many different ways to improve quality of life
  • While the focus of this workshop is PA, what we are really interested in is helping you to improve your life in ways that are important to YOU
  • We are going to take a broad approach with the idea that there may be several things that you want to change, or you may not be sure what you want to change, and it is really the same process for any of them
  • We are not assuming that you are here because there is something wrong or that you need to be fixed.

Introductions
  • Name, tell us about yourself briefly. What would it mean to you to be more active? [Them first]
  • Why we’re doing this
  • Discussion about why this is important work, personal statements from therapist

Informed consent
  • Discuss structure of the day, i.e. half hour break for lunch sometime between 12 and 1 pm, end promptly at 4 pm.
  • Topic 1:
    • This is your time, invite you to make a difference
    • This is about your life, creating one that is important and vital
  • Topic 2:
    • Creating a safe place for people to make this whatever they want to
    • Confidentiality is VERY important; your privacy will be protected
  • Stay in room; stay the whole time
  • Topic 3:
    • Experiential; may be confusing at times – this is expected. This is not intuitive
    • Predictions: (1) Some of this will connect with you, (2) Some of this won’t. If it doesn’t, we ask you to step into that, stick with it, and see if there is something important there.
  • Topic 4:
    • If we see you working on something, ask for permission to push you a bit
    • Push yourself, but do only what you feel ready to do; It’s your choice, you set limits
• Everything you want to say in here, say…
• Everything you don’t want to say in here, say… (you’ve probably hit something important)
• (Optional)
• No rescuing, can’t trust that it’s not done to: “Stop feeling what you’re feeling b/c I don’t want to feel what I’m feeling” or “You’re too damaged”
• This is a discussion and you will be invited to share AND we have a lot to get through so we may redirect at times so that we can move on even if there is more to say.

Exercise stats
• Beneficial for heart disease, diabetes, osteoporosis, breast cancer, colon cancer, blood pressure, inflammation, WEIGHT LOSS, life span/aging
• A potent antidepressant – as effective as medications in some studies
• Results in increases in energy, sense of well-being, personal accomplishment
• If there were a pill that could do all of that, who would take it? And if you had to walk five miles everyday to get it?
• Yet only 25% of Americans get recommended amount of exercise
• Why is it so hard to do something that we know is good for us?
• This is not only true for exercise, but for so many things we want to do differently, for example being kind to a spouse or family member when cranky, patient with kids, eating nutritious food.
• Clearly knowing what to do is necessary but not sufficient when it comes to changing our own behavior

Values
• Funeral exercise—guided exercise with eyes closed, who do you want at your funeral?
• What do you want written on your epitaph?
• Ask: how is what you wrote related to exercise? By taking care of your health, what do you want to be around for? Who do you want to be?
• The invitation is to think about what would really make a difference for your life. This could be about exercising more or it could be about something else. You are free to choose.
• Writing exercise (5 minutes) Eulogy
• Share the epitaph
• What are some of the reasons that you exercise?

Passengers on the bus
• Introduce the metaphor and relate it to how barriers are passengers controlling the bus
• Goals are like signposts along the way, not the endpoint
• Values are an inkling that it will make a difference, not certainty that you will be healthy and live a long life – you may die in a month, how would you want to spend that time
• Idea of making this a part of your life
• Feeling good vs. being happy; enlightened self-interest

More on values
• Stepping into process, thoughts “this is going to suck” – use them to investigate whether there is something important in this moment while at the gym, not just about outcome, is there something cool about taking steps.
• Something cool about struggling for something that you want, getting an award for something you didn’t do much work for, feels weird, didn’t it mean less, isn’t it cool to have the struggle be the very meat of what’s important about this
• Not about long-term vs. short-term – immediate experience includes struggle AND sense of accomplishment, energy

Barriers to PA (Creative Hopelessness)
• Brainstorm typical reasons people don’t exercise – write on white board
• [Possible examples]
  ✓ I don’t like to sweat
  ✓ I don’t like exercise
  ✓ It will hurt
  ✓ I’m too tired
  ✓ I’m too hungry (good example of a thought to pay attention to but not use as an excuse)
  ✓ I don’t have time
• Try to draw out some particularly “sticky” thoughts related to self-stigma
  ✓ I might be embarrassed
  ✓ I don’t look good in the clothes
  ✓ People will look at me funny
  ✓ I’m not coordinated/athletic/good at it
• Most (if not all) barriers that show up are thoughts and feelings, we can address these barriers when they interfere with meaningful activities, look at what gets in the way of acting consistently with your values
• Notice that some of these painful thoughts are judgments about yourself
• Relate to Bus Metaphor

Reason-giving
• Discuss reasons as causes – while some of these reasons are real in one sense and we don’t want to give the impression of not taking them seriously or discounting that it is a real issue, they are still just that – reasons
• Is it possible to go to the gym AND feel embarrassed or tired or have a lot to do? Of course! I’m sure you can think of times when this has been the case [ask for examples]
• Pain as a special case – the more it hurts, the less active you become. How to create a vital life even with pain? How has it worked to just give in or battle the pain?
• Also notice that at times when you are focused on your values, the reasons fall away

The goal of this workshop is for you to create a more vital, workable life. This not about how to make you burn more calories, but rather how to approach your life in a more embracing, humane way.

As a sort of preview of that, we want to look at how this workshop might be helpful to you. We’re going to do a quick exercise.
[Exercise] If X was not a problem for me
Write on the board:
If weight were not such a problem for me, I would have more intimacy in my relationship(s).
If I didn’t have so much stress, I would work harder at my career, and I would try to find the job I always dreamed of having.

If ______________ weren’t such a problem for me, I would ________________.

BREAK

Programming/ Control is the problem
[Get more from them processing after each exercise. Take it slow]

Coke or Pepsi exercise

(1) Where do these thoughts come from?
• [Exercise: What are numbers?] (ACT Page 126)
• Seems a lot of this stuff gets programmed in. (ACT Page 144)
• Mary had a little…. Blondes have more…. There’s no place like…. 
• [Do with them: Notice what pops up in your head, write on notecards] :
• People think that I’m…
• The hardest thing for me to deal with is…
• The best thing about me is that I’m…
• I wish I was…
• The worst thing about me is that I’m…
• Voluntary Share- Isn’t this absurd?; What do you think about this?

(2) Can we control thoughts?
• Revisit: Don’t think of chocolate cake
• How about: Don’t think about past failures – have you tried that one? Did it work?
• How many have you struggled with urges to eat?
• Research has shown that you may be able to suppress in short-term, but it soon appears more often and with more intensity
• When you try to not think of something, you create a verbal rule: “Don’t think of X.” Problem is, that rule contains “X” in it, so it will tend to bring “X” to mind. Make sense?

(3) Can we control feelings?
• Polygraph Metaphor (ACT Page 123)
  • Discussion: How does this fit your experience?
  • What does this mean for what you’ve been struggling with?

(4) So maybe it’s the case that…
• Tie back to the Passengers on the Bus, been trying to kick them off, get in a fight with them, and yet they never really leave. And now you’ve stopped driving your bus forward toward what matters to you.
• 95% vs. 5% (ACT Page 120)

(5) Programming
• Computer Metaphor
• Who has sat down on your computer?
• Open for discussion
• What do you think about that, what does this mean to you?

Possible Discussion Points
✓ *Feelings are normal responses to life events. We can’t control whether or not they come up, or when. Think of hearing a random song on the radio that takes you back to an old memory of high school or college. What are the numbers?*
✓ *We are never going to get rid of stress, negative feelings, busyness, or even intense positive feelings. Life presents us with situations, and our thoughts/feelings/and physiological responses to these situations are natural.*
✓ *When we don’t allow ourselves to have whatever experiences we have, we get into problems. If we wait for these reasons to subside, we will never get to do what really matters.*
✓ *Cycles of avoiding or trying to control our own experience*
✓ *This creates new problems and ultimately make the initial thought, feeling, sensation, craving, exacerbated or more important*
✓ *E.g. I am tired, so I don’t exercise today, but feel more tired the next day and now have negative self-judgments to contend with in addition to more tiredness. Replaced one negative statement for another and meanwhile, no positive action.*
✓ *Motivation as a passenger – does it need to be on the bus in order to do it? Example of going to work*
✓ *Thoughts and feelings do not have to lead to action. They can be noticed for what they are. We can choose what to do based on other factors. We’ll get to that.*
✓ *Not liking exercise [for example] is a choice. Judgments about an activity are not the same as the activity itself. It is a preconceived idea of how it is going to
be. Have you hated exercising every time you have done it, including walking, playing with your kids/pets, hiking, etc.? Not trying to dispute this thought “I hate exercise” but simply to show that you don’t necessarily have to believe it. Believing it is a choice, an action. What do you imagine would happen if you gave up this thought?

[Therapist talks about own experience; story about woman who decided to like exercise, became marathoner, willingness to open up to other possibilities; Milt Glick quote]

Working with the Passengers (Acceptance)

• Now we are going to look at a different way to relate to your passengers than what you have been doing. This is a paradigm shift.
• Tug of War with a Monster metaphor – it’s like you’ve been a tug of war with these reasons, excuses, and self-judgments, hoping that eventually you will win the battle. And yet it seems that you just keep having to pull harder on that rope. What is the alternative? [Wait for responses]
• Kid at the Supermarket metaphor
• Bum at the Party metaphor
• Chinese fingertraps

Distress Tolerance (GOOYM Page 49)

• This is not about grit teeth and fight through it
• This is not about winning by holding your breath the longest. Not the outcome. Literally holding your breath is not the issue here.
• This is about a process- noticing discomfort and making room for it to be there
• Keep eyes closed – this is not a competition

Hold your breath

• Rick Brown data from Brown University: people who could sit with discomfort, in the form of holding your breath and completing a frustrating math task, were able to quit smoking. Those that couldn’t had much more difficulty quitting
• Further evidence suggests that this ability to sit with discomfort is central to a variety of problems that have been called “self-control” issues, such as weight loss.
• Notice when you get and urge, see if you can make room
• Notice any thoughts, see if you can just let them go
• Notice feelings, heart beat, see if it’s ok for that to just be there

Things to say

• Would it be ok to feel this discomfort and do nothing?
• Explore it, sink into it, notice it, not just tolerate it.

Connect to exercise - discussion

Take Your Mind to the Gym (Defusion)

• Set up: where you are before going to a workout, give “mind” brief idea of what usually gets in the way
• What to do when thoughts do get in the way – give yourself a break, this is not about doing it perfectly. Now where do you want to move next, breaking out of the cycle of failure
• We are going to do an exercise now that will help you to practice noticing your mind rather than automatically believing what it has to say.
• Notice when you start to judge the Mind, not like it, not want it – tension builds in your body, like starting to pull out of the fingertrap

BREAK – Notice your mind as you eat your snack, do what you do

Self-stigma and weight
How old is this problem? (Creative Hopelessness)
“Pick one of these thoughts or feelings that really bothers you”
• [Exercise] Write it down on your card
• Ask yourself, was this an issue for me last month? Six months ago? A year? 5 years? 10 years? 20 years?
• “Hold your hand up for how long this thought has been around”
• Exactly how old is this problem? Write it down.
• Sometimes our deepest concerns lurking in the background for years and years.
• Remember the passengers – there may be some way in the back hiding behind the seat that you would rather not hear from or look at
• Seems odd, as a species, we humans are pretty good at fixing and controlling things.
• But maybe normal methods of problem solving, fix it, get rid of it, don’t work so well with psychological stuff. Maybe that’s the case. How long have some of those things been hanging around? Check with your experience.
• **Also, if you approach yourself in a fix it way, are you really a problem that needs to be fixed?

There is a sense of burden you carry
• Because thought and emotion is so pervasive, and can turn on you at any time, we tend to have a sense of inadequacy, self-criticism
• Both in dealing with the world around you (how you have handled your weight and the people around you who you fear judgment from) and the world inside you (feel bad about yourself, and feel bad about feeling bad about yourself)
• Society is most brutal on people who are overweight.
• There are so may negative traits that people unfairly associate with weight.
• Can you name some? [get suggestions from them]/
  ➢ Lazy, ugly, incompetent, untrustworthy, blameworthy, shameful, irresponsible
• This is not about being overweight. This is something that happens for all of us because it’s in the language itself. The form it takes may be related to weight for you, but any friends or family members you have go through a similar process, the content may be different.
• How have you really dealt with that, really. Get a sense of that burden and how you deal with it.
• If you’re like most people, you try to avoid feeling and thinking a certain way, try to suppress thoughts and feelings, try to “be right” about something, or someone who wronged you, blame someone or something, argue with yourself or others

We’re going to look at how our minds bring us to this place of frequent evaluation of everything, including ourselves.

[Cross Cutting Exercise]:
Everyone gets a card.

Names example – Ever notice the associations we have with names? When you meet someone with a name of someone you really disliked? Programming, like we talked about earlier. From those names we already think we know something about what a person is going to be like.

We label people based on our programming all the time (how they talk, what they wear, purses). There are a million things that make us think we already know what a person is like. We’re going to do an exercise to notice how automatic and pervasive this process is. You won’t need to share what you write with anyone. We’d like you to go around the room and write down a positive label for each person here. It can be anything that comes up for you (give an example). (Allow time for this). Now go around the room and write down a negative label for each person here. (Again, allow time).

How does it feel to write down these labels? Do the negative and positive labels feel different, or are both unpleasant? Are any of the things you wrote down labels that you also apply to yourself? Does it feel differently when you apply those labels to yourself?

Now I’m going to ask each of you a question. Try to notice how the person who is answering changes for you as they answer.

Ask each person one question:

1. What is the hardest day you’ve ever had?
2. When was the last time you cried?
3. Who is the member of your family you are most worried about and why?
4. If there has been one moment in your life that has made everything worth it, what would it be?

What do you notice about how the people in this room are showing up for you?

Stigmatizing self and others
• How easy it is, how automatic- Constantly doing the same thing with yourself
• The difference when we see the human being show up -3D
• Notice the language process in that
• The difference when we recognize the human being WE are. Not the stupid, fat, failure, shameful, etc… The complete and whole human being
• Notice, those things you thought about others, ever think them about yourself?

Badges (Similar to ACT Page 162, but wear “content” on shirt for others to see)
You’ve probably noticed some of your programming about yourself already during this workshop. Now we are going to do an exercise that is about willingness and acceptance. Think of a word that is some of your negative programming about yourself that you buy into from time to time. A word that comes up for you about yourself that you struggle with or a word that sometimes stops you in getting something you want in your life. (Therapists give examples.) See if you can make room for these words in the same way as we talk about making room for the bum at your party.

BREAK

Values Discussion/ Committed Action
• Directions (ACT Page 209)
  ➢ Compass, Stars
• Process, not outcomes, not goals (ACT Page 209)
  ➢ Getting degree vs. continued education. The process of skiing vs. getting to lodge
  ➢ Emphasize process versus outcomes
• Not feelings
  ➢ Argyle socks (ACT Page 211)
  ➢ Like going to work. How often do you get up in the morning and NOT want to go to work, not feel like going to work, and yet how often do you seriously consider not going because you are too busy, tired, or people may judge you [insert reason here].
• Chosen, cannot be evaluated, perfect, what you use to evaluate your actions
  ➢ Why is participating in a weight loss program a “good” thing to do?

Link to self-stigma
• This is not about feeding “being a good boy or girl”, “people will like me better”, “this should be important to good people”
• This is really just for you
• Take personal ownership of what you’re doing
• Rather than having another round of getting over your thoughts and feelings

Stand and Declare (30 minutes)
• Orienting framework, this is a human thing, about more, larger patterns in our lives. We’re going to make some commitments too.
• Give context: For some, just standing up here at all might be a really big thing. Say what is there to say.
• [Structure: 1 of us goes first, 1 of us goes last. Or we both go last.]
• In the process of looking at your thoughts and feelings around yourself and your weight, is there somewhere in your life where you can see a cost. That struggling with these thoughts and feelings, or your stance towards them, has cost you something important.
• Tell the group how, what you’ve been doing, and what you’re going to do different
• [Pick someone who will do a good job first]
• [Orientering]
• Take a moment to get present. What is it like to really be seen, really see if it’s ok to make room for any discomfort that shows up, use this as a metaphor for doing this in your life after today. Sense of somehow, these people are just like me
• [Coaching]
• Underneath that, what do you really care about?
• What’s behind even that? What do you really want? What have you really been doing?
• If you feel pulled into rehearsal, that’s not what this is about. Try to stay with the exercise, the people.
Appendix B: Screening and Contact Form

Name: ________________________________ Age: ________

Gender:  Male  Female

Current Address:

_________________________________________________________________________________________________
Street name and number

City, State, Zip code

Permanent Address (if different):

_________________________________________________________________________________________________
Street name and number

City, State, Zip code

Home Phone #: ________________ Primary email: ________________

Mobile Phone #: ________________ 2nd email: ________________

Work Phone #: ________________ Employer name: ________________

Spouse or partner name: ________________ Phone #: ________________

Spouse or partner address (if different):

_________________________________________________________________________________________________
Street name and number

City, State, Zip code
## Appendix C: Measures

### Physical Measures, Breath Holding, and Fitness Battery

<table>
<thead>
<tr>
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<th>Baseline</th>
<th>Post</th>
<th>3 Month FU</th>
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<tbody>
<tr>
<td><strong>BLOOD PRESSURE</strong></td>
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<tr>
<td><strong>BREATH HOLDING (SECONDS)</strong></td>
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<tr>
<td><strong>HEIGHT (CM and INCHES)</strong></td>
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<td><strong>WEIGHT</strong></td>
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<td><strong>% BODY FAT</strong></td>
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<td><strong>MUSCLE (KG)</strong></td>
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<td><strong>BMR</strong></td>
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<td><strong>SIT TO STANDS</strong></td>
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<td><strong>BICEP CURLS</strong></td>
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<td><strong>STATIC BALANCE (SECONDS)</strong></td>
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<tr>
<td><strong>BACK SCRATCH (INCHES)</strong></td>
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Physical Activity and Nutrition Summary

First, write in the date for yesterday. Then fill in the rest of the dates for the previous six days. For each day of the past week, please indicate whether you were “in the box”, number of servings of fruits and vegetables, and the number of calories you burned with *intentional* physical activity.

<table>
<thead>
<tr>
<th>Day: Month/Date</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
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<tr>
<td>“In the box”?</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<td>V/F servings</td>
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<td>Meal replacements</td>
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<td>Calories burned?</td>
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</table>

What is your current weekly physical activity goal (in calories)? ________________
INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous and moderate activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?
   - Yes
   - No  \(\rightarrow\)  \text{Skip to PART 2: TRANSPORTATION}

The next questions are about all the physical activity you did in the last 7 days as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, heavy construction, or climbing up stairs as part of your work? Think about only those physical activities that you did for at least 10 minutes at a time.

   _____ days per week
   - No vigorous job-related physical activity  \(\rightarrow\)  \text{Skip to question 4}

3. How much time did you usually spend on one of those days doing vigorous physical activities as part of your work?
   - _____ hours per day
   - _____ minutes per day
3. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads as part of your work? Please do not include walking.

____ days per week

☐ No moderate job-related physical activity  ➔  Skip to question 6

5. How much time did you usually spend on one of those days doing moderate physical activities as part of your work?

____ hours per day
____ minutes per day

6. During the last 7 days, on how many days did you walk for at least 10 minutes at a time as part of your work? Please do not count any walking you did to travel to or from work.

____ days per week

☐ No job-related walking  ➔  Skip to PART 2: TRANSPORTATION

7. How much time did you usually spend on one of those days walking as part of your work?

____ hours per day
____ minutes per day

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?

____ days per week

☐ No traveling in a motor vehicle  ➔  Skip to question 10
9. How much time did you usually spend on one of those days traveling in a train, bus, car, tram, or other kind of motor vehicle?

______ hours per day
______ minutes per day

Now think only about the bicycling and walking you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the last 7 days, on how many days did you bicycle for at least 10 minutes at a time to go from place to place?

______ days per week

☐ No bicycling from place to place  ➔ Skip to question 12

11. How much time did you usually spend on one of those days to bicycle from place to place?

______ hours per day
______ minutes per day

12. During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place?

______ days per week

☐ No walking from place to place  ➔ Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

13. How much time did you usually spend on one of those days walking from place to place?

______ hours per day
______ minutes per day

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the last 7 days in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.
14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

   _____ days per week

   [ ] No vigorous activity in garden or yard ➔ **Skip to question 16**

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

   _____ hours per day
   _____ minutes per day

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

   _____ days per week

   [ ] No moderate activity in garden or yard ➔ **Skip to question 18**

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

   _____ hours per day
   _____ minutes per day

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

   _____ days per week

   [ ] No moderate activity inside home ➔ **Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY**

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

   _____ hours per day
   _____ minutes per day
PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the last 7 days solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?
   _____ days per week
   [] No walking in leisure time → Skip to question 22

21. How much time did you usually spend on one of those days walking in your leisure time?
   _____ hours per day
   _____ minutes per day

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?
   _____ days per week
   [] No vigorous activity in leisure time → Skip to question 24

23. How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?
   _____ hours per day
   _____ minutes per day

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?
   _____ days per week
   [] No moderate activity in leisure time → Skip to PART 5: TIME SPENT SITTING
25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

   _____ hours per day
   _____ minutes per day

**PART 5: TIME SPENT SITTING**

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

   _____ hours per day
   _____ minutes per day

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

   _____ hours per day
   _____ minutes per day
Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

0  Did not apply to me at all  
1  Applied to me to some degree, or some of the time  
2  Applied to me to a considerable degree, or a good part of time  
3  Applied to me very much, or most of the time  

<table>
<thead>
<tr>
<th>Statement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I found it hard to wind down</td>
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<tr>
<td>2 I was aware of dryness of my mouth</td>
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<tr>
<td>3 I couldn't seem to experience any positive feeling at all</td>
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<tr>
<td>4 I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)</td>
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<tr>
<td>5 I found it difficult to work up the initiative to do things</td>
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<tr>
<td>6 I tended to over-react to situations</td>
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<tr>
<td>7 I experienced trembling (eg, in the hands)</td>
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<tr>
<td>8 I felt that I was using a lot of nervous energy</td>
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<tr>
<td>9 I was worried about situations in which I might panic and make a fool of myself</td>
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<tr>
<td>10 I felt that I had nothing to look forward to</td>
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<td></td>
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<tr>
<td>11 I found myself getting agitated</td>
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<td></td>
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<tr>
<td>12 I found it difficult to relax</td>
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<tr>
<td>13 I felt down-hearted and blue</td>
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<tr>
<td>14 I was intolerant of anything that kept me from getting on with what I was doing</td>
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<tr>
<td>15 I felt I was close to panic</td>
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<tr>
<td>16 I was unable to become enthusiastic about anything</td>
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</tr>
<tr>
<td>17</td>
<td>I felt I wasn't worth much as a person</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>I felt that I was rather touchy</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>I felt scared without any good reason</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>I felt that life was meaningless</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
GHQ

We would like to know if you have had any medical complaints, and how your health has been in general, over the past few weeks. Please answer ALL questions by circling or underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past.

**Have you recently:**

1. **been able to concentrate on whatever you’re doing?**
   - 4: Better than usual
   - 3: Same as usual
   - 2: Less than usual
   - 1: Much less than usual

2. **lost much sleep over worry?**
   - 4: Not at all
   - 3: No more than usual
   - 2: Rather more than usual
   - 1: Much more than usual

3. **felt that you are playing a useful part in things?**
   - 4: More so than usual
   - 3: Same as usual
   - 2: Less useful than usual
   - 1: Much less useful

4. **felt capable of making decisions about things?**
   - 4: More so than usual
   - 3: Same as usual
   - 2: Less so than usual
   - 1: Much less capable

5. **felt constantly under strain?**
   - 4: Not at all
   - 3: No more than usual
   - 2: Rather more than usual
   - 1: Much more than usual

6. **felt you couldn’t overcome your difficulties?**
   - 4: Not at all
   - 3: No more than usual
   - 2: Rather more than usual
   - 1: Much more than usual

7. **been able to enjoy your normal day-to-day activities?**
   - 4: More so than usual
   - 3: Same as usual
   - 2: Less so than usual
   - 1: Much less than usual
(GHQ cont.)

Have you recently:

8. been able to face up to your problems?
   4 More so than usual
   3 Same as usual
   2 Less able than usual
   1 Much less able

9. been feeling unhappy and depressed?
   4 Not at all
   3 No more than usual
   2 Rather more than usual
   1 Much more than usual

10. been losing confidence in yourself?
    4 Not at all
    3 No more than usual
    2 Rather more than usual
    1 Much more than usual

11. been thinking of yourself as a worthless person?
    4 Not at all
    3 No more than usual
    2 Rather more than usual
    1 Much more than usual

12. been feeling reasonably happy, all things considered?
    4 More so than usual
    3 About same as usual
    2 Less so than usual
    1 Much less than usual
Below you will find a list of statements. Please rate how much you agree with each statement as it applies to you. Use the following scale to make your choice.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Completely disagree</td>
<td>Mostly disagree</td>
<td>Neither agree nor disagree</td>
<td>Mostly agree</td>
<td>Completely agree</td>
</tr>
</tbody>
</table>

1. I am different from people who have never had weight problems.
2. Everything that is wrong in my life is my fault.
3. I'm not as good as other people.
4. I'll always go back to being overweight.
5. There is something basically wrong with me.
6. I caused my weight problems.
7. I feel guilty because of my weight problems.
8. I became overweight because I'm a weak person.
9. I would never have any problems with weight if I were stronger.
10. I don't have enough self-control to maintain a healthy weight.
11. I'm not as competent as many of the people around me.
12. I am shameful.
13. I feel insecure about others' opinions of me.
14. People discriminate against me because I've had weight problems.
15. It's difficult for people who haven't had weight problems to relate to me.
16. People doubt my character because of my weight problems.
17. People look down on me.
18. Because of my weight problems, people expect I will be lazy.
19. Others will think I lack self-control because of my weight problems.

20. People think that I am to blame for my weight problems.

21. Others are ashamed to be around me because of my weight.

22. People do not expect me to have any talents or skills.
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.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>never true</td>
<td>very seldom true</td>
<td>seldom true</td>
<td>sometimes true</td>
<td>frequently true</td>
<td>almost always true</td>
<td>always true</td>
</tr>
</tbody>
</table>

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
AAQ-W

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following scale to make your choice.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never True</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

1. It’s OK to feel fat

2. When I have negative feelings, I use food to make myself feel better

3. I try to suppress thoughts and feelings that I don’t like about my body or weight by just not thinking them

4. I am not in control of what I eat

5. I try hard to avoid feeling bad about my weight or how I look

6. I am in control of how much physical activity I do

7. When I evaluate my weight or my appearance negatively, I am able to recognize that this is just a reaction, not an objective fact.

8. In order to eat well and do physical activity, I need to feel like it

9. I need to feel better about how I look in order to live the life I want to

10. Other people make it hard for me to accept myself

11. If I’m overweight, I can’t live the life I want to

12. If I feel unattractive, there is no point in trying to be intimate

13. If I gain weight, that means I have failed

14. I’m in control of my eating behavior

15. I don’t have what it takes to be healthy for life

16. My eating urges control me
Imagine that the following thoughts occurred to you right now. *How valid or believable would each be?* For each question, please circle a number from 1 through 7.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all believable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Completely believable</td>
</tr>
</tbody>
</table>

1  2  3  4  5  6  7  17. I need to get rid of my eating urges to eat better

1  2  3  4  5  6  7  18. I am a stable person

1  2  3  4  5  6  7  19. If I eat something bad, the whole day is a waste

1  2  3  4  5  6  7  20. I should be ashamed of my body

1  2  3  4  5  6  7  21. I need to avoid social situations where people might judge me

1  2  3  4  5  6  7  22. I will always be overweight
Physical Activity Acceptance Questionnaire (PAAQ)

Directions: below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>never true</td>
<td>very seldom true</td>
<td>seldom true</td>
<td>sometimes true</td>
<td>frequently true</td>
<td>almost always true</td>
<td>always true</td>
</tr>
<tr>
<td>1</td>
<td>I continue to exercise, even when I have the desire to stay home or do something else.</td>
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</tr>
<tr>
<td>2</td>
<td>It’s OK to experience urges to stop exercising, because I don’t have to listen to them.</td>
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<tr>
<td>3</td>
<td>It’s not necessary for me to control feelings or thoughts in order to control my physical activity.</td>
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<tr>
<td>4</td>
<td>I need to concentrate on getting rid of my urges to stop exercising or put off exercise.</td>
<td></td>
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<tr>
<td>5</td>
<td>I don’t have to stay home from the gym, even when I feel like I want to.</td>
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<tr>
<td>6</td>
<td>My thoughts and feelings about physical activity must change before I can make changes in my exercise.</td>
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<tr>
<td>7</td>
<td>Despite the thoughts I have about exercise, I am now sticking to my exercise plan.</td>
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<tr>
<td>8</td>
<td>Even if I have the desire to stop while I am exercising, I can still follow my exercise plan.</td>
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**FFMQ**

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

<table>
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<tr>
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<th>1</th>
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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>never or very rarely true</td>
<td>rarely true</td>
<td>sometimes true</td>
<td>often true</td>
<td>very often or always true</td>
</tr>
</tbody>
</table>

_____ 1. When I’m walking, I deliberately notice the sensations of my body moving.
_____ 2. I’m good at finding words to describe my feelings.
_____ 3. I criticize myself for having irrational or inappropriate emotions.
_____ 4. I perceive my feelings and emotions without having to react to them.
_____ 5. When I do things, my mind wanders off and I’m easily distracted.
_____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
_____ 7. I can easily put my beliefs, opinions, and expectations into words.
_____ 8. I don’t pay attention to what I’m doing because I’m daydreaming, worrying, or otherwise distracted.
_____ 9. I watch my feelings without getting lost in them.
_____ 10. I tell myself I shouldn’t be feeling the way I’m feeling.
_____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
_____ 12. It’s hard for me to find the words to describe what I’m thinking.
_____ 13. I am easily distracted.
_____ 14. I believe some of my thoughts are abnormal or bad and I shouldn’t think that way.
_____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
_____ 16. I have trouble thinking of the right words to express how I feel about things
_____ 17. I make judgments about whether my thoughts are good or bad.
_____ 18. I find it difficult to stay focused on what’s happening in the present.
_____ 19. When I have distressing thoughts or images, I “step back” and am aware of the thought or image without getting taken over by it.
_____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
_____ 21. In difficult situations, I can pause without immediately reacting.
_____ 22. When I have a sensation in my body, it’s difficult for me to describe it because I can’t find the right words.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>never or rarely true</td>
<td>rarely true</td>
<td>sometimes true</td>
<td>often true</td>
<td>very often or always true</td>
</tr>
</tbody>
</table>

____ 23. It seems I am “running on automatic” without much awareness of what I’m doing.
____ 24. When I have distressing thoughts or images, I feel calm soon after.
____ 25. I tell myself that I shouldn’t be thinking the way I’m thinking.
____ 26. I notice the smells and aromas of things.
____ 27. Even when I’m feeling terribly upset, I can find a way to put it into words.
____ 28. I rush through activities without being really attentive to them.
____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.
____ 30. I think some of my emotions are bad or inappropriate and I shouldn’t feel them.
____ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
____ 32. My natural tendency is to put my experiences into words.
____ 33. When I have distressing thoughts or images, I just notice them and let them go.
____ 34. I do jobs or tasks automatically without being aware of what I’m doing.
____ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.
____ 36. I pay attention to how my emotions affect my thoughts and behavior.
____ 37. I can usually describe how I feel at the moment in considerable detail.
____ 38. I find myself doing things without paying attention.
____ 39. I disapprove of myself when I have irrational ideas.
Bull’s-Eye

The Bull’s Eye dartboard is divided into four areas of values that are often seen important in people’s lives: work/education, leisure, relationships and personal growth/health. You will find the dartboard on page 2. Note! Look at the dartboard before you go on reading. Further on you will make four X:s on this dartboard to make your estimates. Don’t rush on take your time.

Part 1.
Start by trying to find out what your values base are within each of the four values areas. Think of and look at the area from outside, what it would be like in your dreams, if you had the possibility to get your wishes completely fulfilled. What are the qualities that you would like to get out of each area and what are your expectations from these certain areas of your life? Your value shall not be a concrete goal to reach but a direction that you always can develop against and that are the same through out your life. Getting married could be a goal, to be an affectionate, honest and loving partner could be a value. To accompany your son to a hockey game can be a goal, to be a present and interested parent could be a value. Note! Write your own value of each area on the empty space before you go on. It is your personal values that are important.

Work/education: ____________________________________________________________ 

Leisure: ____________________________________________________________________ 

Relationships: ________________________________________________________________ 

Personal growth/health: ________________________________________________________ 

Start from the values you have written above. Think that your value is "Bull’s Eye" (the middle of the dart board). Bull’s Eye is exactly how you want your life to be, a direct hit, where you are just the one you want to be in your life and where you get what you want from life. Make an X on the dart board in each area that best represent what your life have looked like the last two weeks within each area of value. An X in Bull’s Eye means that you are living completely in accordance with your value in that area, perfect and vital. An X far from Bulls Eye means that your activities don’t correspond to how you want it to be, that your feet are not going in your valued direction. This means that you will mark totally four X:s on the dart board in each area of value. Note! Mark your 4 X:s on the dart board on page 2 before you go on in the text.

Part 2
Now write down what stands between you and to live your life as you want to, from what you have written in your areas of value. When you think of the life you want to live and what you just described, what stops you from living just like that, to the full and vital?
Describe it on the line below.

______________________________________________________________________________
______________________________________________________________________________

Finally you will estimate to what extent the obstacles you just described rule your life and prevent you from living your life as vital as you want to. Circle one of the figures below where: 1 = don’t prevent me at all and 7 = Prevent me completely.

1 2 3 4 5 6 7

Don’t prevent me at all  Prevent me completely
My life is just as I want it to be

My life is far from how I want it to be

Work/Education

Leisure

Personal growth/Health

Relationships
R-SES

Instructions: Below is a list of statements dealing with your general feelings about yourself. If you strongly agree, circle SA. If you agree with the statement, circle A. If you disagree, circle D. If you strongly disagree, circle SD.

1. On the whole, I am satisfied with myself.
   SA   A   D   SD

2. At times, I think I am no good at all.
   SA   A   D   SD

3. I feel that I have a number of good qualities.
   SA   A   D   SD

4. I am able to do things as well as most other people.
   SA   A   D   SD

5. I feel I do not have much to be proud of.
   SA   A   D   SD

6. I certainly feel useless at times.
   SA   A   D   SD

7. I feel that I'm a person of worth, at least on an equal plane with others.
   SA   A   D   SD

8. I wish I could have more respect for myself.
   SA   A   D   SD

9. All in all, I am inclined to feel that I am a failure.
   SA   A   D   SD

10. I take a positive attitude toward myself.
    SA   A   D   SD
Feedback Form

1. Are you currently reaching your physical activity goals? YES NO

2. If so, how do you account for your success?

3. If not, what is getting in the way?

****** If you did not participate in the workshop yet, you are finished! ******

4. If you participated in the workshop, did you find it to be helpful in meeting your physical activity goals?

5. Was the workshop helpful in other ways?

6. Do you have any feedback for the researchers regarding the workshop?

7. Would you recommend this workshop to others?

1 2 3 4 5 6 7
Strongly Disagree
Strongly Agree
DTS

Think of times that you feel distressed or upset. Circle the item that best describes your beliefs about feeling distressed or upset.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Mildly Disagree</th>
<th>Agree and Disagree Equally</th>
<th>Mildly Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1. Feeling distressed or upset is unbearable to me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>2. When I feel distressed or upset, all I can think about is how bad I feel.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>3. I can’t handle feeling distressed or upset.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>4. My feelings of distress are so intense that they completely take over.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>5. There’s nothing worse than feeling distressed or upset.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>6. I can tolerate being distressed or upset as well as most people.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>7. My feelings of distress or being upset are not acceptable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>8. I’ll do anything to avoid feeling distressed or upset.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>9. Other people seem to be able to tolerate feeling distressed or upset better than I can.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>10. Being distressed or upset is always a major ordeal for me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>11. I am ashamed of myself when I feel distressed or upset.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>12. My feelings of distress or being upset scare me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>13. I’ll do anything to stop feeling distressed or upset.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>14. When I feel distressed or upset, I must do something about it immediately.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>15. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.</td>
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</tbody>
</table>

Strongly Disagree | Mildly Disagree | Agree and Disagree Equally | Mildly Agree | Strongly Agree |
The Motivation of Physical Activity Measure (MPAM-R)

The following is a list of reasons people engage in physical activity, sports and exercise. Keeping in mind your primary physical activity at the gym, rate each reason on the basis of how true that response is for you.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>not at all true for me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>very true for me</td>
</tr>
<tr>
<td>1</td>
<td>I want to be physically fit.</td>
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<tr>
<td>2</td>
<td>It's fun.</td>
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<tr>
<td>3</td>
<td>I like engaging in activities that physically challenge me.</td>
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<tr>
<td>4</td>
<td>I want to acquire new skills.</td>
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<tr>
<td>5</td>
<td>I want to lose or maintain weight so that I’ll look better.</td>
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<tr>
<td>6</td>
<td>I want to be with my friends.</td>
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<tr>
<td>7</td>
<td>I like to do this activity.</td>
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<tr>
<td>8</td>
<td>I want to improve my existing skills.</td>
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<tr>
<td>9</td>
<td>I like the challenge.</td>
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<tr>
<td>10</td>
<td>I want to define my muscles so that I’ll look better.</td>
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<tr>
<td>11</td>
<td>It makes me happy.</td>
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<tr>
<td>12</td>
<td>I want to keep up my current skill level.</td>
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<tr>
<td>13</td>
<td>I want to have more energy.</td>
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<tr>
<td>14</td>
<td>I like activities that are physically challenging.</td>
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<tr>
<td>15</td>
<td>I like to be with others who are interested in this activity.</td>
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<tr>
<td>16</td>
<td>I want to improve my cardiovascular fitness.</td>
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<tr>
<td>17</td>
<td>I want to improve my appearance.</td>
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<tr>
<td>18</td>
<td>I think it's interesting.</td>
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<tr>
<td>19</td>
<td>I want to maintain my physical strength to live a healthy life.</td>
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<tr>
<td>20</td>
<td>I want to be attractive to others.</td>
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<tr>
<td>21</td>
<td>I want to meet new people.</td>
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<tr>
<td>22</td>
<td>I really enjoy this activity.</td>
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<tr>
<td>23</td>
<td>I want to maintain my physical health and well-being.</td>
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<tr>
<td>24</td>
<td>I want to improve my body shape.</td>
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<tr>
<td>25</td>
<td>I want to get better at my activity.</td>
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<tr>
<td>26</td>
<td>I find this activity stimulating.</td>
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<tr>
<td>27</td>
<td>I will feel physically unattractive if I don’t.</td>
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<tr>
<td>28</td>
<td>My friends want me to.</td>
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<tr>
<td>29</td>
<td>I like the excitement of participation.</td>
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<tr>
<td>30</td>
<td>I enjoy spending time with others doing this activity.</td>
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</tbody>
</table>