

8-2005

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Katie S. Moran

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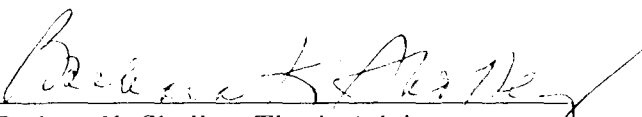
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A cognitive intervention to increase the salience of intrinsic thoughts associated with exercise. Katie S. Moran, Master of Arts in Psychology, University of Richmond, 2005,
Thesis director: Barbara K. Sholley, Ph.D

A four-week cognitive intervention was created to increase the salience of intrinsic thoughts associated with exercise in moderately extrinsic exercisers. Participants were assigned to either an intervention or control condition. Those in the intervention condition were asked to respond to questions concerning the pleasure, enjoyment and/or satisfaction experienced during or after their exercise regimen each week. Results showed a marginally significant two-way interaction ($p = .059$) between the control and intervention condition over time. Those in the intervention condition showed a greater increase in intrinsic motivation than those in the control condition. These results, while only marginally significant, were in the hypothesized direction. Thus, the hypothesis that it may be possible to augment motivations to exercise through the use of cognitive techniques, by focusing on the inherent pleasure that can be derived from exercise, was partially supported. Study limitations and suggestions for future research are discussed.

I certify that I have read this thesis and find that, in scope and quality, it satisfies the requirements for the degree of Master of Arts.


Barbara K. Sholley, Thesis Advisor


Kenneth Abrams, Thesis Advisor


Catherine Bagwell, Thesis Advisor

A COGNITIVE INTERVENTION TO INCREASE THE SALIENCE OF INTRINSIC
THOUGHTS ASSOCIATED WITH EXERCISE

By

KATIE S. MORAN

B.A., Syracuse University, 1999

A Thesis

Submitted to the Graduate Faculty

of the University of Richmond

in Candidacy

for the degree of

MASTER OF ARTS

in

Psychology

August, 2005

Richmond, Virginia

Acknowledgements

Thank you Dr. Barbara Sholley, for your tremendous confidence in my abilities over the past two years. You have challenged me from day one, encouraged me to think independently, and have been supportive every step of the way.

Dr. Catherine Bagwell, thank you for your guidance and positive outlook throughout this process. I have been inspired by your talent as a teacher and your sincere interest in the success of your students.

To Dr. Kenneth Abrams, thank you for your commitment to making this thesis the best it could be. I sincerely appreciate your advice throughout the year.

To Martha Beitner, many thanks for your willingness to listen, to provide encouragement, and a good laugh over the past two years.

Thank you to the Graduate School of Arts and Sciences for providing me with a research grant to successfully carry out this research.

To my parents, Gerry and Paula Moran, and my brother Greg for having a never-ending supply of encouragement and confidence in my success in this program. You have always been my biggest fans and I am so grateful for your love and support.

And to Paul Vincent, for having incredible patience with me as I went through this process, for always having an open ear and an open heart, and of course for always finding a way to lighten me up.

A cognitive intervention to increase the salience of intrinsic thoughts associated with exercise.

People of all ages and gender can benefit physically and psychologically from regular physical activity. Physical activity can reduce the risk of cardiovascular mortality, coronary heart disease, obesity, hypertension, breast and colon cancer, and diabetes mellitus (ACSM, 2000). In addition, physical activity may improve mental health. Benefits may include a decrease in anxiety and depression, enhanced feelings of well-being, and improved performance of work (ACSM, 2000). The effects of exercise on psychological well-being have been widely researched. Exercise, especially aerobic exercise, has also been found to enhance self-concept (Alfermann & Stoll, 2000) and self-esteem (Asci, Kin, & Kosar, 1998). Weight training, in particular, has been found to have the greatest positive, short-term effect on self-esteem (Fox, 2000).

While many individuals recognize that exercise can play an important role in health, most American adults do not get regular physical activity. The American College of Sports Medicine (ACSM) estimates that more than 60% of Americans are not regularly physically active, and 25% are not active at all (ACSM, 2000). Even among those who do make an effort to begin an exercise program, the dropout rates can range from 9% to 87%. These dropout rates are usually highest in the first three months of starting a program. Approximately 50% of adults will have dropped out within one year of becoming physically active. The reasons for this dramatic dropout rate can range from program factors, such as excessive cost or exercising alone, to logistical factors,

including inclement weather or extensive job travel, to personal factors including anxiety or poor self-motivation.

As a result, the goal of many exercise and health professionals is to find ways to reduce the dropout rate and increase individuals' amount, frequency, and intensity of physical activity. Exercise and sport psychologists as well as health-promotion researchers have focused a substantial amount of research towards exercise program commencement and adherence to programs.

Self-determination theory (Deci & Ryan, 1985) is a frequent focus of research on exercise motivation. According to Deci and Ryan, self-determination is “a quality of human functioning that involves the experiences of choice, in other words, the experience of an internal perceived locus of causality” (p. 38). In 2000, Ryan and Deci defined self-determination theory further by explaining that extrinsic motivation refers to doing an activity in order to attain some external outcome. In contrast, intrinsic motivation refers to the performance of an activity for the inherent satisfaction of doing it. Similarly, Mullan and Markland (1997) wrote, “intrinsically motivated behaviors are free from pressures and external controls, are accompanied by interest and enjoyment, and are completely self-determined. Externally motivated behaviors, on the other hand, are determined largely by pressures and controls (either internally or externally imposed), are undertaken essentially for reasons other than intrinsic interest in the activity itself, and can range from being somewhat self-determined to being completely non-self-determined” (p. 350). The innate psychological needs for autonomy, competence, and relatedness underlie self-determination theory. Ryan and Deci suggest there are strong

links between the need for autonomy and the need for competence with intrinsic motivation. Some data also suggest that relatedness might also be important to intrinsic motivation. Essentially, if an individual is able to meet the innate psychological needs for competence, autonomy, and relatedness, they will be intrinsically motivated (Ingledeu, Markland, & Sheppard, 2004).

Applications of self-determination theory include education, organizational settings, and sport and exercise. According to Deci and Ryan (1985) intrinsic motivation in the classroom can be seen when students' natural curiosity and interests stimulate learning. Students who tend to be intrinsically motivated to learn have a higher quality learning experience and enhanced self-esteem. Deci and Ryan have summarized research that revealed significant correlations between intrinsic motivation and achievement, and negative correlations between intrinsic motivation and anxiety. In another study, participants were either rewarded or not rewarded for a learning activity. The possibility of receiving extrinsic rewards, such as money, actually distracted participants from learning and increased the time necessary to solve problems. Deci and Ryan (1985) also proposed that self-determination should be a central component of organizations. They suggested that because creativity, independence, and flexibility have become increasingly important in the workplace, more value has been placed on self-determined motivation. They noted several management theories that promoted personal autonomy, and therefore were inherently intrinsically motivating. Also, the type of reward structures within organizations has been shown to be important to intrinsic motivation. When rewards, especially competition-based rewards, are used to motivate people, it is likely they will

negatively affect people's intrinsic motivations. However, if rewards are appropriately linked to job performance and are given with specific positive feedback, they can be important components of a productive and satisfied workforce.

Most relevant to the current study, self-determination theory with regard to exercise states that individuals exercise for extrinsic or intrinsic reasons, or regulations. Those who are intrinsically motivated to exercise engage in exercise in the absence of extrinsic rewards. Markland (1999) found that intrinsically motivated individuals take part in exercise primarily for the enjoyment and satisfaction gained from the participation itself. These extrinsic and intrinsic regulations can be displayed on a continuum from external regulations to introjected to identified, and finally to intrinsic regulations (see Figure 1). If an individual were more inclined to exercise for external reasons, they would tend to agree strongly with the statement, "I exercise because other people say I should." Those who might fall on the introjected category would respond positively to the statement, "I feel like a failure if I don't exercise." These two regulations are considered extrinsically-motivated because an individual's exercise behavior is determined largely by pressures and controls imposed by others. Although there may not be direct external pressure from another person, as in the case of feelings of guilt, the exerciser is still being regulated by a feeling that is caused by external stressors (Mullan & Markland, 1997). Alternatively, identified and intrinsic regulations are considered to be more intrinsically motivating because they are largely free from external demands. Those who tend to agree mostly with the statement, "I exercise to stay healthy" would be part of the identified category. And those exercising for mostly intrinsic regulations

would support the statement, “I exercise because I enjoy it.” These definitions have been incorporated into a scale to measure motivation to exercise. This scale, the Behavioral Regulation in Exercise Scale (BREQ; Mullan, Markland, & Ingledew, 1997), has been used in several studies (Ingledew, Markland, & Sheppard, 2004; Wilson, Rodgers, Blanchard, & Gessell, 2003; Wilson, Rodgers, & Fraser, 2002), and was used in the current study.

It has been shown that exercising for intrinsically motivated reasons is more desirable for several reasons. First, those who exercise for more intrinsically motivated reasons are more likely to enjoy their experiences. This enjoyment may lead to increased frequency of exercise per week (Frederick & Ryan, 1993). A relationship was found between self-determination and psychological well-being (Maltby and Day, 2001). The researchers split participants into two groups: those who had been exercising for more than six months and those who exercised less than six months. Participants completed a measure of exercise motivation, the Exercise Motivations Inventory 2 (EMI-2; Markland & Ingledew, 1997 as cited in Maltby & Day). In addition, participants completed the self-esteem subscale of the Self-Description Questionnaire III (SDQIII; Marsh, 1990) to measure self-esteem, Goldberg and Williams’ (1991) General Health Questionnaire to measure psychological well-being, and the Hassles Scale from the Hassles and Uplifts Scale (Lazarus & Folkman, 1989) to measure eight aspects of stress. Those participants who displayed intrinsic motives to exercise were found to have lower scores on anxiety, social dysfunction, and depression when compared with those who were more extrinsically motivated.

Additionally, Maltby and Day (2001) found that individuals who had been exercising for more than six months scored significantly higher on measures of stress management, enjoyment, and challenge exercise motives than those who had been exercising for less than six months. Furthermore, those exercising for less than six months scored significantly higher on measures of social recognition, affiliation, and competition motives: all considered to be extrinsic exercise motives. These findings may have important implications for the early dropout rate in an exercise program. If new exercisers do not find enjoyment in their exercise program, and exercise out of obligation, it would seem sensible that they would withdraw from the program.

Also interesting was Maltby and Day's (2001) finding that for those individuals who had been exercising for less than six months, higher scores on extrinsic exercise motives were accompanied by higher scores on somatic symptoms, depression, anxiety, and social dysfunction. These findings, while correlational in nature, highlight the importance of intrinsic exercise motives for both maintaining an exercise program and enhancing psychological well-being. The researchers suggest that exercise motives and psychological well-being interact through the reinforcement of positive feelings; and therefore, exercise becomes more rewarding.

Intrinsic motivations to exercise may also be related to positive physical self-esteem. Wilson and Rodgers (2002) found that identified and intrinsic regulations for exercise were positively correlated with physical self-esteem in physically active females. They infer from these findings that women who value the health benefits associated with exercise or find exercise itself pleasurable are likely to have higher physical self-esteem.

Similar findings by Boyd, Weinmann, and Yin (2002) demonstrated that physical self-perceptions of competence for exercise were a strong correlate of intrinsic motivation for exercise.

Frequency of exercise can also be associated with motivation to exercise. Li (1999) found individuals who tended to exercise frequently displayed higher levels of integrated regulation and identified regulation, as well as intrinsic motivations to learn and experience sensations. These findings imply that frequent exercisers are more self-determined in their exercise behavior than non-frequent exercisers.

Motivations to exercise are not stagnant. Markland and Ingledew (1997, as cited in Maltby & Day, 2001) used aspects of self-determination theory to reason that, “individuals who have extrinsic motives for beginning to exercise may eventually develop intrinsic motivations to exercise over time because these motives have become internalized” (p. 652). Ryan, Frederick, Lipes, Rubio, and Sheldon (1997) provided additional support for this concept. They found that extrinsic motives could predict short-term adherence to exercise, while intrinsic motives were predictive of long-term use of a fitness center. Wilson, Rodgers, Blanchard, and Gessell (2003) found that perceptions of exercise competence and relatedness, as well as identified and intrinsic regulations, increased significantly over a 12-week prescribed exercise program.

Just as exercise motivations may change over time, exercise behavior can also go through stages of change. Prochaska and DiClemente’s (1983) Transtheoretical Model (TTM) has been used to explain the stages of changes in exercise behavior (Prochaska and Marcus, 1994). Cox, Gorely, Puddey, Burke, and Beilin (2003) summarize TTM as

it relates to exercise behavior as a “dynamic process that occurs through a series of interrelated stages that represent different levels of readiness for a given behavior. It is hypothesized that the stages are invariant, but the time spent in a stage may vary and progress is not necessarily linear (i.e. there will be periods of progression and regression)” (p. 478).

The stages of change are: precontemplation (not participating in exercise and not thinking about it), contemplation (not currently participating in exercise, but thinking about starting), preparation (doing a small amount of exercise), action (started exercising at recommended levels in the past six months), and maintenance (exercising at recommended levels for more than six months). Research on self-determination theory and TTM in exercise has provided interesting results. Ingledew, Markland, and Medley (1998) measured exercise motives and stages of change at baseline and at a three-month follow-up. The results showed that extrinsic, specifically appearance-related, motives were more common for those in the precontemplation and contemplation stages of exercise. Furthermore, intrinsic, specifically enjoyment, motives were more common in the maintenance stage.

Exercise promotion and intervention has been the focus of many exercise psychologists and health educators. The means by which experts have studied exercise promotion vary greatly. Some focus on the social, cognitive, or biological mechanisms behind exercise behavior, while others have focused on designing interventions to alter exercise behavior. What most studies seem to have in common is a desire to understand

what it takes to influence individuals to begin an exercise program, maintain an exercise program, and/or address emotional well-being as it relates to exercise.

Field and Steinhardt (1992) investigated two orientations to exercise, self-trusting and self-controlling orientation. The goal of their study was to find that traditional models of health promotion that emphasize health threats might be inappropriate. They attempted to find relationships between these orientations and certain personal characteristics. Similar to intrinsic motivation in self-determination theory, the authors define a self-trusting orientation as an internally directed behavior, focusing on the enjoyment of exercise. In contrast, self-controlling orientation is externally directed behavior, focusing on the external rewards of exercise. Field and Steinhardt gave participants a questionnaire that assessed their exercise orientation as well as several measures of well-being, including general self-esteem and physical self-esteem. They found that individuals who exercised only for appearance reasons had higher scores on self-control. Those who exercised for social or pleasure reasons in addition to appearance or athletic reasons scored lower in external control. Additionally, lower external control scores were associated with higher positive self-reinforcement, physical and general self-esteem. In response to their results, the authors recommend that exercise and wellness programs should focus on internally directed behavior.

As previously noted, Ryan, Frederick, Lepas, Rubio, and Sheldon (1997) found that intrinsic motives for physical activities facilitate long-term exercise adherence. Specifically, these researchers asked participants who had just joined a fitness center to rate their initial motives to exercise. They also rated their workout length, challenge and

enjoyment after each exercise session. Results revealed that adherence to exercise was associated with enjoyment, competence, and social interaction motives, but not with fitness or appearance motives. Enjoyment and competence have previously been associated with intrinsic motivation (Deci & Ryan, 1985). Another finding by Ryan et al. (1997) demonstrated that post-workout ratings of enjoyment were predictive of adherence to exercise. Their findings are important for exercise promotion. Specifically, they suggest that promotion should focus on the inherent enjoyment of exercise or the enhanced competency one might feel over time.

It is logical that there is a cognitive shift in beliefs about exercise over time, and that this cognitive change could be the reason that people begin to perceive more enjoyment associated with exercise the longer they maintain a program. Markland and Ingledew (1997) write that an important factor in getting exercisers to move toward intrinsic motivation is time; yet, Ryan, et al. (1997) suggest that movement toward greater self-determination to exercise may result from explicit focusing upon the intrinsic values of exercise.

Negative thoughts regarding exercise, such as “I feel like a failure if I do not exercise”, may well be what interfere with extrinsic exercisers’ potential to enjoy exercising. Ultimately, these thoughts are likely to interfere with their commitment to exercise. As Maltby & Day (2001) have suggested, enjoyment is an important component for maintaining an exercise regimen. Consequently, it can be expected that because of a lack of enjoyment associated with exercise, as well as possible feelings of failure, shame and guilt for some, many extrinsic exercisers will not maintain a program.

Therefore, increasing the salience of positive, intrinsic thoughts associated with exercise may increase the likelihood of maintaining exercise.

In sport psychology research, there is support for the use of cognitive strategies in sport and exercise to increase competence and enjoyment. Williams and Leffingwell (1996) cite several approaches to enhance sport performance and pleasure, including cognitive restructuring and the utilization of positive self-talk. By taking Ryan et al's (1997) suggestion a step further, another possible cognitive strategy is to have exercisers focus on the intrinsic values of exercise. That is, to have extrinsic exercisers, who tend to have more negative thoughts associated with exercise, concentrate on the more positive aspects of exercise. Specifically, exercisers could focus on the enjoyable and/or satisfying aspects of exercise.

The present study intended to use a technique created to increase the salience of intrinsic, or positive thoughts associated with exercise for extrinsic exercisers. For the current study, an intervention was created to promote intrinsic thoughts associated with exercise for extrinsic exercisers. Once a week, over a course of 4 weeks, extrinsically motivated participants were asked to reflect on anything that might have been pleasurable, enjoyable, or satisfying about their exercise. After thinking about the positive aspects of exercise, they were asked to write about their thoughts. Asking the participants to write about any positive, or intrinsic, thoughts in relation to exercise was intended to augment their original, more extrinsic thoughts about exercise. It was expected that by asking participants to expand their thoughts of exercise to include more positive thoughts, there would be a shift in motivation towards the intrinsic end of the

self-determination continuum. By encouraging participants to focus on pleasurable experiences related to exercise, it is hypothesized that participants' motivation would become more intrinsic faster than if time were the only factor involved.

It was expected that participants in the cognitive intervention condition would demonstrate significant changes in their self-determination. That is, they were expected to become significantly more intrinsically motivated than those in a control condition. Additionally, both conditions were expected to show increased exercise time due to the knowledge that their exercise time was being tracked.

Method

Participants

Participation in this study was solicited from the University of Richmond's fitness center, the Introductory to Psychology class, and SpiderBytes, a university-wide email bulletin board. Signs requesting participation were posted in the University's fitness center. Additionally, announcements were made at the end of group fitness classes. Participants who were in Introductory Psychology received credit for participation. All others were eligible to win one of four \$50 prizes drawn from a lottery, to help increase interest in participation.

As suggested by Ingledew, Markland, and Medley (1998), exercisers in the early stages of exercise adoption are likely to be more extrinsically motivated to exercise. Thus, participants were eligible to participate if they were newer exercisers and were considered very to moderately extrinsically motivated. In order to garner a sufficient number of participants, the criteria were modified from the original design. Of 144

potential participants who completed a preliminary questionnaire, only eight qualified as extremely extrinsically motivated. Few were both newer exercisers and scored below a zero on the Behavioral Regulation in Exercise Questionnaire (BREQ; Mullen, Markland, & Ingledew, 1997). Thus, the criteria for inclusion included newer exercisers who scored less than a 15 on the BREQ, and scored no higher than a 12 on the intrinsic scale (i.e., moderately extrinsically motivated).

Newer exercisers were operationally defined as having begun to exercise regularly in the past six months. Regular exercise was defined as at least 30 minutes of sustained physical activity at least three times a week (ACSM, 2000). Exercise motivation was measured by the BREQ. Informed consent was requested from all potential participants prior to beginning participation. Those who meet the eligibility requirements were contacted and asked to participate in the four-week study.

One hundred and forty four participants completed the initial questionnaire to determine eligibility. Of those that completed the questionnaire, thirty-eight were asked to participate in the four-week study. Three refused to participate, and eight dropped out over the four-week period. Thus, a total of 27 participants completed the entire study.

Measures

Demographics. Participants provided their age and gender at the initial data collection. Twenty-one participants were female and six were male. Twenty-six participants were between the age of 17 and 24, and one was over the age of 60.

Exercise Behavior. At the initial data collection, participants were asked to give details of their exercise frequency for the preceding 3 weeks. These were averaged

together to determine a baseline of exercise behavior. Throughout the four weeks of the study, all participants were asked to provide the amount and frequency of exercise they engaged in over the prior week. The exercise behavior questions were asked via the University of Richmond's Blackboard Learning System, an interactive online education tool. The reasons for the use of Blackboard as opposed to interpersonal communication were twofold: (1) ease of participation; and (2) past research in exercise promotion has suggested that the computer may not be as potentially socially threatening as personal communication with a researcher may be (King, Friedman, Marcus, Castro, Forsyth, Napolitano, et al., 2002).

Behavioral Regulation in Exercise Questionnaire (BREQ). All participants completed the BREQ (Mullan et al., 1997) at the beginning and end of the study. The BREQ is a 15-item self-report measure that assesses the reasons people exercise. Validity data have been provided by Mullan et al. (1997), Mullan and Markland (1997), and Wilson, Rodgers, and Fraser (2002). The BREQ identifies exercise motivation along a continuum from extrinsic to intrinsic motives (see Figure 1). Following the stem, "Why do you exercise?" participants responded to each item on a four-point Likert scale ranging from 1 (*not true for me*) to 4 (*very true for me*).

Cognitive Intervention Questions. Participants in the cognitive intervention condition were asked specific questions via Blackboard that were intended to make them think positively and intrinsically about exercise. Participants were asked to reflect on the pleasure, satisfaction, and fun they might have felt during their exercise sessions. For example, participants in this condition were asked after the third week of the intervention

to think about their exercise sessions over the course of the week, and respond to the following: “We all know that when we enjoy a particular activity we are more likely to do more of it. So enjoying exercise is a great way to help keep you on track. What are three things that you enjoyed in exercising during this past week?”. Additional questions similar to the previous example were asked on a weekly basis (see appendix A).

Design and Procedure

The study had a longitudinal design and was conducted over the course of four weeks. Participants were randomly assigned to one of two conditions: intervention or control. Both conditions completed the BREQ at the beginning and end of four weeks and were asked about their exercise regimen weekly over the course of the study. A total of four questions were asked of the cognitive intervention condition over the course of the study.

A consent form was given to participants when initially expressing interest in participating. At that time, participants were told that the questionnaire they initially completed would determine their eligibility to participate in the primary study. When the eligible participants were selected, an email was sent explaining what was involved in participation: they would complete a series of questionnaires at the beginning and end of four weeks, and be asked questions via the University’s Blackboard system about their experiences exercising once a week. Email reminders were sent to each participant during the week requesting that they go to the Blackboard and answer questions in the Exercise Behavior section. Participants were not able to identify other participants, as the email, discussion, and roster capabilities of the Blackboard were disabled.

Results

A series of one-way repeated measures analyses of variance (ANOVAs) were conducted to determine the effects of the exercise motivation intervention on the Behavioral Regulation in Exercise Questionnaire. For each ANOVA, the between-subjects factor was the condition (intervention or control) and the within-subjects factors were the overall scores on the BREQ or the scores on the extrinsic, introjected, identified, and intrinsic scales of the BREQ.

A score by condition interaction on the intrinsic scale approached significance, Wilk's $\Lambda = .864$, $F(1, 25) = 3.925$, $p = .059$, multivariate $\eta^2 = .136$. The means and standard deviations of the intrinsic scale scores show that the intervention group increased their intrinsic motivation from baseline ($M = 9.92$, $SD = .65$) to the end of four weeks ($M = 10.77$, $SD = .864$). The scores of the control group went down from baseline ($M = 10.93$, $SD = .62$) to the end of the four-week study ($M = 10.21$, $SD = .83$). Means and standard deviations for all scales are presented in Table 1.

Additional analyses were conducted to determine the differences in overall frequency of exercise between groups. A significant main effect was found for the overall amount of exercise for both conditions from baseline to the end of week four, Wilk's $\Lambda = .414$, $F(4, 22) = 7.785$, $p < .001$, multivariate $\eta^2 = .586$. Pairwise comparisons show significant differences between baseline and week one, week two, and week three, thus the overall amount of exercise decreased from baseline during these weeks. There were also significant differences between week one and week four, and week three and week four. Means illustrated that exercise amount increased between

those weeks. Overall, the amount of exercise decreased from baseline to the end of the study. Means and standard deviations for exercise amount each week are presented in Table 2.

Participants in the intervention condition were asked to respond to questions regarding the enjoyment, pleasure, and/or satisfaction they felt regarding exercise during each week of the study. One hundred and eighteen responses were received over the course of the study regarding the pleasure and enjoyment derived from exercise. These responses were grouped into several categories with the consensus of three raters, including the primary researcher. The raters determined that 10 separate categories would be necessary to include all responses. The resulting categories related to responses regarding the enjoyment of exercise were as follows: feelings of accomplishment, appearance, competition, health/improved physical fitness, improved concentration, nature/outdoors, improved mood, reflection/relaxation, social, and other.

Once the categories were determined, the percentage of responses in each category was computed. Participants enjoyed exercising most when there was a social aspect to the workout (17.8% of responses). Many participants enjoyed exercising because it enabled them to spend time with a friend. Also, many responded that making plans with a friend to go to the gym helped motivate them. Not far behind social aspects was enjoying working out for health or improved physical fitness reasons (16.9%). Some participants responded that they worked out because they knew they were doing something good for their health. Others responded that they liked when they felt they were getting stronger and more physically fit.

Another top category of responses to what brought participants pleasure during or after exercise was the importance of appearance (12.7%). Many responded that they felt better knowing that they were losing weight, or getting in shape for swimsuit season. In addition, many respondents enjoyed a feeling of accomplishment (11.9%) after exercising or when they had surpassed a goal. Also, many participants enjoyed exercise because it enhanced their mood (10.2%). Some maintained that exercising had changed a bad mood to a good one. Others decided to take part in a workout because they believed they would feel better once they had completed it. All categories and percentages, along with examples of responses are presented in Table 3.

Discussion

The hypothesis that participants in the intervention group would become more intrinsically motivated was partially supported. While the overall score on the BREQ did not show a significant difference for the intervention condition, there was a condition by score interaction that approached significance ($p = .059$) on the intrinsic scale of the BREQ (see Figure 2). The intervention group increased their intrinsic motivation from the first administration of the BREQ to the second administration at the end of the four-week intervention. The extrinsic and introjected motivation of the intervention group was not reduced significantly, nor was the identified motivation increased. These results help to explain the lack of a significant difference in the overall score. However, the results that intrinsic motivation was increased for the intervention group, and not for the control group certainly support the possibility that the cognitive intervention was successful. Each of the questions that were asked of the intervention group were directly

related to questions on the intrinsic scale, suggesting that the intervention participants did begin to believe that there could be pleasure derived from exercise.

The results for the hypothesis that exercise amount would increase in both conditions was not supported. In actuality, there was a significant overall decrease in the amount of exercise conducted from the beginning of the study to the end. It is important to note that there was not a significant interaction between conditions on amount of exercise from baseline to week four. This demonstrates that, as expected, the intervention did not differentiate between the conditions on exercise behavior. However, the decrease in exercise was contrary to what was expected. In addition, there was considerable variability between each week of the study. For the first three weeks of the study, the amount of exercise decreased significantly from the baseline amount. The amount of exercise increased significantly from the first week of the study to the fourth, as well as the second week of the study and the fourth. Figure 3 displays the change in exercise amount over the course of the study.

One possible explanation for this unexpected overall decrease in exercise amount is the timing that the study took place. Much of the baseline data was taken early in a semester when students tended to have a little more time to spend away from their studies. When the study began, the students were well into the semester, and by the end of four weeks, they were nearing finals time. Thus, as the study progressed, the students may have had more distractions that may have made it difficult to maintain an exercise regimen. It is possible that if the study had taken place during another time of year, the results for the amount of exercise may have been different.

Also, caution should be taken in interpreting the results for the amount of exercise. Levene's test of equality of variances indicates that the assumption of homogeneity of variance was violated at baseline $F(1, 25) = 6.116, p = .021$ and at week four, $F(1, 25) = 16.813, p < .001$.

The analysis of the responses from the intervention participants was an opportunity to learn more about how exercise can be intrinsically motivating through quantitative and qualitative means. Based on the number of responses that were considered to be social in nature, it is clear that exercising with friends and loved ones is an important factor in both the level of enjoyment perceived and motivation to continue exercising. Friends, roommates, and fiancés were all mentioned as people who help to make a workout fun.

At the same time, physical fitness and health reasons were considered almost as important in bringing a positive feeling to exercise. Health-related reasons to exercise are considered to be on the intrinsic end of the self-determination continuum, as part of the identified regulation. While still not necessarily expressing that they were exercising for the inherent enjoyment of it, many participants understood that the benefits to health and fitness were a positive aspect of exercise. Therefore, they felt satisfaction or pleasure knowing they were doing something good for themselves.

Interestingly, exercising was also often considered satisfying or enjoyable when the participants were exercising to improve their shape or weight. Field and Steinhardt (1992) had found that people who tended to exercise for appearance reasons were more likely to be externally motivated. Consequently, it was not necessarily unexpected that

appearance responses were common among this group, as participants were considered moderately to extremely extrinsically motivated, at least at the beginning of the study. However, it is difficult to understand how exercising for weight and shape reasons would be pleasurable. It could be suggested that this type of thinking would just add stress and pressure to the activity, and reduce enjoyment of exercise, yet it was mentioned quite often. Perhaps the enjoyment came more from knowing they were working towards a goal, rather than enjoyment being directly linked to the activity itself.

Similarly, a feeling of accomplishment was also frequently mentioned as an important means of enjoying exercise. Many mentioned that attaining a goal was what could make a workout fun both during and after it. Trying something new and succeeding at it was also important to the level of enjoyment. An improvement in mood was also a factor in many participants' reasons for getting pleasure from exercise.

There are several limitations to the current study. A number of these limitations are associated with the sample of participants. First, the sample size was far smaller than originally planned. It was expected that a minimum of 30 participants in each condition would be required to achieve a powerful intervention. Unfortunately, due in part to unexpected difficulty finding participants who fit the criteria of the original design, the sample size was ultimately less than half that expected. When the study was initially designed, participants would meet the criteria if they were newer exercisers whose overall score on the BREQ was below zero. One hundred and forty four potential participants completed the initial questionnaire. Of those, 92 were considered newer exercisers, but only eight met the original eligibility requirements of the BREQ.

Past research had suggested that newer exercisers were more likely to be extrinsically motivated. As such, it was quite unexpected that out of a possible 92 participants, so few were considered extrinsically motivated. Perhaps this is unique to the university from where the sample was taken. It is also possible that many participants had simply taken some time off from sport and exercise within the past six months. As such, they may have previously regularly exercised and had already become intrinsically motivated prior to beginning their new routine.

Consequently, the criteria for the BREQ were expanded to include those who had scored above a zero, and were moderately intrinsically motivated (according to the intrinsic scale) and moderately to very extrinsically motivated (according to the extrinsic scale). This modification in the design likely impacted the results of the intervention. While the intervention appeared to work for moderately intrinsic participants, it is possible that there would have been stronger and clearer results in favor of the intervention had the sample been highly extrinsically motivated. However, it is important to note that even without the projected 30 participants per condition, results did suggest that the intervention was powerful enough to obtain marginally significant results in favor of the intervention.

There was also a sizeable dropout rate (25%) from the beginning of the four-week study and the end. There was speculation prior to the start of the study that those in the control condition would drop out at a higher rate because they would maintain their extrinsic motivation, which is not associated with maintenance of an exercise program. Fortunately, the dropout rate was almost equal between conditions; five participants

dropped out of the intervention condition and four dropped out of the control condition. The total number of participants who ultimately completed the study was 27 (13 intervention; 14 control). There were no significant differences in BREQ score at Time 1, baseline amount of exercise, or gender between full participants and those that dropped out (see Table 4 for attrition analysis).

Another limitation related to the sample is that 97% of the participants were students at a small liberal arts university. Also, only 22% of the participants were male. Therefore, these results cannot be generalized to a larger, more heterogeneous population.

There is also the possibility that the intervention did not increase the salience of intrinsic thoughts at all, but simply encouraged participants to respond according to what they believed the researcher desired. It is possible that participants were sensitive to the demand characteristic experimenter expectancy, and responded more intrinsically on the second administration of the BREQ because they had been asked about their enjoyment of exercise throughout the study. Therefore, it could be argued that the participants realized what type of response the researcher was looking for on the intrinsic questions on the BREQ, and responded that they enjoyed exercise more because they had been asked specifically about that each week.

However, it is unlikely that experimenter expectancy was the cause of the changes to scores on the BREQ. First, the study was done over the course of four weeks, and the BREQ was the final questionnaire participants needed to complete. The participants did not necessarily complete the final BREQ immediately after responding to the intervention questions, as it was a separate questionnaire on Blackboard. The time lapse between

when the intervention questions were completed could have helped to dissipate any possible biases. Also, the questions on the BREQ are interspersed with questions not related to intrinsic motivation, making it more difficult for the participants to know what the researcher was looking for. And finally, experimenter expectancy is often associated with a laboratory experiment in which the researcher is in direct contact with the participant. In this type of experiment, verbal and nonverbal cues can be given by the researcher, which may bias a participant. In the current study, the participants had no direct contact with the researcher, and therefore would not have been subject to cues from the researcher, making it even more difficult to know what the expected answers were.

Finally, using the BREQ to measure extrinsic and intrinsic motivation on a bipolar continuum could be questioned. Due to the unexpected results that so many participants scored highly on both extrinsic motivations and intrinsic motivations, it is possible that a multidimensional measure would be more appropriate. However, correlational analyses demonstrate that the external scale and the intrinsic scale are significantly negatively correlated at both time one and time two (see Table 5). Thus, the bipolar continuum does appear to be appropriate for this study.

There are several ways that future research could expand on the current study. As a large majority of the participants in the current study were between the ages of 17 and 24, it might be important to see if other age groups would show similar results. For example, it could be hypothesized that older extrinsically motivated participants would be less likely to change than younger college-age participants because they have maintained their extrinsic motivation for a longer period of time. They may be less malleable than

their younger counterparts. Also, it would be interesting to study children's motivations to exercise. With the rising obesity rates in children, there is certainly a need to increase activity levels. It is possible that finding ways to focus children's attention on the fun that can be associated with physical activity would increase their likelihood of making exercise a regular part of their lives.

Also, in the current study, participants were asked to reflect on their exercise over the course of a week. Future research in this area should ask participants to write about their feelings immediately following a workout. It would be interesting to establish whether positive feelings exist in extrinsically motivated exercisers immediately after exercising, or if the feelings are stronger when there has been an opportunity for reflection.

There are important implications to the field of exercise promotion if the findings from the current study are accepted as evidence that self-determination to exercise may be altered through the use of cognitive techniques. While the exploratory nature of the study creates as many questions as are answered, the results suggest that there is some credence to the theory that intrinsic motivation can be enhanced by thinking of the pleasurable aspects of exercise.

Assuming that the premise that intrinsic motivation to exercise is preferable to extrinsic motivation is accepted, then the ability to manipulate and expedite the progression to intrinsically based cognitions is important. These findings could eventually be used to create exercise programs that would help exercisers to maintain a fitness routine. Health promotion professionals could help to reduce the dropout rate

among new exercisers by using intrinsically based programs. Further research is necessary before practical applications of this study can be created and implemented. If this line of research were to be continued and improved, structured exercise programs based on this theory could ultimately be created. These programs could include tailored, individual exercise routines accompanied by group meetings with a professional. The meetings would be an opportunity for clients to identify any positive and pleasurable aspects together. If used in this type of group setting, these types of programs could also be cost effective. And they would also provide some social support for extrinsic exercisers, which, as the current study demonstrates, is an important aspect of enjoyment in exercise.

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Table 1

Means and Standard Deviations of BREQ Scores for Intervention and Control Groups.

	Intervention				Control			
	Time 1		Time 2		Time 1		Time 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Overall	6.31	10.95	8.38	12.85	7.36	8.45	8.93	9.34
Intrinsic Scale	9.92	2.45	10.77	3.75	10.93	2.17	10.21	2.39
Identified Scale	9.15	2.44	9.54	2.30	9.64	1.60	9.29	1.73
Introjected Scale	9.46	2.26	9.31	2.59	9.00	2.60	8.50	2.38
Extrinsic Scale	6.62	3.10	6.69	2.93	7.57	2.24	6.14	2.07

Table 2

Means and Standard Deviations for Exercise Amount in Minutes Per Week.

	Mean	Standard Deviation
Baseline	219.46	140.36
Week one	132.46	91.19
Week two	136.37	86.06
Week three	134.89	87.73
Week four	178.33	116.62

Table 3

Percentage of Responses by Category to Intervention Questions

Category	Percentage	Example
Social	17.9%	“I was able to spend time with my roommate while exercising.”
Health/Physical Fitness	16.9%	“I kept thinking that I will become healthier by doing this.” “I know I am getting stronger day after day.”
Appearance	12.8%	“I stayed focused by imagining myself fitting nicely in my wedding dress.”
Accomplishment	11.9%	“After I exercise I feel like I have accomplished something worth my time.”
Improved Mood	10.2%	“After one of my normal afternoon workouts, I was in the greatest mood and had so much energy.”
Nature/Outdoors	7.7%	“One day I played field hockey outside and really enjoyed the nice weather.”
Reflection/Relaxation	6.9%	“My yoga classes brought me extreme pleasure, I was more relaxed than usual.”
Other	6.9%	“After I have a good workout, I go and have a huge fulfilling meal.”
Improved Concentration	5.2%	“When I needed to study, I was able to maintain my focus after exercising.”
Competition	3.5%	“I enjoyed playing in a game against another team.”

Table 4

Attrition analysis

	Dropouts	Non-Dropouts	Statistically Significant Difference
Mean BREQ Score 1	6.33	6.85	No
Mean exercise at baseline	177.11	219.46	No
Gender	56% Male	22% Male	No

Table 5

Correlations of extrinsic and intrinsic scales of BREQ at Time 1 and Time 2.

		Extrinsic 1	Intrinsic 1	Extrinsic 2	Intrinsic 2
Extrinsic 1	Pearson Correlation	1	-.413*	.675*	-.517*
	Sig. (2-tailed)		.032	.000	.006
	N	27	27	27	27
Intrinsic 1	Pearson Correlation	-.413*	1	-.515*	.713*
	Sig. (2-tailed)	.032		.006	.000
	N	27	27	27	27
Extrinsic 2	Pearson Correlation	.675*	-.515*	1	-.627*
	Sig. (2-tailed)	.000	.006		.000
	N	27	27	27	27
Intrinsic 2	Pearson Correlation	-.517*	.713*	-.627*	1
	Sig. (2-tailed)	.006	.000	.000	
	N	27	27	27	27

* Correlation is significant at the 0.05 level (2-tailed).

Figure 1. Self-determination theory continuum (Deci & Ryan, 1985).

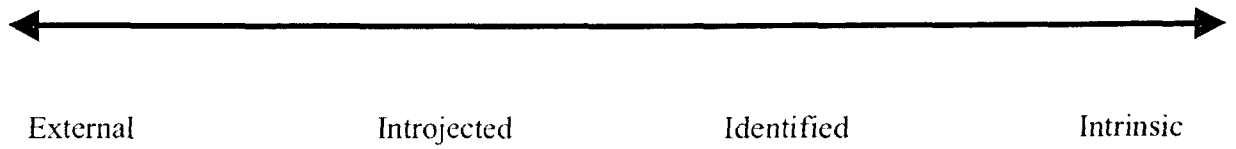


Figure 2. Time by condition interaction for intrinsic scale of the Behavioral Regulation in Exercise questionnaire.

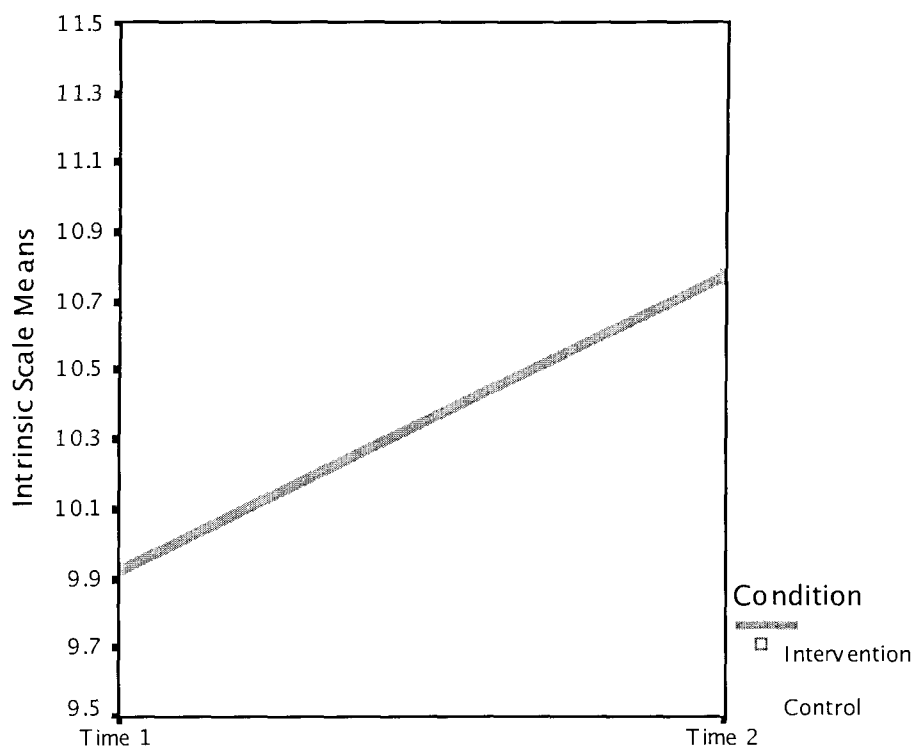
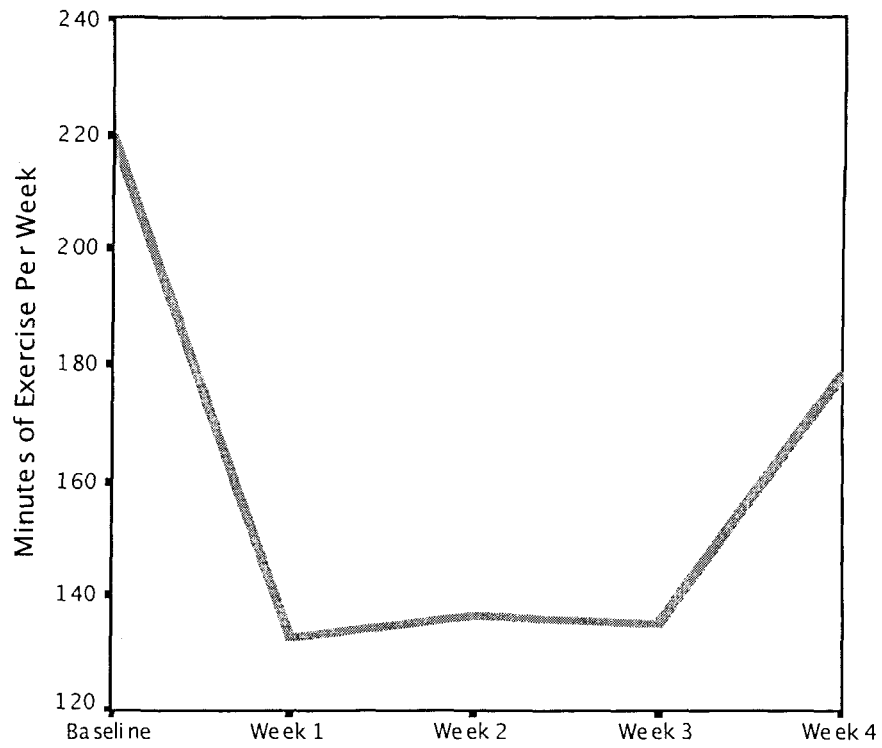


Figure 3. Mean minutes of exercise per week for both conditions.



Appendix A

*Intervention Questions*Week One

It is important to think positively about exercise in order to maintain your regimen. You might even want to keep a personal log about how good you feel. Below, please write about three aspects of exercise that brought you pleasure this week.

Week Two

Personal satisfaction is one of the mainstays of exercise and fitness. If you are keeping that log, did you note your satisfactions with your exercise? Please write about three aspects of exercise that gave you satisfaction.

Week Three

We all know that when we enjoy a particular activity we are more likely to do more of it. So enjoying exercise is a great way to help keep you on track. What are three things that you enjoyed in exercising during this past week? If you are keeping a log, you could check it.

Week Four

There are many benefits to maintaining an exercise routine. A good way to maintain a routine is by relying on your own internal motivation to exercise. Please write about three ways that you kept yourself motivated, focused, and positive about exercise this last week.