

## A Pilot Study of Acceptance and Commitment Therapy for Promotion of Physical Activity

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**Background:** Acceptance and commitment therapy (ACT) appears to have some promise as a method of promoting physical activity. **Method:** This pilot study evaluated the short-term effectiveness of a brief, physical-activity-focused ACT intervention. Young adult, female participants were randomly assigned to an Education (n = 19) or ACT (n = 35) intervention. Both interventions consisted of 2, 2-hour group sessions. ACT sessions taught skills for mindfulness, values clarification, and willingness to experience distress in the service of behavior change. **Results:** Of the intervention completers, ACT participants increased their level of physical activity significantly more than Education participants. **Conclusions:** The results indicate that ACT approaches have the potential to promote short-term increases in physical activity.

**Keywords:** physical activity, exercise, psychology, behavioral science

Regular physical activity aids in the prevention of many diseases and conditions.<sup>1</sup> However, only 25% of adults in the U.S. report engaging in the recommended amount of physical activity.<sup>2</sup> Interventions that use behavior modification strategies have promise for increasing physical activity but short-term effects are modest and maintenance of change is limited.<sup>3,4</sup> Innovations on traditional behavioral strategies and theory are needed to develop more effective programs.

There is a paucity of research about what makes physical activity a difficult behavior to engage in for so many adults. Experimental research designed to promote physical activity might provide additional information about behavioral mechanisms of change. One theoretical approach suggests that interventions might be improved by recognizing that erosion of commitment and the unwillingness to experience distressing internal experiences may play an important role in the difficulty of adhering to physical activity regimens. Research has shown that individuals vary in the extent to which they are open to or accept unpleasant experiences versus feel driven to diminish them psychologically (eg, via suppression) or behaviorally (eg, by performing an action likely to produce change in the experience, such as discontinuing an unpleasant exercise), and linking experiential avoidance with a range of maladaptation.<sup>5</sup> Strong links between activity intensity, perceived aversiveness and choices made in regard to physical activity also have been demonstrated.<sup>6</sup> In sum, an innovative intervention could (a) bolster participants' commitment to behavior change,

(b) build willingness for a range of internal experiences, and (c) promote mindful awareness of physical activity behaviors.

Such innovations are well-represented within newer models of behavior therapies that incorporate principles of mindfulness, experiential awareness, acceptance of distressing internal experiences, and willingness to tolerate distress in the service of valued behavior change. Of these new models of acceptance- and mindfulness-based therapies, Acceptance and Commitment Therapy<sup>7</sup> (ACT) has received the most attention and empirical support.<sup>5</sup> The goal of ACT is to experience internal events fully and without judgment to increase value-driven behaviors.<sup>7</sup> ACT uses a variety of metaphors and experiential exercises to increase awareness and acceptance of unwanted thoughts, feelings, and sensations to foster willingness to experience such internal experiences without trying to change or eliminate them.

There are several reasons why acceptance-based strategies could promote adherence to physical activity goals. First, acceptance-based strategies, and ACT in particular, are designed to facilitate the identification and internalization of values and lasting commitment to behavior consistent with these values, and thus should act against the waning of commitment generally observed among participants in physical activity interventions. Second, acceptance-based strategies focus on increasing the willingness to experience a range of internal phenomena, including those that are aversive. This willingness is hypothesized to be a prerequisite to compliance with physical activity prescriptions. Traditional methods of behavior therapy are based on attempts to control and reduce unpleasant internal states. However, analog and experimental studies have suggested that efforts to directly control internal experiences are often

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ineffective<sup>8,9</sup> and that we have a limited capacity for self-control, such that the ability to control or override thoughts, emotions, urges, and behaviors is impaired by prior exertion of self-control.<sup>10</sup> Acceptance-based strategies may counteract the paradoxical effects of cognitive control and the limited capacity for self-control by promoting experiential acceptance. A core strategy for promoting experiential acceptance is *defusion*, wherein a stepping back or psychological distance is achieved from internal experiences to the extent that the person having thoughts, feelings and sensations recognizes them as merely phenomena created and experienced by the mind in that instant rather than as a “truth.” Analog laboratory studies and mediational analyses of outcome studies suggest that acceptance-based strategies are effective at promoting adaptive behavior.<sup>11–13</sup> Finally, acceptance-based interventions have been effective in increasing adherence to other health-related behaviors, including smoking cessation,<sup>11</sup> self-management of diabetes,<sup>14</sup> and weight loss.<sup>15</sup> Results from these studies and many others<sup>13,16–18</sup> strongly suggest that acceptance-based interventions are able to improve levels of distress tolerance and commitment and that these changes, in turn, help produce superior treatment outcomes.

The primary aim of this study was to collect preliminary information about the effectiveness of an ACT intervention for promoting physical activity in the short-term. Participants were randomly assigned to an intervention that taught ACT skills or provided educational information on physical activity. The study was designed to test the hypothesis that ACT participants would demonstrate greater increases in physical activity than those in the comparison group during an 8-week data collection period.

## Method

### Participants

Female students were eligible if they were between 18 and 35 years old, were not undergraduate freshman, were not a member of a varsity or club sport team, and could safely engage in physical activity. The study was limited to female participants because college students often report feeling more comfortable discussing physical activity in a same-sex, rather than coeducation group. Participants were recruited by flyers on campus and messages to university listservs that targeted students who wanted to increase their physical activity but were concerned that doing so would be difficult. All participants agreed to use Drexel’s Athletic Center for engaging in physical activity for the duration of the study. Fifty-four female students were randomized for this study. The average age of participants was 23.1 years ( $SD = 3.8$ ). Participants reported their race as Caucasian (57.2%), African American (7.4%), Hispanic (1.9%), Asian (13.0%), Native American (1.9%), and Other (18.6%). The mean measured body mass index (BMI) at baseline was 25.1 ( $SD = 5.6$ ). (BMI was not considered as a criterion for inclusion in the study,

as physical activity was expected to be of potential benefit to any young adult, regardless of weight status. Weight control was not directly addressed by any intervention content.) The average number of athletic facility visits per week at baseline was 1.0 ( $SD = 1.3$ ).

### Procedure

The Drexel University institutional review board approved the study. After providing informed consent and being assigned to group clusters, participants were randomly assigned to either the Education or ACT condition. All participants attended 2, 2-hour group sessions, held 2 weeks apart. Groups ranged in size from 8 to 15 participants and were led by an advanced graduate student and a clinical psychologist. Given resource limitations which restricted the number of participants and a desire to prioritize data collection from the novel intervention, participants were randomly assigned to ACT and Education using a 2:1 ratio.

The Education intervention provided information about safely engaging in physical activity. Participants discussed the benefits of flexibility, strength, and aerobic activity and learned about how to incorporate those types of activities into their workouts. Participants brainstormed and discussed the benefits of each type of activity and compiled a list of ways to engage in that activity. Participants were taught how to measure improvement in their physical activity. Group leaders provided information about injury prevention, appropriate nutrition for physical activity, and exercise attire and footwear. Participants also engaged in a group activity designed to dispel common physical activity myths. Materials for the sessions were derived, in part, from guidelines provided by the American College of Sports Medicine.<sup>19</sup>

The ACT intervention was designed to help participants develop willingness skills, become more mindful, distance themselves (defuse) from distressing thoughts about exercise, and strengthen their commitment to exercise-related values. To increase willingness to experience aversive internal states, participants were encouraged to recognize that distress associated with physical activity (eg, fatigue, physical discomfort, urges to stop) generally cannot be suppressed or controlled, and, in fact, attempts to control these experiences are often counterproductive.

Experiential and metaphorical exercises were used to maximize engagement and understanding. For example, to illustrate the severe limitation on our ability to control internal experiences, participants were asked to imagine a scenario in which “the world’s best polygraph machine” was wired to a gun that would fire at them if their anxiety increased beyond a certain level. Mindfulness was taught, in part, by means of another visualization exercise (ie, imagining that one is sitting on a riverbank watching leaves floating down a stream and letting each leaf represent a different thought, feeling, or sensation). Participants practiced defusing from their internal experiences by sitting in a chair and holding their legs parallel to the floor while experiencing, yet stepping

back from, the fatigue and discomfort that accompany this strenuous exercise.

Consistent with principles of ACT (7) and intrinsic motivation theory,<sup>20</sup> the intervention emphasized that participants must engage in behaviors that are consistent with their freely chosen, personal life values (eg, health). Accordingly, participants were asked to reflect on the reasons why increasing their physical activity was important to them (common responses included improved health, weight management, stress relief, increased energy, etc.). Participants were helped to appreciate that commitment to difficult behavioral goals, especially those that involve sustained exposure to unpleasant experiential states, is only likely to be enacted when one connects psychologically with life values important enough and meaningful enough to make such effort and sacrifice worthwhile. To highlight this point, participants were asked to reflect on the areas of their lives in which they already were engaging in valued behaviors despite the short-term discomfort that might result from those behaviors.

## Measures

Assessments were conducted baseline (Week 1), postintervention (Week 5) and follow-up (Week 8). The intervention sessions were conducted during Weeks 2 and 4. Participants were provided with compensation for completing postintervention and follow-up assessments (\$10 at each).

**Athletic Center Visits.** The primary outcome was the number of days per week that participants entered the athletic center. All individuals who enter the athletic center must swipe their identification card for entry. Entry data were captured electronically. This information was available for all participants through follow-up, regardless of their completion of other measures.

**Mindful Awareness.** The Philadelphia Mindfulness Scale<sup>21</sup> (PHLMS) is a self-report measure assessing level of mindfulness as defined by its 2 key constituents, present-moment awareness and nonjudgmental acceptance. Items are rated on a 5-point Likert scale according to the frequency that the item was experienced within the past week. Exploratory and confirmatory factor analyses support the 2-factor structure. Good internal consistency was demonstrated in both clinical (Cronbach's  $\alpha = .75$  in both subscales) and nonclinical (Cronbach's  $\alpha_{\text{Awareness}} = 0.75$ ,  $\alpha_{\text{Acceptance}} = .82$ ) samples,<sup>21</sup> as well as in our sample (Cronbach's  $\alpha_{\text{Awareness}} = .85$ ,  $\alpha_{\text{Acceptance}} = .86$ ). Higher scores indicate greater mindfulness.

**Defusion From Negative Internal Experiences.** The Drexel Defusion Scale<sup>22</sup> is a 10-item scale that assesses the degree of psychological distance from various negative thoughts and feelings. Items are rated on a 6-point Likert scale according to the extent to which one is typically able to defuse from each type of internal experience. The DDS has been shown to have adequate internal consistency (Cronbach's  $\alpha = .83$ ;<sup>23</sup>  $\alpha$  for our sample =

.84). Higher scores indicate greater ability to defuse from internal experiences.

**Physical Activity Experiential Acceptance.** To assess experiential acceptance of exercise-related internal experiences, we adapted the Chronic Pain Acceptance Questionnaire for this study<sup>23</sup> (CPAQ). The CPAQ is a 20-item measure assessing acceptance of chronic pain, and has been shown to have adequate internal consistency (Cronbach's  $\alpha = 0.78$ <sup>23</sup>). Our modified version ( $\alpha$  for this sample = .79), referred to as the Physical Activity Acceptance and Action Questionnaire (PAAAQ) contains 8 items (eg, "It's okay to experience urges to stop exercising, because I don't have to listen to them,") which are rated on a 7-point Likert scale. Higher scores indicate greater acceptance of internal barriers to exercise.

## Results

Participants were randomly assigned with a 1:2 ratio to either the Education ( $n = 19$ ) or ACT condition ( $n = 35$ ). Eighty-five percent of participants attended both intervention sessions; the intervention completion rate did not significantly differ between conditions (18 of 19 Education participants and 28 of 35 ACT participants;  $\chi^2 = 3.9$ ,  $P = .11$ ). Except where noted, only participants who completed the intervention were included in data analyses. ACT and Education conditions were equivalent ( $P > .05$ ) on all at baseline variables with the exception of age (mean = 22.2 and 24.3 years, respectively). As a precaution, all outcome analyses were repeated with age as a covariate, and results were unchanged.

A mixed model, repeated measure analysis of variance (ANOVA) was conducted to examine baseline, postintervention, and follow-up athletic facility visits between groups. Both the Time ( $F(1, 42) = 30.80$ ,  $P < .01$ ,  $\eta^2 = .62$ ) and the Time by Group interaction ( $F(1, 42) = 3.90$ ,  $P = .05$ ,  $\eta^2 = .15$ ) were significant for a quadratic function (see Table 1 and Figure 1). The interaction effect was, specifically, that the ACT group, relative to the Education group, evidenced a larger increase in DAC visits between baseline and postintervention ( $F(1, 42) = 7.33$ ,  $P < .01$ ,  $\eta^2 = .15$ ). Between baseline and follow-up, this difference was trending toward significance ( $F(1, 42) = 2.91$ ,  $P = .09$ ,  $\eta^2 = .07$ ). Postintervention to follow-up Time by Group interactions were not significant ( $F(1, 42) = .68$ ,  $P = .46$ ,  $\eta^2 = .01$ ).

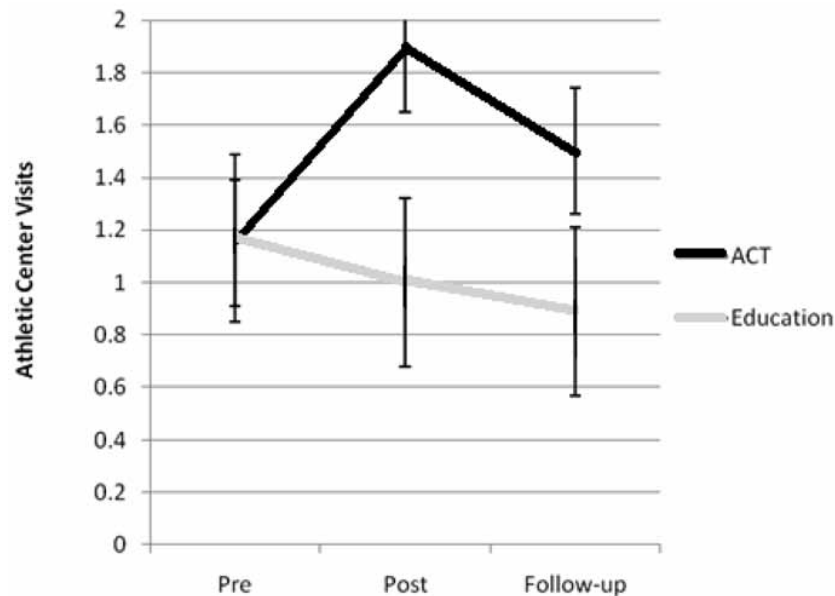
We also conducted intention-to-treat analyses that included participants who attended only 1 session. A generally equivalent set of results was obtained. A marginally significant quadratic function ( $F(1, 50) = 2.79$ ,  $P = .06$ ,  $\eta^2 = .05$ ) was observed. The increase in athletic facility visits for ACT participants was significantly greater than that for Education participants from baseline to postintervention ( $F(1, 50) = 5.3$ ,  $P < .05$ ,  $\eta^2 = .09$ ). When examined from baseline to follow-up, this difference was no longer significant ( $F(1, 50) = 2.34$ ,  $P = .11$ ,  $\eta^2 = .05$ ).

To examine changes in process variables between baseline and postintervention, a 2 (time) by 2 (group)

**Table 1 Effect of Time and Treatment Group on Outcome**

	Baseline			Post-intervention			Follow-up			Main effect (time)			Interaction effect (time by group)					
	Education		ACT	Education		ACT	Education		ACT	F	P	Partial $\eta^2$	F	P	Partial $\eta^2$			
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	F	P	F	P	Partial $\eta^2$			
DAC visit	1.17	0.32	1.15	0.27	1.00	0.27	1.89	0.27	0.89	0.35	1.50	2.94	30.78	<.01	0.62	3.90	<.05	0.15
PAAAQ	30.16	1.68	29.88	1.45	32.33	1.78	34.84	1.78	32.55	8.31	35.35	8.15	12.99	<.01	0.24	1.99	>.05	0.05
DDS	3.56	0.18	3.50	0.15	3.48	0.16	3.77	0.16	3.74	0.73	3.73	1.03	0.72	>.05	0.02	4.22	<.05	0.09
PHLMS: Aware	37.56	1.50	35.15	1.41	36.38	1.20	32.80	1.20	35.00	8.39	35.45	6.98	4.25	<.05	0.09	0.42	>.05	0.01

Abbreviations: DAC visit, number of visits per week to campus athletic center; PAAAQ, Physical Activity Acceptance and Action Questionnaire; DDS, Drexel Defusion Scale; PHLMS: Aware, Philadelphia Mindfulness Scale—Awareness Subscale; SE, standard error; ACT, acceptance and commitment therapy.



**Figure 1** — Mean visits to the Athletic Center per week at Baseline (Week 1), Post-Intervention (Week 5), and Follow-Up (Week 8).

repeated measures multivariate analysis of variance (MANOVA) was performed with PAAQ, PHLMS subscales, and DDS as dependent variables. Omnibus results indicated a significant time  $\times$  group effect ( $F(1, 41) = 38.0, P < .05, \eta^2 = .28$ ). Follow-up analyses revealed that PAAQ and the awareness subscale of the PHLMS significantly increased between baseline and postintervention for both groups, but that group membership did not moderate this effect. However, the time by group interaction was significant in the case of DDS. Specifically, DDS increased among ACT participants, but decreased among Education group participants (Table 1).

## Discussion

Promoting physical activity is an important public health priority. This study evaluated the short-term effectiveness of an analog intervention designed to teach skills and strategies drawn from ACT for the purpose of facilitating physical activity. Young women who participated in a 4-hour ACT intervention increased their physical activity significantly, and the increase in their level of physical activity was significantly greater than that achieved by participants who received an educational intervention.

The ACT intervention targeted skills in a number of areas we postulated would be related to willingness to engage in physical activity [ie, mindful awareness of values and behavior, acceptance of aversive internal experience (tired, hot, bored) and psychologically “stepping back” from experience (defusion)]. As expected, participants in the ACT group evidenced gains in measures

of these 3 variables. Moreover, in the case of defusion, an interaction was observed in that ACT participants increased whereas Education participants decreased from baseline to postintervention. Interactions were not observed in the other variables. These results may indicate that defusion is a particularly effective technique for use in brief exercise interventions. Distancing oneself from internal thoughts and feelings makes it less likely that a person will automatically act on them. For example, if someone has the thought “I can’t exercise today,” they will react to it differently if it is experienced as a “truth” than if as a thought created by the mind. In this way, defusion may be effective for increasing exercise frequency because it allows people to engage in valued behaviors even when they engender uncomfortable thoughts and feelings.

The increase in physical activity that ACT participants achieved remained marginally significant at follow-up, indicating that some of the benefits of the intervention were maintained after the intervention ended. The evidence for maintenance was not as strong for participants who only attended 1 of 2 intervention sessions, which suggests that a minimal dosage may be necessary and that increasing the intensity, length, or frequency of intervention contacts may result in greater maintenance of change. This is not unexpected, given the analog nature of this study and the brevity of the intervention. Intervention contact was limited to 4 hours and the follow-up period was brief because, as the first step in this line of research, the aim of this pilot study was to determine if there was sufficient promise to conduct a more resource-intensive



study. Additional research is necessary to determine the clinical significance of intervention effects when participants have greater treatment contact. However, it is worth noting that ACT participants effectively doubled (from 1 to 2 visits per week) their physical activity from baseline to postintervention. If this change could be sustained, it could have clinically significant physical and/or mental health benefits. This pilot study demonstrates that an ACT intervention has positive, short-term effects on physical activity, and findings clearly warrant additional research. A larger sample and additional intervention contact should be used to attempt to replicate these effects. Additional work should also be directed toward determining whether intensifying the intervention would produce effects that are maintained over the long-term. An ACT intervention could also be tested with other populations; in this study, it targeted healthy young adults who wanted to increase their physical activity but worried that it would be challenging to do so. The intervention might be effective with other populations as well, such as overweight or obese adults who are sedentary and would like to increase physical activity for weight control. This intervention also could be further developed as part of an obesity prevention program, given the importance of physical activity in preventing weight gain. Innovative approaches to obesity prevention are needed, and the use of ACT for physical activity promotion has promise for meeting that need.

Overall, this study supports previous research which indicates that ACT strategies may be a useful addition to current treatments for obesity.<sup>15,24,25</sup> Taken together, these studies demonstrate that acceptance based treatments have been effective in promoting weight loss and physical activity, and in coping with cravings for high calorie food. Theoretically, given the emphasis on distress tolerance and on acceptance of unpleasant urges and feelings, ACT appears to be a good fit for weight loss treatment, both by helping participants to maintain a low calorie diet and to increase physical activity. However, given that the work on ACT and obesity-related issues is primarily based on analog or pilot studies, treatment studies comparing ACT to current gold standards in the treatment of obesity are needed.

The conclusions of this study are tempered by some limitations. The sample size was small and in some respects homogenous: all participants were young women who were enrolled as undergraduate or graduate students at the same university. There was inadequate statistical power to conduct meditational analyses of behavior change. The follow-up period was short (3 weeks) so it is unknown how the effects were maintained beyond that period. The measures also were somewhat limited: it is possible that participants did not follow the instructions to use the athletic center as the sole means of physical activity during the study period. It also is unknown how long participants engaged in exercise once they arrived at the athletic center. On the other hand, the use of objective card swipe data was a study strength, as subjective, self-report measures of physical activity are flawed. The

use of a credible control condition is another strength of this study.

Taken as a whole, current study supports previous research indicating that ACT can promote short-term change in health-promoting behaviors. The results indicate that for young women, learning skills such as mindfulness, defusion, and willingness through a brief intervention can promote short-term increases in physical activity.

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