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THE ROLE OF MOOD IN A PHYSICAL ACTIVITY

TASK THAT REQUIRES SELF-CONTROL

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THE ROLE OF MOOD IN A PHYSICAL ACTIVITY TASK THAT REQUIRES SELF-CONTROL

by

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Dedication

For my parents, Joe & Maureen

my sisters, Felicia & Stacy

and

my grandmother, Catherine

Acknowledgements

My parents taught me the value of commitment, and it is has broken down every barrier I have encountered in this process. My achievements in graduate school have only been made possible because of the endless support my parents have always given me. My success in school is merely just an extension of their reach. It is what they taught me to do. Thank you, Mom and Dad, for everything.

I want to thank John Bartholomew for his advice, insight, humor, and optimism. Thanks for taking a chance on me, Bart. Thanks to my other committee members: Alexandra Loukas, Jane Richards, Mary Steinhardt, and Jan Todd for their expertise and input on this dissertation. Thanks to Esbelle Jowers for lots of stuff, especially food. And thanks to Patty Coffman for all her help, all the time.

Finally, I would like to thank Elizabeth Gilbert for writing the following:

People universally tend to think that happiness is a stroke of luck, something that will maybe descend upon you like fine weather if you're fortunate enough. But that is not how happiness works. Happiness is the consequence of personal effort. You fight for it, strive for it, insist upon it, and sometimes even travel around the world looking or it. You have to participate relentlessly in the manifestations of your own blessings. And once you have achieved a state of happiness, you must never become lax about maintaining it, you must make a mighty effort to keep swimming upward into that happiness forever, to stay afloat on top of it. If you don't, you will leak away your innate contentment. Its easy enough to pray when you're in distress but continuing to pray even when your crisis has passed is like a sealing process, helping your soul hold tight to its good attainments.

THE ROLE OF MOOD IN A PHYSICAL ACTIVITY
TASK THAT REQUIRES SELF-CONTROL

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Self-control is known to be associated with numerous behaviors, many of which impact health. Mood regulation, unfortunately, has been shown to drain self-control, as many individuals choose to attend to their mood, and reduce any efforts to maintain other behaviors that require self-control exertion. Exercise may be one of these behaviors. Therefore, the purpose of this dissertation was to examine the role of mood in a physical activity task that requires self-control. Participants were 152, male (n=113) and female (n=39) undergraduate students aged 18-49 (M=20.6, SD=3.1). All were randomized into 1 of 6 groups according to a 3 (mood induced) x 2 (mood expected) between subjects factorial design. Mood was induced through free writing, and the mood expected was manipulated through feedback about a physical activity task (a squat challenge) to be completed. Self-control was measured with a handgrip endurance test. After the manipulation, each participant was asked to complete as many squat repetitions as he or she could, with the intensity set at 55-60% of their one repetition maximum (1RM). The

number of squat repetitions served as the primary dependent variable. The effect of the mood and expectation was tested through a 3x2 ANOVA. Mood [$F(2,146) = 1.47$, $p=.23$] nor mood expected [$F(1,147) = 0.13$, $p=.72$] were found to impact this physical activity behavior. Self-control, however, was found to be a significant predictor of the number of squat repetitions completed [$\square = .217$, $t(150) = 2.72$, $p<.01$, $R^2=.042$]. Thus, it appears that a manipulated mood is unrelated to physical activity behavior, as operationalized in this dissertation. Future research should seek to assess free living mood and physical activity choices, as the public health challenge of physical activity is more likely the initiation of exercise, not the intensity at which it is completed.

TABLE OF CONTENTS

CHAPTER I: INTRODUCTION

a. Introduction 1
   i. Purpose 1
   ii. Background 1
b. Research Study 8
   i. Purpose 8
   ii. Method 8
   iii. Hypotheses 8
c. Limitations 9
d. Delimitations 10
e. Significance of Study 11
f. Operational Definitions 11

CHAPTER II: REVIEW OF LITERATURE

a. Introduction 13
b. Terminology 13
c. The Regulation of Behavior 14
   i. Feedback Loops 14
   ii. Goal Attainment 15
   iii. The Development of Mood 16
   iv. Mood and Goals 16
d. The Experience of Good and Bad Mood 19
   v. Bad Mood 20
   vi. Good Mood 21
e. Mood Regulation 23
f. Conclusion 29

CHAPTER III: METHODS

a. Hypotheses 31
b. Participants 32
c. Experimental Design 32
d. Power Analyses 33
e. Instruments 33
   vii. Subjective Measures 33
   viii. Objective Measures 35
f. Procedure 37
g. Timeline 40
h. Statistical Analyses 41

CHAPTER 4: RESULTS

a. Descriptive Statistics 42
b. Manipulation Check 43
c. Hypothesis Testing 45

CHAPTER 5: DISCUSSION

a. Main Effect for Mood 51
b. Effect for Mood Expectation 55
c. Main Effect for Self-Control 57
d. Conclusions 58
e. Future Research 59

APPENDIX A: Demographic Information 61

APPENDIX B: PANAS 62

APPENDIX C: Feeling Scale 63

APPENDIX D: Felt Arousal Scale 64

REFERENCES 65

VITA 72

CHAPTER 1
INTRODUCTION

Purpose

The purpose of this dissertation was to examine the role of mood in a physical activity task that requires self-control.

Background

It is currently estimated that 30% of the United States population is obese (CDC, 2003). Obesity is a risk factor for many chronic conditions such as hypertension, hypercholesterolemia, diabetes, stroke, heart disease, certain cancers and arthritis (Flegal, Carroll, Ogden, & Johnson, 2002). It is well known that regular exercise is one way to maintain a healthy body weight. Unfortunately, using exercise for weight control and weight maintenance requires regular participation, and cannot be achieved within a short period of time. Adopting and adhering to an exercise routine is difficult, however. Many novice exercisers are unsuccessful and fail to maintain a long-term commitment. In fact, a recent study found that more than 60% of control subjects dropped out of their exercise routine within a six-month period (Annesi, 2004). This is not surprising; the majority of a new exerciser's experience is typically painful and causes discomfort. As such, the individual must choose to endure this discomfort or discontinue exercising, potentially failing to achieve their related goals. It may seem that the choice to engage in such an activity, one that will produce short-term pain in order to secure a long-term benefit, would be predicted simply by the interest in achieving a goal. The greater the interest

and motivation, the better one will control their behavior. There are, however, other predictors of self-control.

Self-control has been defined as the exertion of control over the self by the self (Muraven & Baumeister, 2000). It is when an individual chooses to override the inherent impulse, or natural tendency, and instead substitutes another response (or lack of response) in its place (Baumeister, Bratslavsky & Muraven, 1998). Self-control, therefore, refers primarily to a delay of gratification. A person endures an immediate noxious stimulus, from boredom, to pain, to perceived lack of enjoyment, so as to achieve a delayed benefit. Central to the majority of the research on self-control is the Carver and Scheier model of the self-regulation of behavior (Carver & Scheier, 1998, Figure 1). The model is a feedback loop that maintains balance by monitoring forces impacting the individual and their behavioral response, while continually comparing the current state to a standard. The standard may be socially or personally derived. Regardless of where it is drawn, behavior that falls short of the standard drives a change in behavior or a shift in the standard. The system is, as a result, often compared to that of a thermostat, one that activates a heater or air conditioner when the temperature drops below or rises above a desired set point. Thus, when a discrepancy is observed, a process of change is initiated to reduce the discrepancy between the current state and the standard, bringing the system back into balance.

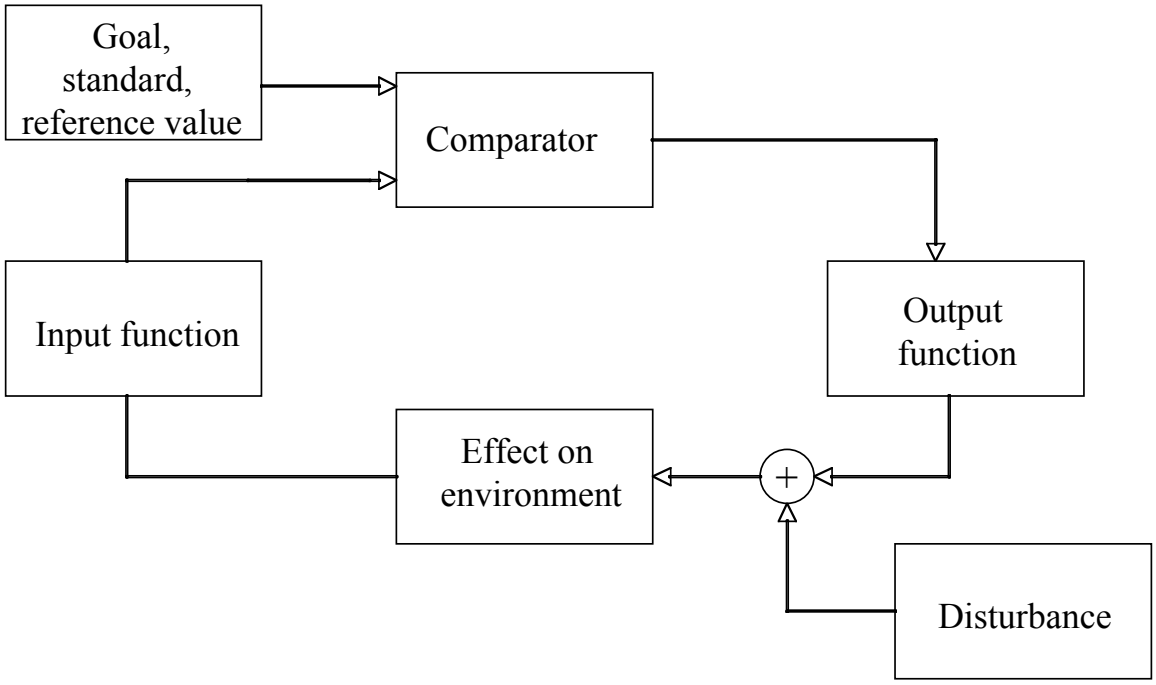


Figure 1. Model of the self-regulation of behavior (Carver & Scheier, 1998, p.11). In this loop, a disturbance is sensed at the point of input, and then compared to the reference or standard. Adjustments are made in the output function.

Because this system involves multiple factors that work to sustain a complex process, it is highly susceptible to failure, and efforts to maintain a behavior are not always successful. In particular, there are two distinct types of failure: underregulation and misregulation. Underregulation occurs when there is a failure to exert self-control. This typically happens when the standard is unclear to the person, and therefore cannot be compared the current state. This results in a lack of monitoring, e.g. many individuals are unaware of a healthy weight for their age, sex and height. Underregulation also happens when there is a lack of strength to override an immediate desired response that will pull the system out of balance, e.g. an inability to resist eating pizza when trying to avoid calorically dense foods. Misregulation, in contrast, is when control is used, but it is

misguided or counterproductive. It is when individuals attempt to control things that cannot be controlled, or they give priority to other tasks that require attention. For example, certain professions require such a high degree of self-control that the individual is unwilling to exert control over an additional lower priority task, such as their exercise routine. As a result, one self-control task is made subservient to another, more immediately valued self-control task. This specific type of failure will drain the system of strength, and eventually lead to underregulation; i.e. performance below the standard.

Baumeister and Heatherton (1996) have shown that self-control is also dependent upon a limited, inner resource of self-control strength. Muraven and Baumeister (2000) add that the act of controlling any behavior requires the expenditure of this inner resource, one that will need to be replenished after being used. Delaying gratification, avoiding temptation, focusing awareness beyond immediate stimuli, resisting procrastination and persisting at boring tasks all require the individual to exert self-control, and all deplete the system of strength. As a result, individuals have a limited capacity for control that is vulnerable to depletion. For example, low or poor self-control is consistently associated with negative behavioral outcomes. It has also been shown to play an important role in sexual activity (Hope & Chapple, 2005), alcohol consumption (Gibson, Schreck & Miller, 2004), academic achievement (Tangney, Baumeister & Boone, 2004), and crime (Gottfredson & Hirschi, 1990).

Thus, there are three primary threats to self-control, (1) the use of an inappropriate standard; (2) an inappropriate behavior whose draw is too great to avoid; and (3) the inability to muster self-control strength due to competing draws on one's self-control.

One of the primary competing draws on self-control is mood regulation. Tice & Bratslavsky (2000) state that these associations exist because the majority of individuals give priority to mood regulation (i.e. engage in mood changing techniques that drain self-control strength), thereby reducing any ability to maintain other behaviors that require self-control. In a recent study, participants were asked to regulate their emotions while watching a distressing movie clip (Tice, Bratslavsky & Baumeister, 2001). Each was then asked to complete a physical self-control task, a handgrip endurance test. It was found that the initial challenge to their self-control, i.e. the effort used to regulate emotions, depleted their self-control strength, resulting in a poor performance on the second task. Numerous other studies have found similar results. Specifically, participants who have been placed into a negative affective state, have shown medium to large performance decrements on various behaviors that require self-control (Oaten & Cheng, 2005; Baumeister, 2002; Baumeister, Bratslavsky, Muraven & Tice, 1998). This has clear consequences as people would be least likely to exercise or engage in other self-control tasks following any challenge to their mood.

Therefore, it appears that the induction of a negative mood will invariably result in a decrement in subsequent self-control tasks. However, the relationship between mood and behavior is complex. In fact, a negative mood has been shown to follow sub-standard performance during a task and, as a result, draw attentional resources and effort to the performance of that task (Compton, Wirtz, & Pajoumand, 2004). This exertion of self-control is pursued, in part, because it is expected that meeting the performance standard will result in improved mood. Thus, the behavioral goal of the task is congruent with the goal of mood regulation. Where negative moods have been shown to undermine

self-control, the self-control tasks were incongruent with mood regulation. Repeatedly, participants have been asked to complete noxious tasks such as drinking a bitter tasting beverage, maintaining a painful handgrip, or other activities with lasting negative affective expectations like unsolvable anagrams or thought suppression. Although each of these tests requires the individual to use self-control, none are valuable to the individual in the short-term, and each are expected to further deplete their mood. Thus, the negative affect pre-task has been confounded by the expectations of further negative affect post-task. This is unlike many real-life self-control tasks, e.g. exercise, that are expected to result in positive moods (Bartholomew & Miller, 2002).

In addition, little research has centered on the effects of positive mood induction on self-control. Current evidence suggests that a positive mood may aid in self-control exertion, increasing the individual's ability to complete a task (Tice, Baumeister & Zhang, 2004). Specifically, positive mood states have been shown to influence health-related self-efficacy, as people believe that they are more able to participate in health-related behaviors, such as safe sex, smoking cessation, and adopting a healthy diet (Salovey, Rothman, & Rodin, 1998; Salovey & Birnbaum, 1989). This may be due to an increased interest in and attention to personal liabilities and health risks, as positive states are more consistent with self-evaluative motives and long term self-regulatory goals (Trope & Pomerance, 1998; Aspinwall & Taylor, 1997). Finally, happy people tend to form more optimistic estimates of the likelihood of future positive and negative events (Forgas & Moylan, 1987; Mayer, Gaschke, & Braverman, 1992), and this, therefore, may provide the necessary motivation to complete a task.

Therefore, it is the focus of this dissertation to examine the role of pre-task mood on the process of self-control exertion in a physical activity task. This dissertation is unique in three ways. First, it will utilize a common mode of physical activity, a squat, as the primary measure of self-control exertion. Second, it will compare a negative and a positive mood induction on the self-control of this task. Third, it will manipulate the expected affective outcome of the self-control task.

Research Study

Purpose

The purpose of the current study was to examine the role of mood in a physical activity task that requires self-control.

Method

All participants were experienced weight lifters recruited from the PED 106C Weight Training classes offered within the Department of Kinesiology and Health Education. Each individual was randomly assigned to a mood induction (positive, negative, neutral) prior to completing an exercise task (a squat). Mood was induced through the recall and written description of notable positive and negative events (Trope & Neter, 1994). The squat task was a challenge to the participant to complete the maximum number of repetitions that he or she could at 55-60% of his or her 1 repetition max (1RM). The experimenter stressed different physiological processes to manipulate expectations for the squat task as a positive (endorphin release) or negative (lactate build-up) experience. Assessments of psychological state were taken prior to and following the squat task.

Hypotheses

1. There will be a main effect for the mood experienced.
    a. Individuals in a positive state are expected to complete more repetitions compared to individuals in a negative or neutral state.

b. Individuals in a negative state are expected to complete less repetitions compared to than those in a neutral state.

2. There will be a main effect for the mood expectations.
    a. Individuals expecting to experience a positive state are expected to complete more repetitions compared to individuals expecting to experience a negative state.
3. There will be an interaction between mood experienced and mood expected.
    a. Individuals in a positive state expecting to experience a future positive state will complete less repetitions than individuals in a negative state expecting to experience a positive state; and more than those in a neutral state expecting to experience a positive state.
    b. Individuals in a positive state expecting to experience a future negative state will complete more repetitions than individuals in a negative state expecting to experience a future negative state; and less than those in a neutral state expecting to experience an negative state.
4. There will be a main effect for self-control ability.
    a. Individuals with more self-control will complete more repetitions than individuals with less self-control.

Limitations

The following limitations had been acknowledged prior to the present study, and are therefore written in the present tense. This study is limited for a number of reasons. Specifically, there are threats to testing that will be unavoidable. For instance, there is a

limitation due to the mood manipulation. The ability to recall a specific event, as well as the intrapsychic differences with regard to this manipulation, possibly impact the direction and intensity of the effect. A manipulation check is used to assess mood change, but unfortunately, this manipulation check possibly also cues the individual, and increases or decreases the effect of the mood manipulation.

Differences in history possibly impact the individual's performance on the squat task. Participants vary in their technique and interest in the squat despite having a similar amount of resistance training experience. Maximal squat repetitions are, however, a valuable test of one's ability to continuously exert self-control, and it is more relevant to physical activity than previous tasks. There is discomfort with this exercise, as physiological mechanisms make it a considerable challenge to complete a high number of repetitions. Additionally, the squat is a core exercise in resistance exercise with which most experienced exercisers are familiar.

Delimitations

The participants in this study are delimited to a population of experienced weight lifters between the ages of 18 and 50. The individuals will be students registered for a class offered by the Department of Kinesiology and Health Education at The University of Texas at Austin in the Spring semester. Using this homogenous sample in a more controlled setting, however, will reduce variability between groups and enhance the ability to detect differences between these groups.

In addition, utilizing the squat as a test of self-control poses a delimitation to this study. The participants who were willing to be tested with this specific exercise, in this

particular way, may be part of a select group unrepresented in the population. There is also a limitation to the squat itself as the behavior beyond the limitation to those people willing to perform it.

Significance of Study

Self-regulation failure is a central part of the majority of personal and social problems in modern western societies (Baumeister, Heatheron & Tice, 1994). This study may help to elucidate some of the mechanisms responsible for self-control ability, such as mood regulation and subsequent control failures. Only a limited number of studies have utilized physical tasks to test self-control, and none have used a weight lifting task. Because this experiment uses a real-world exercise task, the findings of this study may help to explain part of the current trends in exercise participation.

Operational Definitions

Self-Control: The ability of the individual to exert a force over the self, overriding the natural tendency.

Self-regulation: A broad and global effort to maintain an alignment between goals and behavior.

Handgrip Strength: The maximal amount of strength that can be generated by squeezing a hand dynamometer.

Handgrip Endurance: The maximal amount of time an individual can endure handgrip stress.

Negative or Bad Mood: A subjective and mild displeasurable feeling tone with a certain level of felt energy or arousal.

Positive or good mood: A subjective and mild pleasurable feeling tone with a certain level of felt energy or arousal.

Mood Regulation: The initiation, maintenance, or change to the intensity or duration of a mood.

Squat: A resistance exercise done with a weight loaded Olympic barbell that sits across the shoulder. The individual lowers their body into an approximately parallel squat position, bending at the knees until an angle of roughly 90° is reached. The individual then stands up, and this completes one repetition.

CHAPTER 2
LITERATURE REVIEW

Introduction

How well do people stay on-track and keep working away at a task? Does it reflect innate differences - that some individuals are just better at blocking out temptation? Or, are there situational factors that might distract an individual from their goal so that their self-control differs from task to task? Research in this area has found that mood influences a wide array of processes relevant to self-control. The current accumulated evidence, however, fails to be explained by a single theoretical framework (Aspinwall, 1998). The various bodies of research within this area will be described in order to provide a background for explaining the role of mood management within self-control.

Terminology

It is necessary to first make a clear distinction between the terms "self-regulation" and "self-control." Different authors use these terms in various ways, some synonymously and some with distinct differences. This dissertation will consider the term "self-regulation" to be a broad and global effort to maintain an alignment between goals and behavior. "Self-control" however, is more limited. It will be considered the specific process by which self-regulation is realized; that is, the specific and conscious exertion of control over an impulse, in the moment, rather than the ongoing efforts to regulate a behavior to achieve a long-term goal.

In addition, it is important to distinguish among "affect," "mood" and "emotion." Numerous researchers have provided varying definitions for each of these terms. This dissertation, however, will assume that "affect" and "mood" are similar, in that each is a mild feeling tone that can be positively or negatively valenced, with a certain level of felt energy or arousal (Larsen & Prizmic, 2004). An "emotion" in contrast, will be defined as a particularly strong feeling tone that has a clear cause. Emotions can be traced to an object of reference that is the focus of the individual's awareness. Specifically, although emotions may give rise to moods, moods may arise from non-specific or salient causes (Ekman & Davidson, 1994). Furthermore, the terms "affect regulation" (Larsen, 2000) and "emotion regulation" (Gross & John, 2002) have been widely used by other authors, but the term "mood regulation" will be used here to describe any effortful modulation of the feeling tone or valence currently experienced. Emotion regulation, specifically, will not be used, as it is the focus of this dissertation to manipulate a global feeling (e.g. positive, negative) experienced by the participants, and not a specific emotion (e.g. anger, joy).

The Regulation of Behavior

Feedback Loops

The Carver & Scheier (1998) model of the self-regulation of behavior (Figure 1) posits that there exists a cybernetic process of control by which behavior is organized into an effort to move toward desired goals and away from threats. More specifically, self-focus will occur during the testing phase of the regulation process. In this phase, individuals compare their current standing to a particular salient, self-relevant domain,

and determine if they are meeting the standard in that domain. If the current self falls short, the person exerts effort by entering into a cycle of behaviors and evaluations that lasts until the self matches the standard, or until it is determined the match is impossible. This process is considered to be the discrepancy-reducing loop, and operates by negative feedback. There is also a discrepancy-enlarging loop. This mechanism is considered the positive feedback loop, and it attempts to avoid a feared or disliked possible self (Carver, Lawrence & Scheier, 1999). The discrepancy-enlarging loop operates identically to the negative feedback loop, except it attempts to avoid "anti-goals," such as being perceived in a negative way (e.g. an evildoer) or being in a car accident, or acting like the President.

Goal Attainment

Goals vary in their importance and complexity. Many people have both abstract (e.g. lose weight), and concrete goals (e.g. exercise for 30 min. today). The successful attainment of the more abstract goals, however, will often require that the more concrete goals have been accomplished (Carver, 2004); a distinction that underscores the difference between self-control and self-regulation. For example, it is important that the individual regularly exert self-control in order to accomplish their concrete goals, thereby securing successful self-regulation, and attainment of the abstract goals. As in the above example, the act of exercising daily will help the person to eventually lose weight.

Multiple goals will require multiple loops, each of which is continually monitored, providing feedback to the individual. The specific effort needed to reduce the discrepancy of each loop requires the person to exert self-control. Successful exertion of self-control within each loop will further help to satisfy the global effort needed to

maintain all loops. Thus, the management of goal achievement is a complex process that requires the individual to continuously monitor their behavior, and put forth effort to exert self-control when necessary. As a result, the person is able to move toward the attainment of several goals at once.

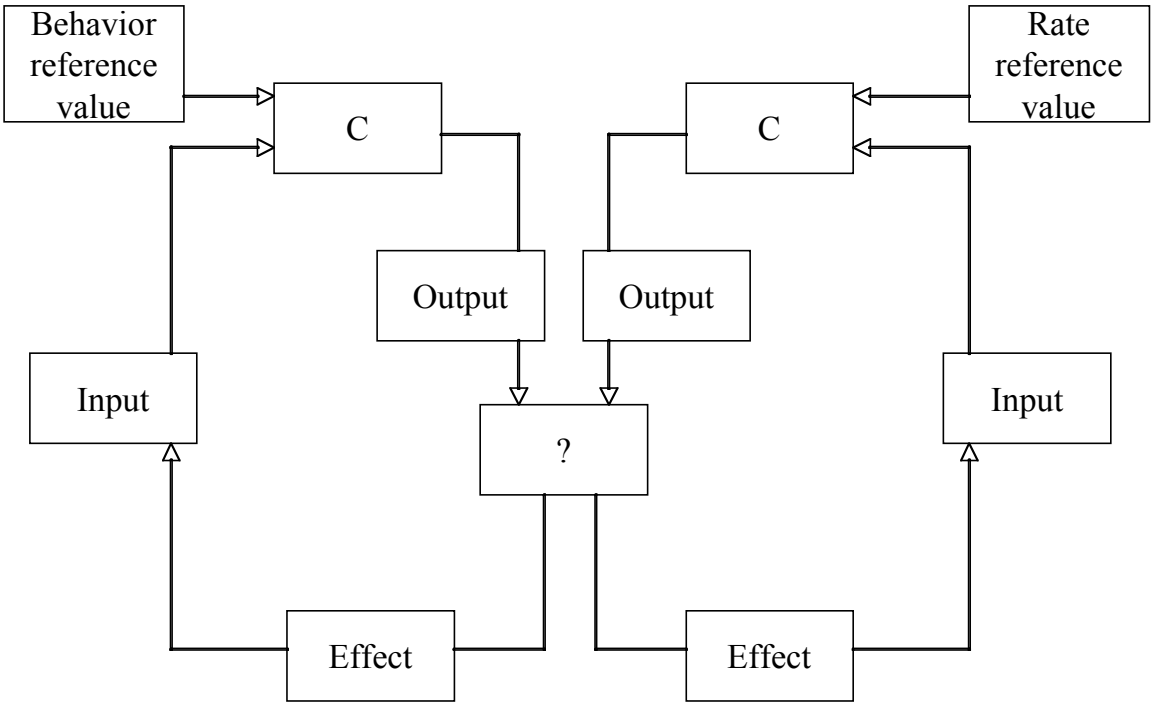
The Development of Mood

Although the Carver & Scheier (1998) model provides a plausible theory from which to understand behavior, it does not operate in a vacuum. There is more to the human experience than simply acting and moving toward goals. Operating along with the behavior-guiding loops is another system from which a feeling state arises, a mood-guiding loop (Carver & Scheier, 1998; Figure 2). The mood loop essentially monitors how well the behavior loop is doing at reducing (or enlarging) the encountered discrepancies. A particular mood state will result from the movement, or the rate of movement, towards goals or away from threats. When an individual is doing better than expected, or moving toward their goal faster than is expected, or required, the result is a positive affective state/mood; when they are doing worse, or are going slower than is expected or required, the result is a negative affective state/mood. More simply, the behavior loop monitors the distance the individual is from the goal, and the mood-guiding loop monitors the rate of progress toward that goal.

Mood and Goals

The role mood plays in the pursuit of goals is complex. Moods reflect the rate at which an error signal is being reduced, i.e. the rate at which the individual is approaching

Figure 2. The action and rate feedback loop (Carver & Scheier, 1998, p.143). The action feedback will determine which behavior will be acted on, while the rate feedback will determine the intensity with which it is pursued.



their goal. If progress towards a goal exceeds the current needs, an individual will likely shift their efforts to focus on another goal (Carver & Scheier, 1998). However, increasing these efforts toward another goal may be detrimental, as it can take resources away from other goals and reduce the likelihood of their attainment. Although mood seems to stimulate goal awareness, an individual may or may not be able to distinguish the specific goal(s) associated with the mood experienced. In fact, situations may arise when the individual's mood has reached a level of awareness, but the path to achieve the goal (i.e. behavior loop) associated with the mood has not reached this same level of awareness (Carver &

Scheier, 1998). This is likely the result of monitoring multiple paths in the pursuit of multiple goals. As such, this specific situation may challenge the individual to determine which of the existing behavioral discrepancies are associated with the mood experienced. Importantly, the particular mood experienced (e.g. good or bad mood) has been shown to either increase or decrease the focus and attention given to the immediate goal pursued (Compton, Wirtz, & Pajoumand, 2004). These, and other inherent effects, however, will be explained more thoroughly later.

More often than not, a viable way to reduce the error rate is clear to the individual. Trying harder, doing more, or going faster, (i.e. self-regulation) will likely result in a reduction of the discrepancy experienced. However, such adjustments must be carefully negotiated. In those times when there is not a clear route, individuals may fail to adjust (i.e. underregulation), adjust inappropriately (i.e. misregulation), or they may choose to focus on reducing the discrepancy of the mood loop outside of the behavioral loop that gives rise to the mood discrepancy (i.e. misregulation). Clearly, none of these actions will move the individual toward their goal, and all are considered a self-control failure within the primary behavior loop. As a result, the successful attainment of a goal will be determined by the individual's ability to exert self-control over the behavior loop, particularly when tempted to instead reduce the discrepancy in the mood loop - outside of the primary behavior loop. In other words, in situations where there is an incongruency between the behavior and mood loops, self-control exertion will be required over the behavior loop for successful goal attainment.

In the next section, the experience and implications of both good and bad moods will be described in an effort to examine the role each will play in self-control. The following section will then discuss the regulation of each of these states in order to provide evidence for the hypotheses of this dissertation. Finally, it will be argued that where individuals see a clear link between behavior and mood (i.e. a congruent goal), they will be motivated to exert self-control, and adjust that behavior to fall in alignment with the desired mood. In situations where there is not a clear link (i.e. an incongruent goal), individuals will be motivated to modify their mood in ways other than through a change in their initial, primary behavior, which will be considered a reduction in the exertion of self-control.

The Experience of Good and Bad Mood

Simon (1967) suggested that the mechanism responsible for the management of goals is emotion. Emotions appear to have the ability to change the relative ranking of the goals. The stronger the emotion felt, the stronger the desire will be to increase the ranking of importance, and thus the motivation to pursue that goal over others. For example, a woman may have a goal of losing weight for her wedding, and chooses to exercise to achieve this goal. However, as the wedding approaches, other goals intrude, causing anxiety and drawing more attention to those goals. The original goal for exercise, drops in importance and exercise behavior is reduced. As time goes on, her anxiety may become so intense that a new goal of reducing her anxiety develops and is pursued through means unrelated to the wedding. Importantly, this effect is not limited to negative states. If she exercised daily, and started to lose weight faster than expected, she

may feel joy. This feeling of joy would also allow the original, exercise goal to move down in the rankings, so that another, more pressing goal could move up, e.g. pick out a wedding cake.

Because moods are not tied to a specific event, they may cause the individual to redirect their focus to search for an associated discrepancy, or they may promote a reduction in effort toward a goal (Carver, 2004). Although every emotion does not tend to prolong itself into a mood, emotions do tend to result in a diffuse, global response, or one that will eventually entail a mood change (Ekman & Davidson, 1994). Thus, like emotions, moods have the potential to change the ranking of a goal, as they can stimulate the self to be more aware of an existing behavioral discrepancy. The specific efforts directed toward reducing a discrepancy in the behavior loop, however, are more likely dependant upon the type of mood experienced, as there are different consequences for being in a good and a bad mood.

Bad mood

There are numerous implications for bad moods that are in line with the Carver & Scheier (1998) model described above. The evolutionary developed response to a negative emotion prompts individuals to interrupt on-going goal pursuit and conserve physiological resources (Chrousos & Gold, 1992). Negative states stimulate the individual to systematically analyze the current situation and its potential for goal attainment and well-being (Carver & Scheier, 1998). A bad mood will induce self-focused attention (Sedikides, 1992) and will increase attention to the physical and somatic experiences of the individual (Stegen, Van Diest, & Van de Woestijne, 2001). It

will also lead to a preference for immediate smaller rewards over the more distant but larger rewards (Wertheim & Schwartz, 1983), and therefore reduce motivation to engage in any behaviors that require high effort for long term gains.

Each of these findings suggests that negative moods create an overriding motivation in humans to reduce these moods. Accordingly, there are several negative behavioral consequences for being in a bad mood. For example, negative moods are known to not only be related to relapses in specific and distinct behaviors, such as drinking alcohol, (McCreary & Sadava, 2000), gambling (Ricketts & Macaskill, 2004), and smoking (Conklin & Perkins, 2005), but also to other more abstract behaviors such as restrained eating (Chua, Touyz & Hill, 2004) and exercise (Stetson, Rahn, Dubbert, Wilner, Mercury, 1997). An individual's ability to exert self-control in the behavior loop is likely to suffer as a function of the extent to which a bad mood disrupts their goal directed behavior. The specific reasons for why certain behaviors are vulnerable to bad moods will be more precisely explained in a different section, however, if individuals are to be successful in focusing on the behavior loop, they must be able to either refrain from the temptation of focusing on the mood loop, or they must be able to modify their behavior in a way that will make the behavior loop congruent with the mood loop.

Good Mood

In comparison to negative states, the experience of positive states has only recently been studied. As a result, numerous cognitive and behavioral outcomes have been explained by comparing the results of positive and negative mood. Importantly, these results suggest that the specific experience of a good mood has implications beyond

not just being in a bad mood. The same evolutionary conserved mechanism does not draw the individual's focus to a specific goal, but instead indicates that any or all threats have dissipated, or that a specific goal no longer requires attention as it is being, or has been attained (Carver, 2003). Once all threats are reduced, there is an increased interest in play and exploration, as these may help to facilitate survival by increasing social bonds (Fredrickson, 1998). As a result, people in a good mood may be more likely to perceive that they have achieved their goals, or have made good progress on a project or task (Johnson & Tversky, 1983; Kavanagh & Bower, 1985). This may be due to an increased ability to be more efficient, flexible or creative when making complex decisions (Isen 1987), or it may be due to an increased ability to notice and take advantage of unforeseen opportunities (Carver, 2002).

This beneficial effect of a good mood has been shown to impact specific health outcomes. For example, numerous studies have found positive affect and good mood to be linked to improvements in both physical and mental functioning. These include beneficial effects on immune system functioning (Davidson, Kabat-Zinn, Schumacher, Rosenkranz, Muller & Santorelli, 2003), pain (Gil, Carson, Porter, Scipio, Bediako & Orringer, 2004), psychological growth (Fredrickson, Tugade, Waugh & Larkin, 2003), stroke (Ostir, Markides, Peek & Goodwin, 2001) and longevity (Danner, Snowdon & Friesen, 2001). As such, good moods are seemingly advantageous to both cognitive and behavioral outcomes. The changes that occur apparently allow the individual to operate in a way that will be beneficial. The mechanisms by which this may happen will be discussed in the next section.

Mood Regulation

Moods can be generated from dense emotional experiences (Ekman & Davidson, 1994). They can last an undeterminable amount of time, and they can potentiate and lower the threshold for arousing particular emotions (Ekman & Davidson, 1994). Current evidence suggests that people are not neutral and passive with their moods. Individuals spontaneously engage in mood management, using various strategies to maintain or attenuate their mood (Forgas, 2000). In effect, there are six possible routes of mood regulation: a person can try to get into, get out of, or maintain a good or bad mood (Tice & Bratslavsky, 2000). However, it appears that the most common experience is to minimize bad moods (Parrott, 1993) and maximize good moods (Larsen, 2004). It has been suggested that the failure to develop mood regulation abilities will lead to adult psychological disturbances (Greenspan & Porges, 1984), as poor mood regulation skills are a central feature in the development of mental illness (Steinfeld, 1990).

The strength of the motivation to adjust the current mood, however, may be determined by several factors. It is likely that the intensity, salience or situational context in which the mood is experienced will ultimately determine the motivation to regulate the mood (Gendolla, 2000). Most of the previous work in this area has centered on the kind of cognitive processing people utilize to regulate their moods. The traditional view of mood regulation is that all individuals are inherently driven to maximize positive states and minimize negative states (Atkinson, 1957). More recent research has maintained this view, but it has come under the evidence gathered for the Hedonic Contingency Model (HCM) (Wegner & Petty, 1994, 2001).

The HCM posits that there is a hedonic motive for all behavior. This means that the main goal of behavior is to maximize positive states while minimizing negative states. The theory predicts that behaviors that result in a more positive (or less negative) feeling state are rewarded, while those that result in a less positive (or more negative) feeling state are punished. Wegener & Petty (1994) argued that for people experiencing a sad mood, engagement in almost any activity would likely result in a less negative mood than their current mood state. As a result, a reward is likely to come without attention or scrutiny to the affective qualities of a chosen activity. On the other hand, for those experiencing a positive mood, only a narrow range of activities can elevate or maintain mood. Thus, happy individuals must carefully select their activities, as many tasks will lessen their mood.

Wegener & Petty have provided significant empirical support for this view, as they conducted several studies demonstrating that happy-induced participants were more calculated in their choices when compared to sad or neutral participants. For example, Wegener & Petty (1994) found that when participants were instructed to watch a set of videotapes, happy-induced individuals chose to watch more of the "happy" labeled tapes than those who were sad-induced or in a neutral mood. The authors suggested that the happy participants based their decisions more heavily on the affective labels of the videotapes than did the neutral or sad participants, and thus, put in more effort to manage their mood. Moreover, it was suggested that happy individuals adopt a mood-maintenance strategy in which they will carefully select information to process and activities to participate in that will allow them to maintain or elevate their mood.

It is currently thought that the underlying, basic motive of much behavior is to feel more pleasant than unpleasant affect, either in the short or the long term (Larsen, 2000). In fact, it was recently shown that the tendency to attend to the hedonic consequences of behavior is done automatically. Handley, Lassiter, & Nickell, (2004) induced participants into a happy, neutral, or sad mood and asked them to rank their preference for future activities (word-pairing) that were not consciously associated with a positive or negative state. It was found that the happy individuals based their preferences on the affective qualities of the future activities without realizing they were doing so. The authors therefore suggested that it is not necessary for the individual to be aware of their mood maintenance practices in order to act on them.

Despite the large support for the HCM, it is not without considerable criticism. If the HCM holds, for instance, why would anyone ever discontinue a behavior that provides hedonic benefits? Several authors have, therefore, suggested that it is an error to hypothesize that all individuals, in every situation, and at all times seek to enhance their mood. Martin (2000), for example, disagrees with the HCM, and states that people may be more likely to seek out positive moods over negative ones, but it should not be assumed that there exists a basic motivation to seek positive and avoid negative feelings. Behavior instead, should be assumed to be contextually sensitive, as situationally based expectations can clearly impact the goal of the desired mood state beyond the simple dichotomy presented thus far. For example, one might seek to attenuate a good mood when at a funeral. Thus, it appears that individuals are strategic in their mood regulating efforts, and movement in mood will proceed toward the desired state. For instance, people sometimes perform a behavior in order to feel good, but other times avoid that

same behavior for the same reason (Erber & Erber 2000). Martin, Abend, Sedikides, & Green (1997) suggest that the effects of mood on behavior depend on how mood is interpreted in the context of ongoing goals, and is not limited to the specific mood experienced. This is supported by other studies showing that people will often neutralize their mood state in order to satisfy instrumental goals (Erber & Erber 2000; Erber, Wegner & Therriault, 1996).

For example, in a series of studies, Erber, Wegner & Therriault (1996) first induced a happy or sad mood using music. Participants were then asked to choose an affectively labeled story to read before continuing on to the second part of the experiment, which would be conducted by a stranger or done alone. Those participants who expected to complete a second part of the experiment alone preferred to read stories with mood-congruent content: sad participants indicated a preference for depressing stories and happy participants preferred cheerful stories. However, those who expected to complete the second part of the experiment with a stranger preferred mood-incongruent stories. Specifically, sad preferred cheerful and happy preferred depressing stories. The authors suggested that this was a clear demonstration that individuals do not necessarily engage in hedonic motives, but instead choose to moderate their mood when motivated to satisfy a particular goal – in this case presenting a neutral front to a stranger.

This is an important distinction. Wegener & Petty (1994, 2001) have argued that all individuals maintain a goal of maximizing positive states and minimizing negative ones. Other researchers believe that mood plays a key role in goal pursuit, but it is not the final determinant of goal attainment. For example, many individuals are well skilled at delaying gratification. They postpone their immediate desires, which may include a

specific temptation to engage in mood enhancement, and they instead direct their efforts toward a task that will bring a more long-term benefit. The management of behavior, therefore, cannot only be isolated to the motivation to feel good. It instead involves a multitude of factors, including mood, that will inevitably determine the action or outcome of a behavior.

This notion is well supported by the Carver and Scheier (1998) action and rate feedback model (Figure 2). For example, in the Wegener & Petty studies, participants are merely asked to regulate mood, without a behavioral or goal-related consequence. A better test of mood regulation would present participants with a choice of modifying their mood in relation to a clear behavioral outcome. In assessing whether or not a participant has actually put effort into mood regulation, it would appear necessary to also challenge the participant to achieve a behavioral goal - one that is incongruent with the mood. In other words, requiring the individual to complete a task that will specifically challenge their ability to manage their mood will reveal the actual strength of the hedonic motivation relative to their ability to manage a behavioral goal. This is the major limitation to the previous studies that find an increase in hedonic tendencies. The participants are not faced with an additional challenge forcing them to choose which discrepancy to reduce – the behavior loop, or the mood loop.

Work by Gendolla (2000) helps to clarify the findings. Participants were first induced into a positive or a negative mood, and then asked each to perform an easy or hard memory task. All were told that a second phase of the study would involve exposure to pleasant, relaxing music. In the high motivation condition, participants were told that the prerequisite for hearing the music was contingent on the successful

completion of the first task. The low motivation condition did not receive performance-contingent access to the music. It was found that in the low motivation condition, the negative mood participants exerted little effort when completing the hard task, but exerted high effort when completing the easy task. Participants in a positive mood, in contrast, exerted little effort in the easy task, but exerted high effort in the hard task. In the high motivation conditions, the results were similar, except that participants in the negative-mood–hard condition exerted high effort. The authors suggested that the negative mood participants used more effort because high effort due to very high demand was justified only when success was highly instrumental for mood regulation. A similar argument is presented by Bell and Calkins (2000) who posit that not all behavior is guided toward maximizing pleasure and minimizing pain in the short run, but rather to investing efforts (and resulting mood) in endeavors and relationships that continue to pay affective dividends over time. Thus, it may be that individuals will be motivated to regulate their mood when either the effort required to do so is low, or if there is a specific and clear positive outcome that will result from using a high amount of effort.

As such, when behavior is clearly linked to a benefit in mood (i.e. when the behavior and mood goals are congruent), it appears that individuals will be driven to exert effort on that behavior. For example, in the above study, the participants in the negative-mood-hard condition exerted high effort in an attempt to gain an affective benefit. They put more effort into completing the memory problems so that success in that area would pay off with a rewarded, expected, mood change. By acting in a way that allowed their goals to be accomplished they aligned their mood and behavior loops. In contrast, when there is not a clear congruence between the behavior and mood goals,

performance on the primary behavior will suffer. The participants that put in little effort had no reason to exert more self-control, as the behavior did not offer this same congruency.

The challenge for self-control, then, is when there is a lack of congruency between the primary behavioral loop and the mood loop, and alternative behaviors are sought as a means to regulate mood outside of the primary behavior.

Conclusion

The relationship between mood regulation and self-control exertion is complex. The ability to exert self-control, regardless of current mood, is problematic for many individuals. A focus on additional tasks (e.g. those related to mood regulation outside of the primary behavior loop) will reduce the chances of successfully completing the primary behavior. The inherent experiences of good and bad mood seem to promote and reduce, respectively, the ability of the individual to self-regulate. As a result, an interesting predicament develops. The person is faced with two questions. First, how strong is the motivation to change the mood (i.e. how tempting is it to engage or disengage in other behaviors that will reduce the discrepancy felt in the mood loop); and second, is the behavior that is required to accomplish a particular, likely immediate, goal congruent with a desired change in mood, a reduction in the mood loop discrepancy.

Current evidence suggests that if the existing mood is not sufficiently strong enough to increase the motivation to change it, the individual will maintain self-control in the behavior loop. If the mood is too powerful, however, the person will likely succumb to temptation, and engage in a behavior that will only moderate the experienced mood.

Thus, in order for a task to be accomplished in this situation, a congruent goal that will reduce the discrepancies of both the mood and behavior loops needs to be salient to the individual. As the person cycles through potential behaviors to engage in, they will be selected based on: (1) the salience of the behavior to the current mood; (2) their belief that the behavior will be sufficiently completed to result in a desired mood; and (3) the effort needed for the task.

In conclusion, it appears that bad moods result in reduced effort, which has been interpreted as poor self-control; and that good moods energize behavior, which has been interpreted as enhanced self-control. However, rarely has a task been utilized that combines a challenge to self-control with the potential for mood enhancement. That is, participants are generally forced into a situation in which the behavior loop is incongruent with the mood loop. Although Gendolla (2000) allowed for a link between these, they limited participants to a self-control challenge that merely provided access to another set of behaviors that might be used to regulate mood. Thus, there is no existing study that has provided a challenge to self-control that directly manipulates the congruency of the mood and behavior loops. This dissertation is designed to fill this void.

CHAPTER 3
METHODS

This dissertation used an objective exercise task to measure self-control ability following a mood induction manipulation. Participants were required to exert themselves both physically and mentally in this study. Subjective and objective measurements were used in an effort to fully capture an accurate assessment of the results.

Hypotheses

1. There will be a main effect for the mood experienced.
    a. Individuals in a positive state are expected to complete more repetitions compared to individuals in a negative or neutral state.
    b. Individuals in a negative state are expected to complete less repetitions compared to than those in a neutral state.
2. There will be a main effect for the mood expectations.
    a. Individuals expecting to experience a positive state are expected to complete more repetitions compared to individuals expecting to experience a negative state.
3. There will be an interaction between mood experienced and mood expected.
    a. Individuals in a positive state expecting to experience a future positive state will complete less repetitions than individuals in a negative state expecting to experience a positive state; and more than those in a neutral state expecting to experience a positive state.

b. Individuals in a positive state expecting to experience a future negative state will complete more repetitions than individuals in a negative state expecting to experience a future negative state; and less than those in a neutral state expecting to experience a negative state.

4. There will be a main effect for self-control ability.

a. Individuals with more self-control will complete more repetitions than individuals with less self-control.

Participants

Participants were 152 healthy, university males (74.3%) and females (25.7%) between the ages of 18 and 49 recruited from the PED 106C Weight Training classes. The mean age of the participants was 20.6 (SD=3.1); 52% identified themselves as White, 21.1% were Asian-Pacific Islander, 19.1% were Latino, 3.9% were Black, and the final 3.9% identified as Other or 2 or more. The mean height was 68.6 inches (SD=3.6) and the mean body weight was 161.5 lbs. (SD=31.8). All participants had experience with weight training, and in particular the squat, as defined by at least four weeks of regular resistance exercise (two or more days per week), prior to the date of recruitment.

Experimental Design

This study was a randomized, controlled, cross sectional design. Participants were randomized into 1 of 6 groups according to a 3X2, between subjects factorial design.

Power Analysis

A power analysis was conducted with PASS. With a balanced 3X2 design, alpha set at .05, and having more than 20 individuals in each cell, this experiment had sufficient power to detect small effect sizes of 0.36 and 0.35 for the main effects of mood induction and expected mood, respectively; and the interaction effect size of 0.33.

Instruments

Subjective Measures

Previous research in this area has shown that a clear distinction needs to be made between positive and negative mood, and not just a lack of a positive or negative mood in each condition (Aspinwall, 1998). In other words, it is important to have a condition where participants actually feel good and actually feel bad, as opposed to a situation in which one condition has participants that actually feel good, and another condition where the participants are just not feeling good to the same level. This distinction will allow for the analysis to distinguish between the effects that are due to the presence of the mood, and not just its absence. As such, a successful good and bad mood manipulation is required for this study to be executed. The following measures will be used to fully capture the change in global valence and arousal experienced by the participants, and thus provide a complete mood manipulation check.

Positive and negative psychological states were measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; Appendix B). The PANAS is a 20-item questionnaire with positive (interested, excited, alert, etc.) and

negative (guilty, nervous, upset, etc.) affect subscales. It is scored on a 5-point Likert-type scale anchored with "very slightly or not at all" and "extremely." The subscales of positive affect (PA) and negative affect (NA) are calculated by summing the 10 items for each valence that may range from 10-50 in each scale. The mood descriptors were selected after factor analytic studies found relatively pure markers of high PA or high NA (Watson, Clark, & Tellegen, 1988). The 10-item subscales of the PANAS showed good internal consistency reliability in this sample (α=.92 for PA and α=.84 for NA). The PANAS is regularly used with exercise studies, and has shown acceptable validity (Bartholomew & Miller, 2002).

Although the PANAS effectively captures the specific mood state of the participant, it is purposefully being used as the manipulation check. The more specific experience of affective valence and level of arousal will be measured with additional psychological assessments. Asking participants to rate their feelings beyond these measures, however, could cause them to focus on their feelings, and in fact, change the induced mood (Schwarz & Clore, 1983). Thus, only two other brief measures in addition to the PANAS will be used in an effort to protect against this error.

Affective valence was measured with the Feeling Scale (FS; Hardy and Rejeski, 1989; Appendix C). The FS is an 11-point, single-item measure of the pleasure–displeasure dimension of affective response during physical work. The scale ranges from +5 to –5 with anchors provided at the 0-point ("neutral") and at all odd integers, ranging from "very good" (+5) to "very bad" (-5). The FS has been shown to be sensitive to the demands of physiological tasks, such as exercise. The FS was significantly correlated to PA, R=.57; and NA, R=-.49, in this sample.

Arousal was measured with the Felt Arousal Scale (FAS; Svebak and Murgatroyd, 1985; Appendix D). The FAS is a 6-point, single-item measure of perceived activation. The scale ranges from 1 to 6, with anchors at 1 ("low arousal") and 6 ("high arousal"). The FAS was significantly correlated to PA, R=.43; and NA, R=-.16, in this sample, and has been used extensively with exercise-related studies with similar internal consistencies and external validity (Ekekakis, Hall, Van Landuyt & Petruzzelo, 1999; Kerr & Van den Wollenberg, 1997).

Objective Measures

Self-control ability, the exertion of control over an inherent impulse or natural tendency, was be tested using a handgrip endurance task. The task utilizes a commercially available hand exerciser. It is a two-handle device connected by a spring; squeezing the handles together compresses the spring. A piece of paper was placed between the handles so that on the closed position the paper was held in place. When the participant released his or her grip, the paper fell out. Time was recorded in seconds with a stopwatch. This procedure was a direct replication of the method used by Muraven, Tice & Baumeister (1998). These data were used to indicate the participant's baseline level of self-control ability.

One of the limitations with handgrip endurance as a measure of self-control ability is that it is related to physical strength – specifically handgrip strength. As a result, maximal handgrip strength was collected and controlled for in the analysis. Maximal handgrip was assessed using a handheld dynamometer. Participants sat with their arms by their side and squeezed a hand dynamometer as hard as possible with an

overhand grip for 3 seconds. The instrument was not allowed to touch the body and the participant was not allowed to bend at the elbow. Each participant completed three trials under the observation of an experimenter who ensured that there is no break in protocol. Values were recorded in kilograms, and the average of the three trials is reported. This procedure is a direct replication of the method used by Merlini, Mazzone, Solari, & Morandi (2002).

The squat challenge consisted of placing a barbell across the shoulder, loaded to 55-60% of 1RM, and then asking participants to lower their body into an approximately parallel squat position (i.e. knees angle at roughly 90°) for as many repetitions as possible. Proper execution of the squat requires the individual to exert a significant amount of self-control; as such, it was the primary outcome measure in this dissertation. Although novel in self-control research, the squat challenge was selected for three reasons. First, it is a real world task that represents an important challenge facing regular weight lifters. Exerting effort to continue doing more repetitions when lifting weights determines the intensity of the exercise, a key variable required for changes in fitness. Second, it is a task that demands the participant continually exert self-control. With each additional repetition, the task becomes more and more difficult, as physiological mechanisms start to fatigue the muscles being used. Third, the squat is a core exercise in resistance exercise and it will therefore not be a task that confounded by being novel.

The intensity of the squat was set at 55-60% of 1 RM because both males and females would be expected to perform 25 repetitions at this weight (Baechle & Earle, 2000). This measure, therefore, provided a clear criterion against which to judge self-control exertion, i.e. their performance relative to 25 repetitions.

Maximal squat was assessed using the method described by Baechle & Earle (2000). Participants first warmed-up with light resistance. The experimenter then progressively increased the weight, allowing the participant to rest (up to four minutes) in between weight changes. An initial attempt was be made by the participant to perform a 1RM. The weight was then increased or decreased depending upon the performance. Successful completion of a 1RM ended the test.

Procedure

Participants were recruited from classes beginning in the fourth week of January 2006, in the Spring semester. Participation in this study was used to make-up two classes that the participant may have missed at anytime during the semester. As a result, participation in this study was one of several activities students could use to make up an absence.

All participants were required to make two appointments, both of which took place in the Exercise Psychology Laboratory (EPL, 849 Bellmont Hall), and weight training room (502 Bellmont Hall). During the first session, each participant filled out an informed consent and was then asked to complete the subject information sheet. Each then performed the maximal handgrip strength test, the handgrip endurance test, and the 1RM squat.

Upon arrival at the second appointment, the participant first completed the PANAS, the FAS, and the FS. Depending upon the randomly assigned manipulation (positive or negative mood expectation), the participant then listened to the experimenter recite one of the following scripts:

Positive mood expectation: “Today you are first going to do a writing memory exercise. You will then do a squat test downstairs in 502. It is important that you try to do as many repetitions as you possibly can. This can be difficult as working to fatigue may be uncomfortable, but keep in mind there has been a lot of research that exercise can cause a positive impact on your mood. One of the primary explanations has been the release of endorphins, the body’s natural pain killers, which seem to be released in proportion to the degree of fatigue. So, while you wouldn’t expect to experience a heavy endorphin release with a normal workout, research shows that working to full muscular fatigue will produce the effect. So, the harder you work, the more endorphins will be released, and the better you will feel during recovery. Therefore, please do your best to complete as many repetitions as you possibly can, and go to failure on this exercise.”

Negative: “Today you are first going to do a writing memory exercise. You will then do a squat test downstairs in 502. It is important that you try to do as many repetitions as you possibly can. This can be difficult as working to fatigue may be uncomfortable, and a lot of research has shown that fatigue can cause a negative impact on your mood. One of the primary explanations has been the release of lactate, the body’s natural response to heavy exercise, which seems to be released in proportion to the degree of fatigue. So, while you wouldn’t expect to experience a heavy lactate release with a normal workout, research shows that working to full muscular fatigue will produce the effect. So, the harder you work, the more lactate will be released, and the worse you will feel during

recovery. Despite this, please do your best to complete as many repetitions as you possibly can, and go to failure on this exercise."

Following this, the participants were asked to complete the second randomly assigned manipulation, a positive, negative or neutral mood induction. To induce mood, participants were asked to share three instances in which they were especially happy or sad. They indicated the most significant event, and were asked to write (on a computer) about the event for 8 minutes. They were encouraged to re-experience the event to the best of their ability, allowing the emotions to overtake them during writing. Control participants copied one page of text from a nutrition textbook. This was used as it was bland text without emotional triggers, and seemed to be somewhat related to exercise. All participants were left alone in a room. Further, they were told that the writing would not be read by anyone, and that they would be able to delete the writing personally. This type of manipulation has been used as a valid means of inducing mood states (Trope & Neter, 1994), and has been used successfully within our laboratory. Previously, we found a .48 effect size reduction in positive affect, and a .53 effect size increase in negative affect when asking participants to write about a negative event in their life. Once the mood induction was complete, the participant immediately filled out the PANAS, the FAS, and the FS, and was then directed to 502 for the squat challenge. Prior to the squat challenge, the participant was reminded of the expected mood manipulation. The experimenter said:

Positive mood expectation: "You are now going to do the bench press challenge. As a

reminder, it is important that you try to achieve a maximal number of repetitions. Even though this will be difficult, it will make you feel better, so try to do your best to complete as many repetitions as you possibly can, and go to failure on this exercise."

Negative mood expectation: "You are now going to do the squat challenge. As a reminder, it is important that you try to achieve a maximal number of repetitions. Even though this will be difficult, and will make you feel bad, try to do your best to complete as many repetitions as you possibly can, and go to failure on this exercise."

Immediately after completing the squat challenge, the participant was debriefed about the purpose of the study and dismissed.

Timeline

Task 1. Subject Recruitment & Initial Data Collection, Weeks 1-8:

a. Initiate, confirm, and secure contacts for participant pools.
b. Recruit participants.
c. Begin preliminary testing: maximal handgrip strength test, handgrip endurance test, and 1RM bench press.
d. Schedule second appointment.

Task 2. Second Appointment & Data Collection, Weeks 2-10:

a. Testing: psychological assessments, mood induction and bench press challenge.
b. Participant debriefing.

Statistical Analyses

The number of squat repetitions served as the primary dependent variable. These data were analyzed through a 3 (mood induction) X 2 (expected mood) ANOVA. Hypothesis #1 was tested through the main effect of pre exercise, induced mood. Hypothesis #2 was tested through the main effect of post exercise mood expectations. Hypothesis #3 was tested through the test of interaction between these factors.

To test the effects of trait differences in self-control strength, the above analysis was repeated with handgrip endurance entered into an ANCOVA as the covariate. This provided a test for Hypothesis #4. Handgrip strength was controlled for prior to entering handgrip endurance into the equation. A simple linear regression was also conducted on handgrip endurance as a predictor of the number of repetitions completed.

Effect sizes were calculated as Cohen's d statistics (Cohen, 1992) for all univariate comparisons.

CHAPTER 4
RESULTS

The purpose of this study was to examine the role of mood in a physical activity task that requires self-control. The main variable of interest, the dependent variable, utilized squat exercise. Individuals were challenged to complete as many squat repetitions as they could within a single bout of exercise. It was hypothesized that the mood induction would result in differences in self-control as indicated by the number of repetitions completed. This chapter will address these aims through a presentation of:

1. The descriptive statistics for the sample.
2. The correlations for the interrelated measures of mood.
3. An ANCOVA using the pretest affect score (i.e. positive or negative affect) as the covariate for the manipulation check for the mood induction.
4. A 3x2 ANOVA utilizing the main dependent variable, and designed to test Hypotheses 1, 2, and 3; and two linear regressions testing the change in mood score as a predictor of the main dependent variable.
5. A simple linear regression testing self-control (SC) as a predictor of the main dependent variable (Hypothesis 4).
6. An ANCOVA to test the effects of mood while controlling for SC, and a linear regression to test the main effects of mood and SC (regardless of condition) and their interaction.

Descriptive Statistics

Baseline demographic data is presented in Table 1, and a correlation matrix of all variables is presented in Table 5. There were no significant differences for any of the

demographic variables amongst any of the assigned conditions. Participants were 152 healthy, university students between the ages of 18 and 49, and they were recruited from the PED 106C Weight Training classes. The mean age of the participants was 20.6 (SD=3.1); 52% identified themselves as White, 21.1% were Asian-Pacific Islander, 19.1% were Latino, 3.9% were Black, and the final 3.9% identified as Other or 2 or more. The mean height was 68.6 inches (SD=3.6) and the mean body weight was 161.5 lbs. (SD=31.8). However, there was a large difference between the number of males (n=113) and females (n=39). Despite an equal distribution across conditions, gender differences were tested. Not surprisingly, there was a significant difference between genders for height [$F(1,151) = 95.16$, $p<.01$], weight [$F(1,151) = 56.94$, $p<.01$], one repetition maximum (1RM) [$F(1,151) = 100.93$, $p<.01$], handgrip strength [$F(1,151) = 128.67$, $p<.01$], and handgrip endurance [$F(1,151) = 17.21$, $p<.01$].

Table 1. Descriptive Statistics (n=152)

	Mean (SD)	Range
Age	20.6 (3.1)	18-49
Weight (lbs)	161.5 (31.8)	105-310
Height (inches)	68.6 (3.6)	58-78
1RM (lbs)	200.3(62.5)	75-365
Handgrip Strength (kg)	40.4 (11.1)	15-64
Handgrip Endurance (secs)	46.4 (27.1)	3-144

Manipulation Check

The Feeling Scale (FS), Felt Arousal Scale (FAS), and Positive And Negative Affect Schedule (PANAS) were used to assess the mood manipulation. The FS and the FAS were specifically used to ensure that the PANAS was fully capturing both the

affective and arousal states of the participants. Each of the post-mood manipulation measures were found to be significantly correlated in the expected direction to a corresponding measure. These data are presented in Table 2.

Table 2. Correlations Among Mood Measures (n=152)

	PA	NA	FS	FS
PA	1.000			
NA	-.148	1.000		
FS	.566**	-.494**	1.000	
FAS	.428**	-.159*	.493**	1.000

*p<.05; **p<.01

In order to determine the differences in positive affect (PA) and negative condition (NA) among the groups, an ANCOVA was performed using the pretest affect (i.e. PA or NA) score as the covariate. Significant results were found [F(1,146) = 14.01, p<.01], and post-hoc tests revealed that participants assigned to the positive mood induction condition were found to score significantly higher in PA when compared to the negative condition [F(1,97) = 106.67, p<.01, ES=.52]; and when compared to the control condition [F(1,99) = 89.51, p<.01, ES=.47]. In addition, participants assigned to the negative mood induction condition were found to score significantly higher in NA when compared to the positive condition, [F(1,97) = 57.73, p<.01, ES=.37]; and when compared to the control condition [F(1,99) = 50.50, p<.01, ES=.34], and were found to score significantly lower in positive affect when compared to the control condition [F(1,99) = 19.43, p<.01, ES=.16]. Finally, there were no differences in NA between the positive mood induction condition and the control condition [F(1,99) = .68, p=.42,

ES=.01]. Thus, it appears that the mood induction was successful, and a comparison of conditions appropriate. These data are presented in Table 3.

Table 3. Differences in PA and NA at Post Mood Manipulation (N=152)

	Positive Affect Mean (SD)	Negative Affect Mean (SD)
Positive Induced Mood n=50	33.7 (7.0)	12.9 (4.1)
Negative Induced Mood N=50	23.2 (7.3)	17.1 (5.9)
Control Condition N=52	29.0 (6.9)	13.0 (3.3)

Hypothesis Testing

A 3 (mood induced: positive, negative, control) x 2 (mood expectation: positive, negative) ANOVA was conducted on the number of squat reps completed in order to test Hypotheses 1, 2, and 3. These data are presented in Table 4. Hypothesis 1 was disconfirmed as there was no significant main effect for mood induction [F(2,146) = 1.47, p=.23]. Hypothesis 2 was also disconfirmed as there was no significant main effect for mood expectation [F(1,147) = 0.13, p=.72]. Finally, Hypothesis 3 was disconfirmed as there was no significant interaction between groups [F(2,146) = 1.87, p=.16].

Because this study manipulated mood, the participant's change in mood (i.e. posttest minus pretest) was also analyzed in order to determine if the change in mood impacted the number of squat repetitions completed. Therefore, two linear regressions were done using the change scores for PA and NA. The first testing the main effects and interaction of a change in mood score for PA and the baseline SC, and the second, testing the main effects and interaction of a change in mood score for NA and the baseline SC.

There was no main effect found for a change in PA [β = .076, t(150) = .948, p=.34, R^2=.059], but there was a main effect for SC [[β = .214, t(150) = 2.682, p<.01, R^2=.059], and there was no interaction [[β = -.070, t(150) = -.868, p=.39, R^2=.059]. The results for a change in NA were similar to those above, with no main effect for a change in score for NA [β = -.048, t(150) = -.588, p=.56, R^2=.050], with a main effect for SC [β = .214, t(150) = 2.665, p<.01, R^2=.050], and no interaction [β = -.043, t(150) = -.52, p=.60, R^2=.050]. Thus, the results from the 3x2 ANOVA hold even when using the change scores as the predictors of behavior.

Table 4. Repetitions Completed by Condition.

	Positive Expectation Mean (SD)	Negative Expectation Mean (SD)	Totals N=152
Positive Induced Mood	30.2 (12.0) n=24	33.5 (9.2) n=26	31.9 (10.7) n=50
Negative Induced Mood	29.2 (11.9) n=25	28.8 (9.0) n=25	29.0 (10.4) n=50
Control Condition	30.9 (9.8) n=27	26.1 (11.5) n=25	28.4 (10.9) n=52
Totals n=152	30.1 (11.1) n=74	29.4 (10.3) n=78	

A simple linear regression was conducted with SC as the predictor and squat repetitions as the dependent variable in order to test Hypothesis 4. In contrast to the above hypotheses, Hypothesis 4 was confirmed. SC was found to be a significant predictor of the number of reps completed [β = .217, t(150) = 2.72, p<.01, R^2=.042]. See Figure 3. Considering the impact of SC on the dependent variable, it may be that the

effects of mood on reps was masked by the effects of SC. As a result, a 3x2 ANCOVA was done to test Hypotheses 1, 2, 3. This revealed a similar pattern of results as in the original ANOVA, with no effect being found for mood induction [F(2,145) = 1.66, p>.05], and mood expectation [F(1,146) =.175, p>.05], nor did these variables interact with SC as the covariate [F(2,145) = 1.24, p>.05].

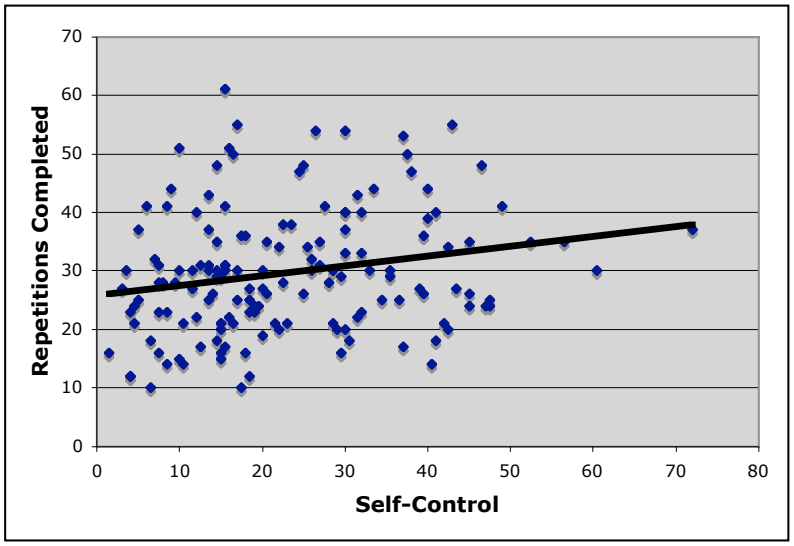


Figure 3. Repetitions Completed vs. Self-Control (self-control data were rescaled)

Thus, it appears that a manipulated mood is unrelated to physical activity behavior, as operationalized in this dissertation. Although the manipulation check supported the success of the mood manipulation, it may be that variability in mood within each condition remained, masking the effects of mood on this physical activity behavior. To test for this possibility, three simple linear regressions were performed using the absolute values of positive affect (PA), negative affect (NA), and PA minus NA (PAMNA) (collected prior to performance) and SC as predictors, with squat reps as the dependent variable.

The first regression showed a marginal main effect for PA [β = .151, t(148) = 1.92, p=.056, R^2=.093]; there was a significant main effect for SC [β = .224, t(148) = 2.85, p<.01, R^2=.093]; and there was also a marginal interaction for PA and SC [β = -.145, t(148) = -1.84, p=.067, R^2=.093]. A second regression analysis was performed using NA and SC as predictors of the number of reps. There was no main effect for NA [β = .186, t(148) = -.01, p>.05, R^2=.049]. The significant main effect for SC held [β = .207, t(148) = 2.50, p<.01, R^2=.049], and there was no effect for the interaction of NA and SC [β = .234, t(148) = -.05, p>.05, R^2=.049]. A final regression was performed using PAMNA and SC. There was no main effect for PAMNA [β = .074, t(148) = .91, p>.05, R^2=.054], with the significant main effect holding for SC [β = .216, t(148) = 2.69, p<.01, R^2=.054], and there was no significant effect for the interaction of PAMNA and SC [β = -.030, t(148) = -.38, p>.05, R^2=.054].

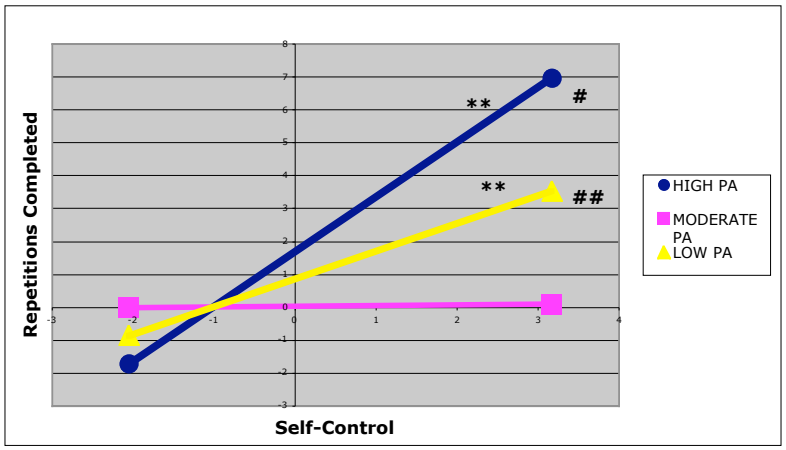


Figure 4. Self-Control and Positive Affect Interaction (data were rescaled) **=sig. different from 0, p<.01; #=sig. different from low and moderate groups, p<.01; ##=sig. different from moderate, p<.01.

In an effort to use this dissertation as a learning tool, the marginal interaction between PA and SC was probed utilizing the procedures outlined by Aiken & West (1991). These procedures require a number of steps. First, the regression equation was

recast by isolating PA. It was then plotted by substituting three values into the equation, generating three simple regression lines. As Cohen & Cohen (1983) suggest, the three Z-values chosen were: 1) one standard deviation below the mean (low PA group), 2) the mean (moderate PA), and 3) one standard deviation above the mean (high PA). Once plotted (Figure 2), the slope of each line was tested against zero. Both the high PA [$t(1, 150) = 6.14$, $p<.01$] and low PA groups [$t(1, 150) = 4.50$, $p<.01$] were found to be significantly different than 0, but the moderate group was not [$t(1,150) = .75$, $p>.05$]. Finally, all three groups were tested against each other in order to determine if each was significantly different from one another. The high group was significantly different from the low [$t(1,150) = 2.38$, $p<.01$] and moderate groups [$t(1,150) = 5.99$, $p<.01$], and the low group was significantly different from the moderate group [$t(1, 150) = 4.18$, $p<.01$].

Table 5. Correlation Table.

	REPS	STRENGTH	ENDURANCE	PA	NA	FS	FAS	PAMNA	GENDER	HEIGHT	WEIGHT	1RM
REPS	**1.000**											
STRENGTH	**.053**	**1.000**										
ENDURANCE	**.217****	**.450****	**1.000**									
PA	**.154**	**.058**	**.008**	**1.000**								
NA	**.000**	**-.021**	**-.068**	**-.148**	**1.000**							
FS	**.105**	**.044**	**.067**	**.566****	**-.494****	**1.000**						
FAS	**.201***	**-.071**	**.001**	**.428****	**-.159***	**.493****	**1.000**					
PAMNA	**.087**	**.083**	**.071**	**.527****	**-.526****	**.458****	**.304****	**1.000**				
GENDER	**-.021**	**-.680****	**-.321****	**-.053**	**-.088**	**.027**	**-.128**	**.055**	**1.000**			
HEIGHT	**-.076**	**.579****	**.292****	**.008**	**.003**	**.036**	**-.014**	**-.047**	**-.623****	**1.000**		
WEIGHT	**-.075**	**.595****	**.272****	**.027**	**-.042**	**-.128**	**-.128**	**.020**	**-.525****	**.566****	**1.000**	
1RM	**-.036**	**.624****	**.339****	**.117**	**.022**	**.036**	**.865**	**.043**	**-.634****	**.478****	**.673****	**1.000**

* = p < .05, ** = p < .01

CHAPTER 5
DISCUSSION

This dissertation was designed to determine the role of mood in common physical activity task that requires self-control. The specific focus was to differentiate between positive and negative mood states, and determine how each of these may impact an individual's behavior, primarily when the behavior is dependent upon self-control exertion. The results suggest that mood within an average range is insufficient to influence behavior. The results also suggest individuals will refrain from using this physical activity task to manage their mood. Although these findings are not consistent with other studies conducted on mood and self-control, there are a number of unique factors that may contribute to the dissimilar results.

Main Effect for Mood

Numerous studies have demonstrated that intense moods can decrease the focus and attention given to an immediate goal (Compton, Wirtz, & Pajoumand, 2004), and that they can also stimulate mood management efforts (Tice, Bratslavsky, & Baumeister, 2001). This shift in attention/priority from the task at hand to the mood is expected to result in reduced self-control exertion. As mood was successfully manipulated in this study (ES=.38 for positive affect induction and ES=.44 for negative affect induction) any change in self-control was expected to be manifested by a reduction in the number of squat repetitions completed until volitional exhaustion. The data failed to support this prediction.

The first and most plausible explanation is that while the mood induction was successful, the resulting moods were insufficiently intense to draw attention/priority from the task at hand. For example, in this study, the post-manipulation mood scores were 33.7 (SD=7.0) for PA in the positive mood induction condition, and 17.1 (SD=5.9) for NA in the negative mood induction condition. When compared to the normative scores on the PANAS, however, it appears that mood was not manipulated to a particularly intense level. For example, the normative adult scores on the PANAS are 31.3 (SD=7.6) for PA, and 16.0 (SD=5.9) for NA (Crawford & Henry, 2004). Thus, it appears that while the mood manipulation was successful, it did not provide a significantly intense mood state beyond the normative data. The manipulation, instead, seemed to only slightly increase PA in the positive condition, and slightly increase NA in the negative condition. This, however, is not a limitation. A manipulation of mood within the average range serves to increase the generalizability of the findings of this study, as it considers a wide range of moods that may be experienced over the course of a typical day. It does, however, leave open the possibility that only a particularly intense mood would likely be sufficient to modify behavior. However, any study that induced such an intense mood change would likely cross an ethical boundary. Given that this study manipulated mood to a normative level, it is not a failure of the proposed method execution, but simply, a null effect.

A second reason for the null effect may be related to the mood assessment timing and techniques used. Simply asking participants to rate their feelings before and after the manipulation, with three different measures, could have caused them to focus their attention on feelings presented by the questionnaires, and not those actually experienced.

The salience of an experienced mood is less impactful when participants misattribute their momentary experienced feelings for those that are asked to be rated (Schwarz & Clore, 1983). That is, the narrow assessment of positive and negative affect may shift mood to these constructs, and away from those that might actually be experienced. This sort of error would be expected to increase the within subject variation, obscuring any subsequent impact on behavior.

Despite the above, there was a significant main effect for absolute PA on the number of squat repetitions. This finding agrees with previous studies that have reported a positive mood state to energize self-control exertion (Baumeister, 2002). However, there was also a marginally significant interaction between positive affect and self-control on squat repetitions (p=.06). This was decomposed according to the procedures outlined by Aiken and West (1991). The results of this analysis are presented in Figure 2.

These data indicate that self-control has little effect on squat repetitions when PA is moderate. Self-control, however, becomes a more important predictor of behavior as PA moves in either direction. This was unexpected and does not easily fit within a single theory of self-control. For instance, it appears that at high levels of baseline self-control, low PA will increase the number of squats done, but only in comparison to the amount done by the moderate PA group. Were this study to follow the literature, and an individual could exert more self-control when feeling high PA, then it would follow that the moderate PA group would have done more repetitions than the low PA group. Yet, this is not the case. Instead, self-control is most influential at both extremes of mood. It may be that the intense mood conditions created a drive to manage the mood. Those with high PA had an increases ability to exert self-control, and therefore completed more

repetitions. Although a plausible explanation, it does no apply to the findings for low baseline self-control.

When considering low levels of baseline self-control, those experiencing high PA completed the least number of squat repetitions. Those experiencing low PA did more than the high PA group, but less than the moderate PA group. Again, there is no literature to support this finding. It may be that when individuals with low self-control experience an extreme good mood (high PA), they engage in mood management in an effort to protect this good mood. They chose to refrain from engaging in a behavior that may threaten their mood (i.e. they do less squats). In comparison, those who feel very low PA are not engaging in mood management, or at least not to the same extent as those who feel high PA, and therefore do more squats than the high PA group. This difference may be due to what psychological processes are measured with PA. For instance, low PA does not signify feeling bad per se – they may feel merely neutral. Therefore, efforts to reduce the low PA may not be as powerful as those efforts to maintain high PA, and the number of squats completed would differ.

Nonetheless, any interpretation of these results must be done cautiously, as these data trends appear to be unique to this study. The above findings suggest that intense mood interacts with baseline self-control, and both of those with high and low baseline self-control may be at the mercy of their experienced affect. It seems that when an intense mood is experienced, (e.g. very high or low PA), a behavior change occurs in line with one's level of self-control.

A final explanation for the null effect of mood could be the combined influence of mood intensity and motivation to complete the task. As stated, the mood manipulation

done in this study was successful, and it is comparable to other studies that have manipulated mood. For example, Rucker & Petty (2004) showed changes in behavior with an ES=.33; as did Erez & Isen (2002) with an ES=.21 mood change. Thus, the participants in this study had a similar mood change as those in other studies; yet, in this study it did not influence their behavior. It could be, then, that the motivation to complete the squat task had a much stronger influence on behavior than mood. Although motivation was not measured in this study, it could have drawn attention to, or created a goal outside of that which was stated in the study.

For example, all the participants in this study were taking the PED 106C Weight Training class. They were challenged to complete as many squat repetitions as they could - a task that is a part of every class. Thus, simply avoiding the cognitive dissonance that would result from doing poorly would have provided enough motivation to do well. Other issues such as the motivation to follow the directions of the experimenter; the motivation to complete the study in order to receive full class credit; the high amount of motivation it takes to just execute a squat; or even just viewing this exercise as a 'class quiz' could have motivated the participants. In addition, the assigned spotters watched each participant, and any existing self-presentational concerns were likely impacting their motivation to succeed in the task.

Effect for Mood Expectation

The main effect for mood induction was expected to be moderated by mood expectation. That is, when behavior is clearly linked to a benefit in mood, it appears that individuals will be driven to exert effort on that behavior. In fact, it is thought that

regularly people attend to their moods, and they will use various mood management techniques in order to maintain or lessen their mood (Forgas, 2000). Therefore, it was thought that the manipulated mood participants would either seek to protect or reduce their mood depending upon the type of mood experienced. In other words, they would either reduce their effort in the squat task when primed with a negative mood expectation (i.e. lactate release), or they would increase their effort when primed with a positive mood expectation (i.e. endorphin release). However, there was neither a main effect for mood expectation nor an interaction between mood manipulation and expectation in this study.

Because individuals will use mood management techniques when the mood is intense, when the effort required to do so is low, or when there is a specific and clear positive outcome that will result from using a significant amount of effort (Gendolla, 2001; Bell & Calkins, 2000), three explanations for the results are possible.

First, as previously stated, the experienced mood was not intense enough. The participants were not stimulated to alter or manage their mood, and therefore, attempts to use the squat task as a mood management tool were not evident.

Second, the physical effort needed to carry out the task, regardless of the expectation, was high. Thus, even the participants who were expecting a negative outcome had to put in a considerable effort. The squat is, after all, a difficult and complicated exercise that requires both skill and concentration. As such, it would follow that the participants would only put in a statistically larger effort when a clear positive outcome was expected. This may have not been the case, as the benefit to be gained from a higher effort may have not been clear.

Which leads to the third likely reason there was no difference between conditions. The participants may have not believed the experimenter with regards to the mood expectation manipulation. This was an unavoidable and uncontrolled error in this study. Because all the participants had previous weightlifting experience, it is possible that a real-life experience with "going to failure" with a weightlifting exercise was a more believable and realistic outcome than that which was primed by the experimenter.

It should be noted, however, that after debriefing the participants, most said that they believed the expectation manipulation, but that changes in mood were ancillary when actually doing the squats; further providing evidence that the mood experienced had not reached a particular threshold or level of intensity in this study, and mood management was therefore not a key interest.

Main Effect for Self-Control

As previously reported in the regression with absolute PA, self-control was a significant predictor of the number of repetitions completed – which confirmed Hypothesis 4. This was not surprising, as numerous studies have shown self-control, as measured with the handgrip endurance test, to be associated various behavioral outcomes (Ciarocco, Sommer & Baumeister, 2001; Muraven & Baumeister, 2000; Muraven, Tice & Baumeister, 1998). Thus, this specific result in this dissertation is in-line with previous reports that have found participants with lower levels of self-control to be less likely to persist at tasks that require self-control.

It may be that these tasks, however, reflect a spurious relationship due to an unmeasured variable. Specifically, Gailliot and colleagues (2006) showed that low levels

of blood glucose predicted poor performance on a self-control task, and that consuming a glucose drink eliminated these impairments. The authors suggested that acts of self-control deplete blood glucose, and proposed that there may be a physiological link to self-control, and its depletion. Although blood glucose data was not gathered in the current study, it could have provided valuable insight into to the number of squats completed, as both the handgrip endurance test and the squat task require resistance to muscular fatigue. For instance, it would be a larger challenge to self-control if an individual had to squat when their blood glucose was low, in comparison to when it was stable or high. However, the handgrip and squat tasks were separated by at least one week and it is, therefore, unlikely that blood glucose levels, which vary throughout the day, would be closely associated over this length of time. This interpretation, however, cannot be ruled-out as blood glucose levels were not assessed. This would, therefore, provide a potential extension of this work in future research.

Nevertheless, the significant relationship found between the handgrip endurance test and the squat challenge provides evidence that the squat was an effective self-control task choice for this study. Although more work needs to be done in this area, future tests using a similar design could be beneficial.

Conclusions

This dissertation was designed to assess the generalizability of the previous mood and self-control research. The intent was to determine if the relationship between mood and self-control would hold when applied to a physical activity behavior. The results suggest that this was not the case, and that mood cannot moderate self-control exertion

when individuals are faced with a maximum repetition squat test. Despite the limitations previously mentioned, it is clear that the mood manipulation resulted in a change in mood that is in-line with other research, and it reflected the range of moods that people are likely to experience in their daily lives. In addition, the outcome expectation for the task was clearly presented and understood, but not acted upon. Thus, the results seem tenable within this group of individuals, and as a result, this was a fair test of the proposed hypotheses.

Given the results, then, it is unlikely that a normative mood will moderate the relationship between self-control and this type of physical activity behavior. Moreover, it is unlikely that a high effort physical activity task, such as a squat, will be used as a mood management tool. After all, the participants in this study were students registered for a weight training class, and it would seem that this group would be the most comfortable doing squats. If the mood, self-control and behavior relationship did not hold with these individuals, it seems unlikely that it would be carried over to other individuals not as familiar with resistance training.

Future Research

The exercise task in this study centered on exertion to muscular failure. This was selected as it provides a clear indication of self-control. It is a task that potentially carries a high degree of motivation to perform, and therefore does not seem to be easily affected by mood. The major contribution of this dissertation, however, is that it draws a line between studying the continuation of a physical activity behavior and the initiation of one. The results of this study suggest that individuals who have already committed to

doing an exercise are unlikely to curtail their efforts in that exercise when experiencing a moderate level mood. The next question, therefore, is does this generalize to those who have not already committed to doing some type of physical activity.

For example, future studies may choose to focus on free-living mood and its impact on self-control and physical activity behavior. Monitoring free-living exercise choice, and the volume of exercise completed in a single bout of exercise could prove to be beneficial. Such studies could determine the real world impact of moods on exercise behavior, and not just that experienced from a manipulated state. Assessments of mood with diaries, and assessments of physical activity with pedometers are likely a good starting point. Clearly, it seems more likely that a free-living mood state would be more likely to impact physical activity behavior than that which is manipulated in a controlled university experiment.

The struggle the nation is currently having with low rates of physical activity is undoubtedly a multifaceted problem. There are numerous factors that tie into an individual living a sedentary lifestyle, however, performing almost any behavior will require self-control exertion. For many, initiating exercise explicitly presents a substantial challenge to their self-control. The public health challenge in physical activity is therefore the initiation of exercise, and not necessarily the completion of it. This dissertation has helped to draw the distinction between measuring the completion of an exercise, and testing the initiation of it. Future studies should seek to test this difference as it would be a useful extension of this research.

Appendix A

Demographic Information

Name_____

Email_____Phone #_____

Age_____

Male or Female

Height _____feet _____inches Weight_____

Race:

_____Asian/Pacific Islander

_____Black

_____Hispanic

_____White

_____Other/2 or More

Subject #_____ **Condition_____**

Appendix B

Positive and Negative Affect Schedule

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel right now, that is, at the present moment. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

1. interested	_____	11. irritable	_____
2. distressed	_____	12. alert	_____
3. excited	_____	13. ashamed	_____
4. upset	_____	14. inspired	_____
5. strong	_____	15. nervous	_____
6. guilty	_____	16. determined	_____
7. scared	_____	17. attentive	_____
8. hostile	_____	18. jittery	_____
9. enthusiastic	_____	19. active	_____
10. proud	_____	20. afraid	_____

Appendix C

Feeling Scale

How Do You Feel Right Now?

+5	Very Good
+4	
+3	Good
+2	
+1	
0	Neutral
-1	
-2	
-3	Bad
-4	
-5	Very Bad

Appendix D

Felt Arousal Scale

How Do You Feel Right Now?

6 High Arousal

5

4

3

2

1 Low Arousal

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