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I am submitting herewith a dissertation written by James Kip Matthews entitled "The Impact of Planned and Unplanned Layoffs From Training on Withdrawal Symptoms of Exercise-Addicted Individuals." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

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We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

The Impact of Planned and Unplanned Layoffs From Training On Withdrawal Symptoms of Exercise-Addicted Individuals

A Dissertation
Presented for the
Doctor of Philosophy
Degree
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James Kip Matthews
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DEDICATION

This dissertation is dedicated to my parents

Mr. George Eric Matthews and Mrs. Louise Rivers Matthews

who have continuously given me love and encouragement

and to my wife

Mrs. Kimberly Watson Matthews

whose strength, support, and understanding enabled me to pursue my dreams.

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Abstract

The rise in popularity of aerobic sports has resulted in increased reports of athletes being addicted to a regular regimen of exercise. This phenomenon has led to a need for psychological research examining exercise addiction. The purpose of this study was to investigate empirically the occurrence of negative exercise dependence and to obtain a psychological profile of those who have become addicted to the activity of exercise.

Sixty-two members of a suburban fitness/health club were solicited to participate in the study. An examination of the effects of continued exercise, planned layoffs from training, and unplanned layoffs from training on the withdrawal symptoms of addicted and nonaddicted exercisers was conducted. The Profile of Mood States was employed to assess withdrawal. Results of the MANCOVA found no significant interaction effect between addiction status (exercise-addicted, nonaddicted) and treatment condition (continued exercise, planned layoff, unplanned layoff). However, main effects for addiction status and treatment condition were significant. Post hoc analyses revealed that nonaddicts reported significantly higher levels of confusion and bewilderment than exercise addicts. Subjects in the condition of continued exercise reported significantly lower levels of tension than participants in the planned and unplanned layoff from training conditions. Subjects who experienced a planned layoff from training had significantly higher levels of anger compared with those subjects in the continued-exercise condition. No differences in underlying personality were found between exercise addicts and nonaddicts as measured by the Eysenck Personality Questionnaire.

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CHAPTER 1

Introduction

Over the past two decades, aerobic exercise such as running, cycling, and aerobic dance has become immensely popular. Many reasons exist for why people engage in regular programs of exercise, including improved physical fitness and an increased sense of well-being. Aerobic exercise provides physiological benefits such as improved cardiovascular functioning, a decrease in percentage of body fat, lowered heart rates and blood pressure, and reduced risk of coronary heart disease (e.g., Cooper, 1968; Paffenbarger, Jr. & Hyde, 1988; Pollock, Wilmore, & Fox, 1978; Sharkey, 1979). Besides these physiological changes, many psychological benefits result from habitual physical activity. Much research has shown the therapeutic effects of running on depression, anxiety, and stress (e.g., Leith & Taylor, 1990). Other studies suggest that exercise participation can lead to enhanced self-esteem, self-confidence, and body image (e.g., Dishman, 1985; Wilfley & Kunce, 1986).

Despite the positive benefits of regular physical exercise, an increasing number of problems and concerns stemming from physical activity are being reported to medical doctors. Practitioners of sports medicine report that overuse injuries such as shin splints and amenorrhea are now common (Diekhoff, 1984). Negative consequences of habitual exercise may stem from what has been described in the popular literature as exercise addiction.

Opinions regarding exercise addiction have shifted dramatically over the past two decades. Using exercise as an example, Glasser (1976) presented positive addiction as that

type of addictive experience that provides psychological strength and increases the satisfaction that one has in life. With exercise, the addiction is considered positive if the individual is provided with some form of psychological and/or physiological benefit from the physical activity. However, Morgan (1979) later described a type of exercise addiction that is negative in nature. In this view, addiction to exercise has been defined as dependence, of a psychological and/or physiological nature, upon a regular regimen of exercise, characterized by the presence of withdrawal symptoms 24-36 hours after exercising (Sachs, 1981). Unlike exercise for positively addicted individuals, physical activity has become a controlling factor for negative dependent exercisers, eliminating other choices in life. As Anshel (1991) noted, exercise has become the exercise-addicted person's foremost priority to the point that the activity controls him or her.

Morgan (1979) asserted that exercise addiction is present if two requirements are met: 1) the person requires daily exercise to cope with his or her concerns, and 2) if deprived of exercise, the person manifests various withdrawal symptoms. Such symptoms include depression, restlessness, insomnia, and irritability. In Morgan's view, the true exercise addict will continue to exercise even when it is medically, vocationally, and socially contraindicated. At this point, exercise addicts give their daily exercises higher priority than job, family, or friends (Joseph & Robbins, 1981; Robbins & Joseph, 1980; Rudy & Estok, 1990).

The manner in which one becomes dependent on exercise is similar to that for other types of addictions (Morgan, 1979). Initially, an individual will adopt an exercise program and experience muscle soreness, shortness of breath, and other unpleasant side effects.

However, as the person begins to get in better shape, various psychological and physiological changes occur. These changes include improved cardiorespiratory functioning, decreased body fat, and improved self-esteem. During this time, the exerciser is provided with many reinforcers such as compliments from friends and family and the experience of the runner's high. If the daily exercise becomes the primary source of an athlete's reinforcement, then exercise addiction is likely to develop.

Addiction and Commitment to Exercise

Is it possible for athletes to exercise regularly and still not be considered addicted to physical activity? Theorizing about the relationship between regular exercise and exercise addiction, Sachs and Pargman (1979) proposed a model to clarify motivation for running. In their model, two axes are believed to exist; one axis represents psychobiologic dependence (addiction) and the other axis shows the cognitive-intellectual commitment that a person has for the activity. Sachs and Pargman viewed commitment as a multifaceted construct represented by many factors including, time spent thinking about exercising, amount of time engaged in exercise, amount of money and energy expended in their sport, and so forth. Sachs and Pargman (1984) stated that the truly exercise-addicted athlete is one who is both highly committed and dependent on the activity.

Several researchers have examined the relationship between commitment to exercise and exercise addiction. The first study that dealt with this issue was an attempt to assess an individual's commitment to running (Carmack & Martens, 1979). In their study of 315 runners, the authors found that a significantly greater proportion of females experience discomfort when a run is missed. However, level of perceived addiction to running was

not significantly different between males and females. In addition, the results of the study suggest that higher scores on the Commitment to Running Scale were associated with higher levels of perceived addiction. Higher scores on the Commitment to Running Scale were also associated with higher levels of discomfort when a run is missed and with running for longer periods during their regular daily runs. Carmack and Martens concluded that the results support the notion that commitment and perceived addiction were similar constructs.

C. Corbin disagreed with the idea that commitment to physical activity and exercise addiction are the same constructs (personal communication, April 1992). Commitment implies an intention or pledge to engage in certain behaviors and cannot be expected to be acted upon with 100% certainty. Corbin and coworkers (Corbin, Nielsen, Borsdorf, & Laurie, 1987) explored generalized commitment to physical activity through a modification of the Commitment to Running Scale. These investigators found that higher Commitment to Physical Activity Scale scores were associated with highly active subjects. In a follow-up study, Deeter (1988) reported that attitudinal commitment to physical activity was a significant predictor of behavior among college-aged populations. However, the results were unstable across samples, suggesting a need to examine other factors such as individual differences and barriers to exercise.

Chapman and DeCastro (1990) explored the relationships between running addiction, commitment to running, and associated psychological characteristics. The results suggest that the Running Addiction Scale and the Commitment to Running Scale measure different constructs because of the low correlation between the scores. In addition, Chapman and

DeCastro found that running addiction was associated with positive personality traits but not with mood enhancement. Similar findings were reported by Thaxton (1982). She noted that Commitment to Running Scale scores and addiction scores were not correlated with one another, lending support to the theory that commitment and addiction are not similar constructs.

Withdrawal from Exercise

As stated earlier, one defining characteristic of negative exercise addiction is the presence of withdrawal symptoms when a person has not exercised over time. Many investigators have examined the effects of abstinence on exercise-addicted individuals. This research is similar to previous studies on substance abusers. These researchers wanted to know what happens both psychologically and physiologically to a person when he or she does not exercise. This is an important issue to address for two reasons. First, exercise in moderation is reported to provide optimal physical and psychological benefits (Lebow, Averbuch, & friends, 1992). Secondly, athletes sometimes cannot exercise. Therefore, an exploration into individuals' experiences during layoffs may provide clinicians and researchers information that can be utilized to promote exercise adherence without athletes becoming negatively addicted.

Thaxton (1982) examined the effects of running and deprivation on habitual runners. A Solomon four-group design was employed to control for pretest sensitization. Subjects were assigned to either running or no-running groups for one day and were compared on two measures: the Profile of Mood States (POMS) and galvanic skin response (GSR). Neither running nor pretesting significantly affected the subjects' GSR or POMS scores.

However, a significant interaction effect was found. Subjects in the no-pretest/running group reported significantly lower depression and lower GSR scores than those subjects in the pretest/no-running group. These results suggest that the combination of not running and being pretested lead to heightened anxiety and depression.

Robbins and Joseph (1985) studied the effects of therapeutic and mastery running on exercise withdrawal. Therapeutic running is seen by these authors as a type of physical activity that serves to improve one's mood and reduce state anxiety and depression. Mastery running is a type of physical activity that leads to a heightened sense of accomplishment and results in a "positive self-feeling." The authors hypothesized that for those individuals who engage in running for its therapeutic benefits, exercise may serve to reduce anxiety and depression temporarily, but leave the sources of these moods unaltered. Therefore, the experience of withdrawal is seen as a return to those original sensations from which they were escaping. On the other hand, mastery runners who do not exercise will experience distress due to the removal of a self-esteem enhancing activity. Results of this study imply that runners who exercise to escape states of uncomfortable feeling experience irritability and restlessness when they do not run. On the other hand, irritability, depression, sleeping problems, muscle tension, and fatigue were reported by runners who use running for coping with life crises. In addition, the more an individual values running for its mastery component, the more likely the person would exhibit irritability, restlessness, guilt, frustration, and insomnia when required to miss a run.

Does withdrawal occur when there is a planned layoff from training? What happens when an athlete incorporates rest days into the training schedule? Does he or she

experience withdrawal during this layoff? Crossman, Jamieson, and Henderson (1987) examined whether withdrawal effects found in earlier studies would be found in competitive athletes during planned layoffs. Female athletes across sports and male and female swimmers experienced more positive moods during the layoff, suggesting a type of psychological relief from the activity. However, the experience of withdrawal was more prevalent among male athletes across sports and male and female athletes competing at higher levels. It should be noted that the subjects were competitive athletes who may or may not have been addicted to exercise. Since the subjects were not identified as exercise addicts, little can be learned from this study about exercise addiction.

Chan and Grossman (1988) studied the psychological effects of running abstinence upon consistent runners. The investigators compared two groups of runners. Injuries forced the first group to stop running; the second group continued running. Prevented runners were found to show significantly greater tension, depression, confusion, anger, and hostility than continuing runners. Prevented runners also showed less vigor. The authors attribute these emotional reactions to two factors. First, the distress found in the prevented runners may stem from a loss of what is found in the activity, namely, a sense of self-control, mastery, and a mechanism for coping with stress. Secondly, the sudden discontinuation in running could change the endorphin levels that would influence the athletes' moods. However, this author believes that neither of these explanations takes into account an athlete's typical response to injury. These reactions may include sadness, anger, and anxiety stemming from a loss of status or playing time or some aspect of the self

(Larson, Starkey, & Zaichkowsky, 1996; McDonald & Hardy, 1990). Further research needs to be conducted to understand these reactions more fully.

Withdrawal symptoms have been reported in more recent studies when regular, committed runners abstained from running during the study (Gauvin & Szabo, 1992; Morris, Steinberg, Sykes, & Salmon, 1990). Both investigations found that regular runners reported increased physical symptoms after one week of exercise deprivation. However, in the study by Morris et al. (1990), psychological effects such as depression and anxiety were found after the second week of deprivation. These responses were not found in the study by Gauvin and Szabo (1992).

Close inspection of these studies reveals a mixed pattern of responses to exercise deprivation. Some researchers reported an addictive pattern to layoffs from training, while other investigators actually found a psychological relief response. These conflicting results may be due to factors such as criteria for the selection of subjects, reasons for a layoff from exercise, and differing measures employed to assess withdrawal.

Personality Profile of Exercise Addicts

Over the past twenty years, researchers have shown an interest in the personalities of athletes. This is due in part to the belief that the measurement of psychological characteristics is useful in predicting athletic performance (Morgan, 1974). Consequently, well more than 1,000 studies have been conducted in an attempt to understand better the personality traits associated with this population (Fisher, 1984). Much of this research focused on the personality trait differences between elite and amateur athletes. These studies found that elite athletes often report high levels of vigor and below normal levels

of tension, depression, anger, fatigue, and confusion (e.g., LeUnes, Hayword, & Daiss, 1988). Despite the vast amount of research conducted, no clear personality profile of athletes across sports has emerged. However, within specific sports such as running, several consistent findings have been reported.

Frazier (1987) investigated the introversion-extroversion styles of marathon runners with varying performance levels. In this study, subjects were given the Eysenck Personality Inventory to assess their level of introversion. The results suggest that these long distance runners were no more introverted than the general population. In addition, the author found no differences in levels of introversion-extroversion among the different ability groups. These findings contradict earlier published writings that reported individual sport athletes, particularly distance runners, were more introverted than team sport athletes (Cratty, 1986).

What psychological characteristics are associated with individuals who participate in long endurance events? Clingman and Hilliard (1987) attempted to address this question by studying a large sample of adult endurance athletes from a variety of sports. The authors employed the Personality Research Form, which measures achievement, aggression, autonomy, dominance, endurance, harm-avoidance, and play. The results imply that these "super-adherers" are motivated to achieve and are strong perseverers. They are often leaders who object to doing things other than their way. Finally, they usually do not take many risks, avoiding those activities that pose a potential threat to their body.

Morgan, O'Connor, Ellickson, and Bradley (1988) evaluated the psychological characteristics of a group of elite male distance runners. The authors found that these athletes exhibited the well-known "iceberg profile" on the Profile of Mood States. This profile occurs when scores on tension, depression, anger, fatigue, and confusion fall below the population average and vigor scores fall above the 50th percentile. These subjects also displayed scores on trait anxiety, neuroticism, extroversion, and psychoticism that fell within the normal range for the general population.

Before the 1990s, little research existed which explored the personality characteristics of individuals who are addicted to exercise. Anshel (1991) attempted to address this need in a study examining members of health clubs. Health club members were identified as addicted or nonaddicted to fitness. Subjects' attitudes and beliefs about exercise-related habits were assessed in four content areas: a) pre-exercise affect, b) post-exercise affect, c) feelings about missing exercise bouts, and d) physical and psychological responses to injury and illness. Anshel found that fitness addicts were more eager, self-confident, restless, and acutely stressed than nonaddicts. In addition, fitness addicts usually continued to engage in physical activity while feeling discomfort, even with an injury or sickness.

While the study of athletic personalities has been met with much controversy (Silva, 1984), many researchers continue to try to understand better the characterological makeup of this population. Little attention has been devoted specifically to the psychological characteristics found among exercise addicts. As more research is conducted in this area, an exercise-addictive personality style may emerge in the literature.

Statement of the Problem

In the past twenty years, the medical and psychological communities have been witnesses to the creation of a new behavioral phenomenon, exercise addiction. This awareness spurred many research studies examining the effects of exercise deprivation on withdrawal symptoms among regular, habitual athletes (e.g., Crossman et al., 1987; Robbins & Joseph, 1985; Thaxton, 1982). This body of research formed the groundwork for a better understanding of how consistent, sometimes excessive, exercise affects people's physiological reactions, moods, and behaviors. These studies provided a rich, detailed picture of this newfound syndrome.

While much has been learned about exercise addiction from these studies, several important areas need to be examined more closely. For instance, many of these studies used subjects who were habitual, regular, or consistent exercisers, only some of whom may have been exercise-addicted. Few investigators directly identified exercise-dependent individuals to serve as subjects in exercise deprivation studies. This problem may have stemmed from how people were being labeled as exercise-addicted in the first place. As noted earlier, several instruments have been developed to measure the existence of exercise addiction or running addiction. Another void that needs to be addressed is the exercise deprivation condition as a focus of study. Earlier studies primarily employed planned layoffs from training or injury situations when studying exercise deprivation. While these situations naturally occur for athletes and are worthy of study, these events may have also confounded the results found in this research.

Cognitive social learning theory (Bandura, 1977) asserts that individuals have both efficacy and outcome expectations. The former refers to people's confidence that they can cope successfully with a stressful situation. The latter refers to the belief that a particular behavior will produce a given outcome. Efficacy expectations determine how much energy people will expend and how long they will persist when they encounter challenging and aversive situations. A planned layoff such as a rest day is common for many training regimens. From their experience with these planned layoffs, athletes may display efficacy expectations that they can cope successfully during this period. These high efficacy expectations are expected to reduce the presence of withdrawal symptoms during the layoff.

These expectations stand in marked contrast to those expectations found in unplanned layoffs. An unplanned layoff may result from several sources including, injury, time restraints, and unexpected travel. In these novel situations, the athlete may have lowered efficacy expectations that they can successfully cope during this period. These negative self-efficacy evaluations are hypothesized to cause a significant amount of psychological distress through withdrawal symptoms including, irritability, tension, depression, and decreased vigor.

The purpose of this study was to understand better the nature of exercise addiction. Withdrawal symptoms reported by addicted and nonaddicted exercisers were compared as the participants were subjected to treatment conditions of continued exercise, planned layoffs from training, or unplanned layoffs from training. This investigation extended and contributed to previous studies in many ways. First, subjects were classified as exercise-

addicted or nonaddicted before treatment administration. By involving both addicted and nonaddicted exercisers in the same study, it was easier to assess the differential impact that layoffs from training had on these subjects' moods. Previous research primarily involved one group (i.e., habitual exercisers) as a focus of study. Secondly, this researcher directly investigated how these three treatment conditions affect the withdrawal experience. Before, investigators targeted only planned layoffs or unplanned layoffs, coupled with a control group, in their studies. Other investigations have found high self-efficacy to have a positive influence on an individual's ability to abstain from those substances to which he or she has become addicted (e.g., Condiotte & Liechtenstein, 1981; DiClemente, 1981; DiClemente, Prochaska, & Gibertini, 1985). The results from this research helped to shed light on the relationship between efficacy expectations and addictive response patterns to exercise.

Another purpose of this study was to obtain a preliminary psychological profile of exercise-addicted individuals. As mentioned earlier, some researchers have studied personality profiles of highly committed athletes (e.g., Anshel, 1991; Clingman & Hilliard, 1987). If addicted exercisers display a significantly different personality profile from those exercisers who are not addicted, then this profile would facilitate the detection and treatment of exercise dependence. In addition, the personality profile may provide clues as to the etiology of this disorder.

With the above considerations in mind, this investigation attempted to answer the following research questions:

1) What differences in withdrawal symptoms as measured by the Profile of Mood States are found between exercise addicts in the unplanned layoff from training, planned layoff from training, and continued exercise conditions?

2) What differences in withdrawal symptoms as measured by the Profile of Mood States are found between nonaddicts in the unplanned layoff from training, planned layoff from training, and continued exercise conditions?

3) What differences in withdrawal symptoms as measured by the Profile of Mood States are found between exercise addicts and nonaddicts across all three treatment conditions?

4) What personality differences are found when comparing exercise addicts with nonaddicts on the four Eysenck Personality Questionnaire subscales of Introversion-Extraversion, Psychoticism, Neuroticism, and Lie?

5) What gender differences exist with respect to the prevalence of exercise addiction?

6) What demographic variables are associated with exercise addiction?

CHAPTER 2

Methodology

This chapter describes the purposes and design of this study. Included in this chapter are the following topics: 1) description of the subjects, 2) description of the instruments, 3) description of the procedures, and 4) presentation of the hypotheses and data analyses.

One purpose of this study was to understand more clearly the nature of exercise addiction. Specifically, this research examined the withdrawal symptoms of exercise addicts and nonaddicts resulting from different types of layoffs from training. In this study, there were three treatment conditions, 1) continued exercise, 2) planned layoff from training, and 3) unplanned layoff from training. Subjects in the condition of continued exercise served as a control group, where participants were asked to follow their regular training regimen without any modifications. Subjects in the condition of planned layoff from training were asked several days ahead of time not to exercise for a three-day period. In contrast, those individuals in the condition of unplanned layoff from training were not notified to abstain from exercise until one day before the layoff period. These conditions comprised the three levels of the first independent variable, treatment condition.

Participants were also classified as addicted to exercise or not addicted to exercise. This classification provided the two levels of the second independent variable, addiction status. Withdrawal symptoms were assessed by the measurement of subjects' moods. Six different moods were measured at the beginning of the study (pretest) and again after the layoff period (posttest). The six mood scores were the dependent variables used in this study.

This 3 (treatment condition) X 2 (addiction status) design resulted in six different cells. Subjects in each cell were measured at two points in time, with the pretest scores being used to control for initial differences among the six groups.

The second purpose of this study was to obtain a personality profile of exercise-addicted individuals and compare that with the profile provided by nonaddicts. Exercise addicts and nonaddicts were compared on several different areas of personality, including preference for being around others, tough-mindedness, emotionality, and presentation of self in a positive light. Here, the independent variable was addiction status, while the four areas of personality were the dependent variables.

The final purpose of this study was to examine the relationship of various demographic variables to addiction status. These demographic variables included gender status, amount of money invested on exercise-related equipment/goods per year, and employment status.

Participants

Participants were adult volunteers solicited from a suburban fitness/health club in the metropolitan Atlanta community. This fitness/health club is one of several clubs that serve the surrounding county area and has a membership of more than 2500 individuals. Permission to solicit subjects from the fitness/health club's membership list was obtained by the Principal Investigator from the Club Director (see Appendix A). The Club Director provided 510 member names, telephone numbers, and addresses. Member names were assigned consecutive numbers from 1 to 510. The Principal Investigator randomly selected 244 individuals using the random number generator provided with the Casio fx-115v calculator. Next, the Principal Investigator telephoned each selected club member. During

this initial contact, the Principal Investigator described the study and requested participation, following as closely as possible the text of the Solicitation to Participate form (see Appendix B). If the individual stated an interest and participated in the study, a copy of the Solicitation to Participate and two copies of the Informed Consent Form (see Appendix C) were mailed to him or her. Each participant was asked to sign the Informed Consent Forms and return one copy back to the investigator in a self-addressed stamped envelope, while keeping one copy for his or her records.

Of the 244 club members who were contacted, 88 agreed to participate and were mailed packets. Thirty-six subjects returned all the questionnaires as directed. Follow-up requests were made to those subjects who had not returned their materials. Each of the first two requests was made through a telephone call to the participant. These two telephone calls were made eleven days and fourteen days from the beginning date of their participation. If the subject still had not returned his or her questionnaires within seventeen days from the beginning date of participation, a letter was sent to that subject's home address. Twenty-seven additional subjects returned their questionnaires after all follow-up requests.

A total of 62 subjects completed the entire study for a completion rate of 70.5%. For a participant to have completed the study, he or she had to return all questionnaires, had to score less than 20 on the Eating Attitudes Test-26, and had to follow the directions for his or her exercise participation for the week. One subject was excluded from the study after scoring above 20 on the Eating Attitudes Test-26. In the total sample, there were 27

exercise addicts and 35 nonaddicts. Of the 62 participants, all but two individuals were Caucasian (Euro-American).

Materials

Materials used in this study included the Study Description and Solicitation to Participate, two Informed Consent Forms, the General Information Questionnaire (see Appendix D), the Exercise Addiction Scale (see Appendix E), the Eysenck Personality Questionnaire, the Exercise Activity Log (see Appendix F), two Profile of Mood States scales, and the Eating Attitudes Test-26 (see Appendix G).

The General Information Questionnaire was used to assess several exercise-related variables. These variables included number of minutes per day spent exercising, the number of days per week they engaged in physical activity, and how much money they invested in exercise. In addition, the General Information Questionnaire asked for information regarding the subject's age, gender, employment status, and ethnicity.

Subjects were asked to report their daily exercise patterns during the study on the Exercise Activity Log. Verbal instructions for completing the log were given to the subjects during the initial telephone contact. Participants were directed to complete the Exercise Activity Log each day. The subjects were requested to note in what exercise(s), if any, they engaged. Also, they were asked to record the duration and the time of day of that exercise.

The Exercise Addiction Scale is a slight modification of an instrument used in a study by Chapman and DeCastro (1990), the Running Addiction Scale (RAS). The Exercise Addiction Scale contains eleven items associated with exercise addiction to which

individuals respond using a five-point likert scale from "Strongly Agree" to "Strongly Disagree." This scale yields one overall score of exercise addiction. In the Chapman and DeCastro (1990) study, the Running Addiction Scale displayed acceptable internal reliability (coefficient alpha of .82), with item-total correlations ranging from .36 to .69. A positive correlation was found between the RAS and self-rated addiction (.664 for males; .753 for females). In addition, the RAS was moderately correlated with discomfort when a scheduled run was missed (.475 for males; .391 for females). These values suggest that the RAS is a valid measure of running addiction. Also, face validity is evident in the RAS. This instrument contains many items assessing behaviors commonly associated with running addiction, such as running in pain and running while an injury healed. The Principal Investigator obtained permission from the author of the RAS to use the instrument in this study (see Appendix H).

The only change made in the RAS was the replacement of the word "run" or its variant with the word "exercise" or the appropriate variant to form the Exercise Addiction Scale (EAS). This word change occurred on each of the eleven items. This modification should not alter the instrument's reliability significantly based on a similar modification of the Commitment to Running Scale (CR) in a study by Corbin et al. (1987). In that study, the Commitment to Physical Activity Scale (CPA) was formed through the substitution of the term "physical activity" for "running." CPA mean values and standard deviations were similar to the CR scale. Alpha values were also similar between these two scales.

The Eysenck Personality Questionnaire - Adult Form (EPQ) is a short, reliable personality inventory that takes 10-15 minutes to administer (Eysenck & Eysenck, 1975).

This instrument has been widely used in sport personality research (e.g., Davis, Brewer, & Ratusny, 1993; Davis & Mogk, 1994; O'Connor & Davis, 1992). The EPQ measures three dimensions of personality, Extraversion-Introversion, Neuroticism-Stability, and Psychoticism or tough-mindedness. Eysenck and Eysenck (1975) report that the test-retest reliabilities of the four scales Psychoticism, Extraversion, Neuroticism, and Lie are .78, .89, .86, and .84, respectively during a one month interval. In addition, internal consistency reliabilities range from .68 to .88. These four scales are reliable for use with individuals (Kline, 1978). Research findings with the Eysenck Personality Inventory appear to support the validity of the EPQ in the measurement of introversion and emotionality. Studies on the new scale, Psychoticism, suggest that this scale is marginally helpful in discriminating psychotics, prisoners, and people with personality disorders from normals (Tellegen, 1978).

The Profile of Mood States (POMS) measures dimensions of affect and mood, and has been useful in showing the effects of layoffs on habitual athletes (McNair, Lorr, & Droppleman; 1992). The Profile of Mood States consists of 65 adjectives describing feelings and moods to which the subject responds on a five-point likert scale ranging from "Not at All" to "Extremely." Each subject was given a score on six separate scales including Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-Inertia, and Confusion-Bewilderment. These scales were used to assess the severity of withdrawal and psychological distress of the subjects. The only change made in this instrument was a revision in the directions to state, "Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE circle under

the answer to the right which best describes HOW YOU ARE FEELING RIGHT NOW." The original directions stated, "Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE circle under the answer to the right which best describes HOW YOU HAVE BEEN FEELING DURING THE PAST WEEK INCLUDING TODAY." This revision provides immediate information about a person's current mood intensity and how their mood may have resulted from participation in the study.

The Profile of Mood States has test-retest correlations ranging from .65 to .74 (a median time of twenty days) and KR-20 values ranging from .84 to .95. The lack of high test-retest reliability coefficients for this mood measure could be interpreted as evidence for its construct validity (McNair et al., 1992) because of normal fluctuations in moods encountered by individuals over time and across situations. With respect to the instrument's concurrent validity, McNair et al. (1992) report the correlations between the POMS subscales and scores on similar instruments. For example, a correlation of $\underline{r} = .80$ was found between the Tension subscale on the POMS and the Taylor Manifest Anxiety Scale for 200 outpatients. In addition, a correlation of $\underline{r} = .61$ was found between the Depression subscale and the Beck Depression Inventory in another study. Authors of the POMS Manual provide several tables that highlight high correlations between the POMS subscales and appropriate subscales in other instruments, providing further evidence for the validity of the Profile of Mood States. The POMS also appears to have considerable face validity (Eichman, 1978). This instrument has proved successful in detecting shifts in mood and affect when a person participates in exercise (Farrell, Gates, Maksud, &

Morgan, 1982; Thaxton, 1982; Wilfley & Kunce, 1986). As Eichman (1978) points out, "the forte of instruments such as POMS is in the area of treatment evaluation, usually psychotherapy and/or medication" (p. 1017). Therefore, the POMS is considered an excellent research and clinical instrument for the assessment of mood and feeling states (Weckowicz, 1978).

The Eating Attitudes Test-26 (EAT-26) is a widely used 26-item, 6-point, forced-choice, self-report measure of the symptoms commonly found in anorexia nervosa. The Eating Attitudes Test (EAT-40) was developed by Garner and Garfinkel (1979) and originally included 40 items. These authors found that the correlation between EAT-40 scores and group membership (anorexic and normal controls) was $\underline{r} = .87$ ($\underline{p} < .001$), suggesting good concurrent validity. In addition, high internal reliability was found by the developers of the instrument (alpha = 0.94). Garner, Olmstead, Bohr, and Garfinkel (1982) proposed an abbreviated version of the EAT-40 that included only 26 items from the original instrument. Factor analysis on the EAT-40 revealed three factors that accounted for 40.2% of the total variance. These factors were labeled as 1) dieting (avoidance of fattening foods and preoccupation with being thinner), 2) bulimia and food preoccupation (thoughts about food and bulimia symptoms), and 3) oral control (self-control of eating and perceived pressure from others to gain weight). Fourteen items from the EAT-40 did not measure one of these three areas and were excluded from the EAT-40 to form the EAT-26. The authors found a high positive correlation between total scores for each instrument ($\underline{r} = .98$). Also, internal reliabilities of the EAT-40 and the EAT-26 were very close (alpha = .92 and .90, respectively). They concluded that the fourteen

items removed from the EAT-40 were redundant and did not increase the scale's predictive power. The Principal Investigator obtained permission from the author of the EAT-26 to use the instrument in this study (see Appendix I).

Procedure

Subjects were solicited and mailed Solicitation to Participate and Informed Consent Forms as detailed in the Participants section. Once the Principal Investigator received the Informed Consent Forms, the subjects were mailed a packet of materials. The packet included, written directions regarding their participation, the General Information Questionnaire, the Eysenck Personality Questionnaire, the Eating Attitudes Test-26, the Exercise Activity Log, the Exercise Addiction Scale, two Profile of Mood States scales, and two self-addressed stamped envelopes. Subjects were requested to complete and return in one of the self-addressed stamped envelopes all questionnaires except the two Profile of Mood States scales and the Exercise Activity Log.

Several researchers have noted that exercise addicts and eating-disordered individuals share several behaviors in common, most notably, excessive exercising (e.g., Blumenthal, Rose, & Chang, 1985; Yates, 1991). To remove the presence of eating disorders in subjects as a confounding variable, people who scored 20 or higher on the Eating Attitudes Test-26 were eliminated from the subject pool. One participant was eliminated by this criterion. This subject was contacted by the Principal Investigator via the telephone and asked to participate in the project no longer. At that time, she was offered referrals to area mental health agencies. A cut-score of 20 was used by the authors of the EAT-26 and is believed to identify the same percentage of individuals with eating concerns as the

original EAT. This subject was instructed to return the unused Profile of Mood States and the Exercise Activity Log to the Principal Investigator in the second self-addressed stamped envelope. At the conclusion of the study, the eliminated subject was mailed a debriefing letter explaining the purpose of the study, sharing some findings, and thanking her for participating.

After this step, subjects were assigned to the exercise-addicted or nonaddicted groups. One problem that currently exists in this area of research is the confusion and inconsistency in the diagnostic criteria for exercise addiction. At least seven different scales have been developed for the measurement of running addiction or exercise addiction (e.g., Hailey & Bailey, 1982; Rudy & Estok, 1989). For this study, a combination of behavioral information and paper-and-pencil scale results was used to classify subjects as exercise-addicted or nonaddicted. M. Sachs (personal communication, February 1994) stated that this method is a more reliable means of identifying addicted exercisers than either method alone. The exercise-addicted individual was defined by the Principal Investigator as one who engages in at least 45 minutes of exercise four days per week and has an EAS score of 40 or higher. Those subjects who did not meet these criteria were assigned to the nonaddicted group. The behavioral component of this classification scheme was based upon the results provided in earlier exercise addiction studies (e.g., Carmack & Martens, 1979; Rudy & Estok, 1990). Subjects considered more addicted in those studies reported exercising for at least 40 minutes, four to five days per week. The EAS cut-score was established by identifying the Running Addiction Scale score that was one standard deviation above the mean score for the Chapman and

DeCastro (1990) study. While exercise addiction is a process and not an "either-or" condition (Sachs, 1981), these minimal requirements are believed to suggest the early stages of negative exercise addiction based on earlier writings (Chapman & DeCastro, 1990; Prussin, Harvey, & DiGeronimo, 1992).

After the subjects had been classified as exercise-addicted or nonaddicted, they were randomly assigned to one of three treatment conditions; continued exercise, planned layoff from training, or unplanned layoff from training. To reduce the effects of an individual's personality, namely overemotional behavior, on the outcome measures, the three treatment conditions were counterbalanced with approximately the same number of high scorers (raw score >= 12) on the EPQ-Emotionality scale. Once the random assignment took place and the treatment conditions counterbalanced on EPQ-Emotionality scores, subjects were contacted by the investigator via the telephone.

Subjects in the condition of continued exercise were telephoned during the weekend and asked to follow their regular training schedule for the upcoming week. They were asked to complete the POMS Monday morning and again Sunday afternoon at the end of the week. After completing both sets of POMS, they were asked to return these scales and the Exercise Activity Log in a self-addressed stamped envelope to the investigator.

Subjects in the planned-layoff condition were contacted during the weekend and asked to follow their regular training schedule between Monday and Thursday of the upcoming week. However, they were requested to abstain from any exercise Friday, Saturday, and Sunday during this initial telephone call. This request created a planned-layoff scenario since the subjects knew several days ahead of time that they would not be exercising at the

end of the week. The subjects in the planned-layoff condition were informed that one purpose of this study was to examine the effects of exercise on people and how that compares with when someone has not exercised for several days. Therefore, we needed their cooperation in avoiding all types of exercise during those three days. They were asked to complete the POMS Monday morning and again Sunday afternoon. After completing both sets of POMS, they were asked to return these scales and the Exercise Activity Log in a self-addressed stamped envelope to the investigator.

Subjects in the unplanned-layoff condition were telephoned during the weekend and asked to follow their regular training schedule for the upcoming week. This request created an expectation that they could continue exercising without any changes in their schedule. They were asked to complete the first POMS questionnaire Monday morning. Unlike the planned-layoff condition, these subjects were contacted by telephone late Wednesday and Thursday of that week by the investigator. These participants were asked not to exercise Friday, Saturday, and Sunday, creating an unplanned-layoff scenario. The subjects in the unplanned-layoff condition were informed that one purpose of this study was to examine the effects of exercise on people and how that compares with when someone has not exercised for several days. Therefore, we needed their cooperation in avoiding all types of exercise during those three days. They were asked to complete the POMS again Sunday afternoon. The subjects were requested to return both copies of the POMS and the Exercise Activity Log in a self-addressed stamped envelope to the investigator.

After the subjects returned both Profile of Mood States and activity logs, a follow-up telephone call was made to each subject to obtain three important pieces of information. First, subjects were asked about their reaction to being requested not to exercise during those three days. This information gave the Principal Investigator some clues about how people felt about being manipulated during this study and may explain some results. Secondly, subjects were asked if they really did abstain from all exercise during those three days. This question was used to confirm their self-report of physical activity during the week. Another question asked during this conversation was whether they noticed if any other behaviors had significantly increased or decreased when they had not exercised. The last part of the telephone call provided subjects with a detailed debriefing of the study. Afterwards, they were sent a debriefing letter explaining the purpose of the study and thanking them for their participation.

Concern over subjects' willingness to participate in this study was based on earlier exercise addiction research (e.g., Baekeland, 1970). To increase the likelihood of participation throughout the week, all subjects who completed the study were given a chance to win one of two prizes through a drawing. Specifically, each subject's identification number was written on a standard-sized piece of paper and placed into a box. One identification number was drawn from the box. That subject received a 13-inch remote control color television valued at approximately $150. Another identification number was drawn from the box and that subject received a $50 gift certificate to a chain sporting goods store. Subjects were notified of their prize winnings during this last telephone call.

Hypotheses and Data Analyses

As mentioned earlier in this chapter, there are three main purposes to this study. The first purpose of this study was to assess the effects of planned and unplanned layoffs from training on the moods of addicted exercisers and nonaddicts. This purpose led to the formation of the following research hypotheses:

Hypothesis 1.

H_0: There will be no significant interaction between treatment condition and addiction status on the combined mean scores of the Profile of Mood States subscales when adjusted for pretest score differences.

Hypothesis 2.

H_0: There will be no significant differences in mean scores on Tension-Anxiety, Depression-Dejection, Anger-Hostility, Fatigue-Inertia, Confusion-Bewilderment, and Vigor-Activity between exercise addicts and nonaddicts when adjusted for pretest score differences.

Hypothesis 3.

H_0: There will be no significant differences in mean scores on Tension-Anxiety, Depression-Dejection, Anger-Hostility, Fatigue-Inertia, Confusion-Bewilderment, and Vigor-Activity among the three treatment conditions when adjusted for pretest score differences.

Data Analyses for Hypotheses 1 - 3. To test the above hypotheses, multivariate analysis of covariance (MANCOVA) was performed ($p < .05$). The treatment conditions (continued exercise, planned layoff from training, and unplanned layoff from training) and

addiction status (exercise addict, nonaddict) served as the independent variables. The dependent variables were the six posttest scores on the Profile of Mood States scales. Pretest scores on the POMS were employed as covariates to adjust for initial differences in the scores for the six cells (treatment condition X addiction status). A significant MANCOVA was followed by univariate analyses of variance (ANOVAs) to find out which of the subscales, if any, showed significant differences among treatment conditions, addiction status, or the interaction between the two independent variables. The Bonferroni adjustment procedure was used to control for Type I error inflation resulting from carrying out multiple univariate analyses. A significant ANOVA was followed by post hoc procedures (Duncan's multiple range test) to find out which levels of the independent variables differed significantly from each other.

The following assumptions of the MANCOVA were considered before conducting the MANCOVA just described. The first assumption was that the data had a multivariate normal distribution. That is, each of the dependent variables should be approximately normally distributed.

A second assumption of the MANCOVA is homogeneity of the variance-covariance matrices. Multivariate analysis of variance requires that the covariance, the variance shared between two variables, for all pairs of the dependent variables, not be significantly different from each other for all experimental groups (Weinfurt, 1995).

The third assumption for the MANCOVA is the presence of homogeneity of regression hyperplanes and this implies that the regression coefficients within each group are homogeneous across groups. In other words, "the relationship between the covariates

and dependent variables in any one group is the same as the relationship in any other group" (Tabachnik & Fidell, 1983, p. 234).

The final assumption for the MANCOVA that must be considered is that all observations are independent of each another. In other words, a subject's scores on the dependent measures are not influenced by the other subjects in his or her experimental group.

The second of the three main purposes of this study was to examine and compare the personalities of exercise addicts and nonaddicts on introversion-extroversion, emotionality, tough-mindedness, and presenting self in positive light. This purpose led to the formation of the following research hypotheses:

Hypothesis 4.

H_0: There will be no significant difference in mean scores on Extraversion-Introversion between exercise addicts and nonaddicts as measured by the Eysenck Personality Questionnaire.

Hypothesis 5.

H_0: There will be no significant difference in mean scores on Neuroticism-Stability (emotionality) between exercise addicts and nonaddicts as measured by the Eysenck Personality Questionnaire.

Hypothesis 6.

H_0: There will be no significant difference in mean scores on Psychoticism (tough-mindedness) between exercise addicts and nonaddicts as measured by the Eysenck Personality Questionnaire.

Hypothesis 7.

H_0: There will be no significant difference in mean scores on the Lie scale between exercise addicts and nonaddicts as measured by the Eysenck Personality Questionnaire.

While most studies have not shown a consistent personality pattern of athletes in or across various sports, this author hypothesized that significant differences in personality would emerge between addicted and nonaddicted athletes. This last hypothesis is based on reports of addicted exercisers withdrawing from people and immersing themselves into their physical activity, creating a more introverted response to the EPQ (e.g., Prussin et al., 1992, Rudy & Estok, 1990). In addition, exercise addicts' unwillingness to follow medical advice and reduce their level of activity (e.g., Morgan, 1979) is thought to manifest itself with elevated scores on Psychoticism or tough-mindedness on the EPQ.

Data Analyses for Hypotheses 4 - 7. To detect the existence of significant differences between the addicted and nonaddicted exercisers on the Eysenck Personality Questionnaire, a multivariate analysis of variance (MANOVA) was conducted ($p < .05$). Addiction status served as the independent variable. The dependent variables were the four subscale scores on the Eysenck Personality Questionnaire (EPQ). A significant MANOVA was followed by univariate analyses of variance (ANOVAs) to find out which of the subscales, if any, contributed significantly to the differences between exercise addicts and nonaddicts. The Bonferroni adjustment procedure was used to control for Type I error inflation resulting from carrying out multiple univariate analyses. Inspection

of the descriptive data would reveal which group scored significantly higher on the separate EPQ scales.

The following assumptions of the MANOVA were considered before conducting the MANOVA just described. The first assumption was that the data had an approximate multivariate normal distribution. Second, all observations were assumed to be independent of each other. Finally, there was an assumption of homogeneity of the variance-covariance matrices.

The last of the three main purposes of this research was to examine the relationship between exercise addiction and various demographic variables. These demographic variables included how much money was spent on exercise-related equipment/goods per year, gender, employment status, and preference for exercising alone or with others. The following hypotheses were tested:

Hypothesis 8.

H_0: There will be no significant difference between exercise addicts and nonaddicts in the mean amount of money invested each year on exercise-related equipment, club fees, and goods.

Hypothesis 9.

H_0: There will be no significant difference in the mean amount of time at their current level of exercise participation between exercise addicts and nonaddicts.

Hypothesis 10.

H_0: There will be no significant difference in the mean amount of time spent at work per week between exercise addicts and nonaddicts.

Data Analyses for Hypotheses 8 -10. These hypotheses will be tested though the use of independent samples t-tests ($p < .05$).

Hypothesis 11.

H_0: There will be no significant difference in the percentage of females among all the exercise addicts compared with the percentage of females among all nonaddicts.

Hypothesis 12.

H_0: There will be no significant difference in the percentage of employed workers among all exercise addicts compared with the percentage of workers among all nonaddicts.

Hypothesis 13.

H_0: There will be no statistically significant difference in the percentage of individuals who prefer to exercise alone among all exercise addicts compared with the percentage of individuals who prefer to exercise alone among all nonaddicts.

Data Analyses for Hypotheses 11 - 13. To test these research hypotheses, a chi-square test of independence ($p < .05$) will be employed for each question.

CHAPTER 3

Results

This chapter includes the following information: 1) demographic information about the sample of addicted and nonaddicted exercisers, 2) descriptive statistics, 3) results of multivariate analysis of covariance tests on the six subscale scores on the POMS, 4) results of the multivariate analysis of variance tests on the four subscale scores on the EPQ, 5) results of t-tests comparing exercise addicts with nonaddicts on several variables associated with their exercise behavior, and 6) results of chi-square analyses examining the relationship between exercise addiction and gender and between exercise addiction and preference for exercising with others.

Demographic Results

Exercise Addicts. See Table J-1 for demographic information about the exercise addicts (AD)[1]. The ages of the participants in the AD group ranged from 19 to 83 years. The mean age was 41.0 years. Among the ADs, there were 19 females and 8 males. Seventeen of the ADs were married, 6 were single, 3 were divorced, and 1 was widowed.

Regarding money invested each year on exercise-related equipment, goods, and materials (e.g., club membership, clothing, equipment, etc.), ADs spent an average of $700.5 per year (SD = $389.7), with amounts ranging between $99 and $2000. Twenty-two ADs reported working, while 5 were not employed. Of those ADs who work, an average of 37.3 hours per week is spent at work (SD = 13.6 hrs.).

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[1]All tables are located in Appendix J.

Exercise Nonaddicts. See Table J-1 for demographic information about exercise nonaddicts (NA). The ages of the NA subjects ranged between 22 and 75 years. The mean age was 39.9 years. Twenty-two NAs were females and 13 were males. Thirty-one NAs were married, 2 were single, and one person each was separated or divorced.

Regarding money invested each year on exercise-related equipment, goods, and materials (e.g., club membership, clothing, equipment, etc.), NAs spent an average of $770.4 per year (SD = $502.0), with amounts ranging between $0 and $3000. Twenty-five NAs reported working, while 10 NAs were not employed. Of those NAs that work, an average of 45.4 hours per week is spent at work (SD = 12.8 hrs.).

Descriptive Statistics

Exercise Addiction Scale (EAS) scores for ADs ranged from 40 to 49 with a mean score of 42.8 (SD = 2.8) (see Table J-2). ADs exercised between 60 minutes and 120 minutes per day ($\bar{X}$ = 80.0 minutes, SD = 19.1) for an average of 5.1 days per week (SD = .9).

EAS scores for NAs ranged between 27 and 41 with a mean score of 35.9 (SD = 3.1). NAs exercised between 30 minutes and 150 minutes per day ($\bar{X}$ = 60.9 minutes, SD = 29.4) for an average of 4.0 days per week (SD = 1.1).

Descriptive statistics for the exercise addicts and nonaddicts for all nondemographic variables are presented in Table J-2. These descriptive statistics include results from the EAS, EAT-26, pretest and posttest mean scores on the Profile of Mood States subscales, mean scores on the Eysenck Personality Questionnaire subscales, and the General Information Questionnaire.

Multivariate Analysis of Covariance - Profile of Mood States

A two-factor multivariate analysis of covariance (MANCOVA) was performed with the six posttest subscale scores of the Profile of Mood States as the dependent variables. The pretest scores on each of these six subscales were employed as covariates. One independent variable was treatment condition, with the three levels of continued exercise, planned layoff from training, and unplanned layoff from training. A second independent variable was addiction status, with two levels: exercise addicts and nonaddicts.

Each assumption associated with MANCOVA was considered. While the assumption of independence of observations was clearly met, there was a lack of homogeneity of the variance-covariance matrices (Box M = 229.58, $p < .05$). Upon graphical inspection of the data, the lack of multivariate normality associated with the posttest scores on Tension was believed to influence the homogeneity of the variance-covariance matrices results. Using the Levene test in SPSS for Windows (ver. 6.1), a power transformation was employed to stabilize the variances for the posttest Tension scores. "Transformation is undertaken because the distribution is skewed and the group mean is not a good indicator of the central tendency of the scores in the distribution" (Tabachnik & Fidell, 1983, p. 84). Here, the power transformation resulted in each observation of the posttest Tension scores being raised to a power of -2, the reciprocal square. Each transformed Tension score was then multiplied by a constant value of 10,000. In addition, boxplot displays produced through SPSS revealed several cases that had extreme and/or outlying scores on several subscales. While the definition of an outlier is arbitrary, the SPSS boxplot procedure defines two categories of outlying values (Norusis, 1993). The lower boundary of the box is the 25th

percentile and the upper boundary is the 75th percentile. The length of the box is the distance between the 25th and 75th percentiles. Cases with scores that are more than three box-lengths away from either boundary are defined as "extreme values" (Norusis, 1993). Cases with scores that are between 1 ½ and 3 box-lengths away from either boundary are defined as outliers. Boxplot displays identified two individuals that had a total of five extreme scores across all dependent variables. One participant had noticeably more extreme scores than the other, however. The participant with the most extreme scores was dropped from the MANCOVA analysis leaving a total sample size of 61. The excluded subject was included in all other data analyses for a total sample size of 62.

After the data transformation and the removal of one outlier, the assumption of homogeneity of variance-covariance was satisfied (Box M = 150.26, $p > .05$). Graphical inspection of the data revealed a normal distribution across variables. To test the homogeneity of regression hyperplanes, a special SPSS routine was used which an SPSS technical consultant provided for this investigator (D. Nichols, personal communication, October 21, 1996). Results from this analysis indicate that homogeneity of regression hyperplanes did not exist, implying there was a significant interaction between the independent variables and the covariates, $F (174, 96.65) = 1.46$, $p < .05$. After inspecting the univariate F tests, the pretest Anger scores were dropped as a covariate. The homogeneity of regression hyperplanes assumption was then considered and found acceptable, $F (150, 125.1) = 1.30$, $p > .05$.

A 2 X 3 between-subjects multivariate analysis of covariance was performed on the six dependent variables: Powtens (power-transformed Tension scores), Depression-Dejection,

Anger-Hostility, Vigor-Activity, Fatigue-Inertia, and Confusion-Bewilderment. Independent variables were addiction status (exercise-addicted and nonaddicted) and treatment condition (continued exercise, planned layoff, and unplanned layoff).

With the use of Wilks' criterion and after adjusting for pretest score differences on the five POMS subscales, the combined dependent variables were not found significantly affected by the interaction between addiction status and treatment condition, F (12,90) = 1.08, $p > .05$. Thus, differences in moods between exercise addicts and nonaddicts did not vary significantly across treatment conditions. Inspection of the univariate F tests showed a near-significant interaction effect between addiction status and treatment condition on the posttest Vigor-Activity scores, F (2, 50) = 2.54, $p = .09$.

The MANCOVA analysis on the POMS subscales showed a significant main effect for addiction status, F (6, 45) = 3.53, $p < .05$. The univariate F tests were then examined using the Bonferroni adjustment procedure to control Type I error inflation ($\alpha = .05/6 = .008$). No subscale on the POMS was found significant at this level (see Table J-3). However, some authors (e.g., Stevens, 1992) state that the Bonferroni adjustment is not necessary since the MANCOVA had already controlled for Type I error inflation. By not employing the Bonferroni adjustment, the Confusion-Bewilderment subscale was significant, F (1, 50) = 5.83, $p < .05$. Inspection of the data for exercise addicts and nonaddicts on the Confusion-Bewilderment subscale revealed that nonaddicts scored significantly higher than exercise addicts (M = 40.6 and M = 39.0, respectively). The significant MANCOVA test and nonsignificant univariate tests indicate that there is

some linear combination of the dependent variables, after adjusting for pretest score differences, that contributed to the significant difference between exercise addicts and nonaddicts on the Profile of Mood States. However, no individual POMS subscale significantly contributed to that difference.

A significant main effect on the POMS subscales for treatment condition was found through the MANCOVA analysis, $\underline{F}$ (12,90) = 2.98, $\underline{p} < .05$. In Table J-4, inspection of the follow-up univariate $\underline{F}$ tests found one subscale to be significant after the Bonferroni adjustment procedure (Powtens) and three other subscales to be significant without this adjustment (Anger-Hostility, Confusion-Bewilderment and Vigor-Activity). Further post hoc tests (Duncan's multiple range test) were then conducted on each of these four subscales to detect where the differences occurred among the three treatment conditions (see Tables J-5 through J-8).

Duncan's multiple range test for comparing means reported by the three treatment condition groups yielded the following results. For Anger-Hostility, the planned-layoff group was found to have significantly higher scores than the continued-exercise group (see Table J-5). No significant differences in Anger-Hostility were found between the continued-exercise group and the unplanned-layoff group. Also, there was no significant difference between the planned-layoff and unplanned-layoff groups.

With respect to the Confusion-Bewilderment subscale, no two groups were significantly different from each other (see Table J-6). Similar results were also found on the Vigor-Activity subscale (see Table J-8). However, for the transformed Tension scores, a significant difference was found between the continued-exercise group and the planned-

layoff group and between the continued-exercise group and the unplanned-layoff group (see Table J-7). No significant differences were found between the planned- and unplanned-layoff groups.

The lack of a significant interaction effect in the MANCOVA led to a failure to reject the null hypothesis for Hypothesis 1. This finding indicates that the combination of addiction status and treatment condition did not significantly affect the combined dependent variables when adjusting for pretest scores on five of the POMS subscales.

Significant main effects were found, however, for both addiction status and treatment condition. Examination of the post hoc results showed that exercise addicts and nonaddicts significantly differed on the Confusion-Bewilderment subscale, with nonaddicts reporting higher levels of confusion and bewilderment. This result led to a rejection of the null hypothesis for Hypothesis 2.

Inspection of the post hoc follow-up tests for the treatment condition main effect revealed that these conditions significantly differed on four of the six POMS subscales: Anger-Hostility, Confusion-Bewilderment, Powtens, and Vigor-Activity. Duncan's multiple range test results show that the continued-exercise group scored significantly lower than the planned-layoff group on the Anger-Hostility subscale. The continued-exercise group also scored significantly lower than both the planned-layoff and unplanned-layoff groups on the Powtens subscale. While the mean score for the continued-exercise group is higher on Powtens than those of the other two groups, this mean score reflects a *lower* mean score on Tension because of the type of data transformation employed. These results led to a rejection of the null hypothesis for Hypothesis 3.

Multivariate Analysis of Variance - Eysenck Personality Questionnaire

To assess differences in personality style between exercise addicts and nonaddicts, a one-way multivariate analysis of variance (MANOVA) was performed. The four subscale scores of the Eysenck Personality Questionnaire (Extraversion-Introversion, Neuroticism-Stability, Psychoticism, and Lie) were the dependent variables. The independent variable was addiction status (exercise-addicted and nonaddicted).

Each assumption associated with MANOVA was considered. The assumption of independence of observations was met. There was homogeneity of the variance matrices (Box M = 11.37, $p > .05$). Graphical inspection of the data also revealed multivariate normality. Since none of the assumptions behind the MANOVA analysis were rejected, comparison of exercise addicts' personalities with nonaddicts' proceeded with the MANOVA.

With the use of the Wilks' criterion, the combined dependent variables were not found significantly affected by addiction status, $F(4, 57) = 2.28$, $p > .05$. Upon inspection of the univariate F tests, no single subscale was found significantly affected by addiction status (see Table J-9). The lack of a statistically significant MANOVA test result led to a failure to reject the null hypotheses associated with Hypotheses 4 through 7. Examination of these results found no combination of the dependent variables that could discriminate between exercise addicts and nonaddicts with respect to these four personality subscales on the EPQ.

Independent-Samples t-tests Examining Addiction Status Differences

Three variables were studied to see if they were significantly related to addiction status. These three variables were: 1) amount of money spent on exercise-related equipment/goods per year, 2) length of time at current level of exercise participation, and 3) number of hours of work per week. An independent-samples t-test was employed to investigate whether the presence of exercise addiction was associated with individuals spending more money on exercise-related items. Inspection of the t-test results found no statistically significant difference between exercise addicts (M = $700.5 / year; SD = $389.7) and nonaddicts (M = $770.4 / year; SD = $502.0) in money invested per year on exercise-related goods/equipment (e.g., club membership, equipment, etc.), t (59) = .60, p > .05. These results led to a failure to reject the null hypothesis for Hypothesis 8.

An independent-samples t-test was employed to examine whether exercise addicts and nonaddicts differed on time spent at their current level of exercise participation. Results suggest that no statistically significant difference exists between exercise addicts (M = 30.7 months; SD = 30.4 months) and nonaddicts (M = 35.9 months; SD = 38.9 months) on time spent at their current level of exercise participation, t (59) = .57, p > .05. This result led to a failure to reject the null hypothesis associated with Hypothesis 9.

Finally, an independent-samples t-test was conducted in a comparison of the time spent at work per week for exercise addicts and nonaddicts. Exercise addicts reported significantly less time at work per week than nonaddicts, t (44) = 2.1, p < .05). Data show that exercise addicts work on average 37.3 hours per week (SD = 13.6), while nonaddicts

work on average of 45.4 hours per week (SD = 12.8). As a result, the null hypothesis for Hypothesis 10 was rejected.

Chi-square Tests of Independence

Three chi-square tests were conducted to investigate whether gender, work status, and preference for exercising alone are independent of addiction status. Gender was found to be independent of addiction status, x^2 (1) = .384, $p > .05$. In other words, there is no statistically significant difference in the percentage of males and females in the exercise addict group compared with the nonaddict group. Similar results were also found when examining work status (x^2 (1) = .840, $p > .05$) and preference for exercising alone or with others (x^2 (1) = .146, $p > .05$). These results led to a failure to reject the null hypotheses for Hypotheses 11, 12, and 13.

CHAPTER 4

Discussion

The purpose of this study was to understand better the nature of exercise addiction and associated withdrawal from exercise. This investigation compared the exercise withdrawal experiences encountered during planned layoffs from training and unplanned layoffs from training for exercise addicts and nonaddicts.

Regarding subjects' moods, results of the MANCOVA indicated no significant interaction effect between addiction status (exercise-addicted, nonaddicted) and treatment condition (continued exercise, planned layoff from training, and unplanned layoff from training). However, significant main effects for addiction status and treatment condition were found. In addition, the results of the study showed no significant personality differences between exercise addicts and nonaddicts as measured by the Eysenck Personality Questionnaire.

The nonsignificant interaction effect found in the MANCOVA analysis indicates that differences in mean mood scores between exercise addicts and nonaddicts do not vary across treatment conditions when adjusting for pretest score differences on the POMS. This investigator believed that such an interaction effect would be found. High efficacy expectations were anticipated for the planned-layoff condition, with addicted and nonaddicted exercisers believing they can cope with this stressful situation. Differences between exercise addicts and nonaddicts were expected to emerge in the unplanned-layoff condition. Here, addicted exercisers were facing an unanticipated withdrawal period and were expected to have lower efficacy expectations to cope successfully with this novel

situation. Psychological distress in the form of withdrawal symptoms were expected to come from these lowered expectations.

These hypothesized results were not found in this study. However, there were significant main effects for addiction status and treatment condition. Nonaddicted exercisers scored significantly higher on Confusion-Bewilderment than addicted exercisers when controlling for pretest differences (without the Bonferroni correction). The data appear to support Glasser's (1976) notion of positive addiction. In this view, exercise may provide some form of a psychological benefit for the individual. Rather than being debilitating, exercise has therapeutic effects for those who are highly committed and dependent on this activity.

Regarding the main effect for treatment condition, inspection of the post hoc analyses revealed some surprising findings. Duncan's multiple range test for comparing means indicated that individuals in the planned-layoff group exhibited significantly higher levels of anger than those in the continued-exercise group. However, there was no significant difference between the planned-layoff and unplanned-layoff groups nor between the continued-exercise and unplanned-layoff groups.

Because of the treatment design, this investigator anticipated the greatest levels of anger to occur in the group subjected to the condition of unplanned layoffs from training. These participants were initially told they could continue their regular level of exercise for the entire week. However, these participants were later contacted and asked not to exercise for the following three days. In contrast, subjects in the planned-layoff group were asked several days ahead of time not to exercise on those same three days.

Surprisingly, the planned-layoff subjects provided the highest mean score on Anger-Hostility.

One explanation for this finding may be that the subjects in the planned-layoff group had several days more to think about what was being asked of them concerning their participation than subjects in the unplanned-layoff group. This period gave the planned-layoff subjects time to ruminate about the change they were asked to make in their exercise routine. That rumination may have produced increasing levels of anger toward the experimenter and toward themselves for agreeing to participate. These feelings of resentment and anger were evidenced on the Anger-Hostility subscale of the POMS.

Weiner (1986) contends that if personal failure or difficulty is perceived by the individual as controllable by others, then anger is usually experienced. Subjects in the planned-layoff group may be making an external, controllable attribution for their situation — the experimenter caused this to happen. In contrast, subjects in the unplanned-layoff group may be experiencing more surprise. Surprise is typically elicited by external, uncontrollable attributions (Weiner, Russell, & Lerman, 1979). For example, these subjects may attribute their layoff to poor luck, not the investigator. This attribution would result in lower levels of anger compared with the planned-layoff subjects.

Concerning tension, subjects in the continued-exercise condition reported significantly lower levels of tension than subjects in the planned- and unplanned-layoff conditions. These findings are consistent with the hypotheses proposed by Robbins and Joseph (1985). They asserted that for those people who exercise for its associated therapeutic benefits, exercise may temporarily reduce anxiety and depression, but leave the sources of

those feelings unaltered. Indeed, numerous studies have found exercise to be effective in the management and treatment of depression and anxiety (e.g., Wilfley & Kunce, 1986).

Another explanation for the decreased Tension scores for continued-exercise subjects may come from the fact that subjects in the continued-exercise condition were asked not to make any changes in their exercise participation for the week. In contrast, subjects in the other two conditions experienced artificial manipulation of their exercise routines. This manipulation of their exercise may have resulted in evaluation apprehension, creating a type of anxiety encountered through one's participation in an experiment (Huck, Cormier, & Bounds, 1974). These subjects knew that one purpose of this study was to compare the effects of exercising with the effects of not exercising for several days. This information may have fostered the development of certain demand characteristics that caused the subjects to provide what they thought would be the "right" responses, resulting in higher scores on Tension.

There was concern over the validity of subjects' self-report of physical activity participation. In this study, the planned- and unplanned-layoff groups had significantly higher Tension scores than the continued-exercise group. These observed differences would not be expected if subjects in both layoff groups misrepresented their abstinence from physical activity. Also, subjects who habitually exercise tend to be meticulous with keeping records of their exercise (Lebow et al., 1992). Intentional misrepresentation of one's physical activity participation on the Exercise Activity Log would be uncharacteristic of a habitual exerciser.

No significant differences between exercise addicts and nonaddicts were found on the following Eysenck Personality Questionnaire subscales: Extraversion-Introversion, Neuroticism-Stability, Psychoticism, and Lie. Results did not support this author's hypotheses that exercise addicts would report significantly higher scores on each subscale. While previous studies have found personality characteristics associated with people who exercise at extreme levels (e.g., Clingman & Hilliard, 1987), similar results were not found in this study.

From the description provided by Eysenck and Eysenck (1975), the Extraversion-Introversion scale assesses the source of people's energy and attention. Even though exercise addicts and nonaddicts in this study do not differ as to the source of their energy and attention, they may differ about how they use that energy. Exercise addicts may prefer to use their energy in the pursuit of solitary tasks and projects, while nonaddicts engage in activities that involve other people and require social interaction. If this were true, one would expect to find a relationship between addiction status and preference for exercising alone. However, the results indicated that addiction status was independent of subjects' preferences for exercising alone.

Exercise addicts were hypothesized to exhibit higher degrees of emotionality than nonaddicts. This investigator believed that exercise is a means of "self-medication" for exercise addicts, allowing the individual to cope better with these fluctuations in moods. This investigator believed that nonaddicts, in contrast, participate in exercise primarily for improved health and a sense of mastery. The results of this study did not support these

hypotheses. Both nonaddicts and exercise addicts showed levels of emotionality that were comparable to the norms provided by Eysenck and Eysenck (1975).

Exercise addiction is socially acceptable. Many runners and exercise participants proudly claim that they are addicted to exercise as if this were a badge of courage. This widespread perception may explain why nonaddicts and exercise addicts did not differ on either the Psychoticism subscale or the Lie subscale of the Eysenck Personality Questionnaire. The Psychoticism subscale measures the degree to which individuals ignore social norms and are insensitive to others' needs, while the Lie subscale is a measurement of the tendency of subjects to present themselves in a positive light (Eysenck & Eysenck, 1975).

The differences in how people view chemical addictions and exercise addiction may lead to differences in how they are displayed. While secrecy and deception are characteristic of alcoholism and other drug addictions, this is not true of exercise dependence. Instead, T-shirts from road races and the newest tennis shoes are proudly worn by exercise addicts and nonaddicts alike. This public display suggests a lack of shame and embarrassment typically found in substance dependency, where individuals withdraw from their social network, focus only on their personal needs, and use deception to cover up this excessive behavior (Kaplan & Sadock, 1988; Ranew & Serritella, 1992). Perhaps as more people in our society become more aware of the negative consequences surrounding excessive exercise, the differences between these two types of addictions may disappear.

The limitations of this study should be considered. The health club setting from which the subjects were solicited might limit the generalization of these findings. Subjects were members of a suburban health and fitness club who could afford the annual membership dues. Most were Caucasian. Therefore, any generalization of the results to populations not in health club settings, or to persons of color, should be done cautiously.

Exercise addicts who were willing to abstain from exercise for the specified period may not represent other populations of exercise addicts. One investigator (Baekeland, 1970) found that no amount of money would persuade habitual exercisers to vary their regimen for the one-month period used in his study. Further, subjects who were identified as exercise addicts may have been highly invested in learning about the psychological effects of exercise on them. This investment could have provided enough motivation to persevere during this stressful withdrawal period.

These results underscore the importance of exercise in providing a positive psychological benefit for individuals. The occurrence of confusion among nonaddicts points out how exercise helps to maintain clarity of cognitive functioning. Also, subjects who abstained from exercising reported increased levels of tension. This study highlights the role that cognitive factors play in how people respond to anticipated changes in their exercise routine, with subjects in the planned-layoff condition reporting significantly higher levels of anger.

In future research on excessive exercise, comprehensive screenings should be made to identify exercise addicts. Investigators must discriminate between participants who are true exercise addicts and those who are highly committed to exercise, but not dependent

on exercise. This is a demanding task. However, if exercise addiction is seen as a process, and if a true exercise addict is one who is both highly committed and highly dependent, then such an endeavor should prove useful in understanding key characteristics associated with exercise addiction.

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Appendices

Appendix A



1964 Highway 54
Post Office Box 2242
Peachtree City, Georgia 30269
Telephone: (770) 48-SHAPE

May 14, 1996

Mr. James Kip Matthews
Counseling Center
Georgia State University
University Plaza
Atlanta, GA 30303

Dear Mr. Matthews:

This letter is to verify that Mr. Kip Matthews has my permission to use names from our club membership list to solicit subjects for his doctoral dissertation research study. As club director, I have discussed this study with Mr. Matthews and I am willing for him to use the membership list solely for this purpose. He has agreed not to distribute the names from this list and to keep this information confidential.

Sincerely,

J. D. Holmes
Director
Club Peachtree Fitness Center

Appendix B

Study Description and Solicitation to Participate

My name is Kip Matthews. I am a sixth year doctoral student in Counseling Psychology at The University of Tennessee - Knoxville and am currently preparing to collect data for my dissertation.

The research I am conducting is a study of the psychological effects of exercise participation. To examine these effects, I need the help of people who are willing to share their thoughts and feelings concerning their experiences with exercise participation. In addition, individuals will be asked to answer questions about their personality style.

I am seeking volunteers who would be willing to participate in this research. Your participation would involve responding to several brief questionnaires that would take less than one hour total to complete. These questionnaires include the following instruments: the Profile of Mood States, the Eating Attitudes Test, the Exercise Participation Scale, the Eysenck Personality Questionnaire, and the daily Exercise Activity Log. In addition, you may be asked to modify your exercise activity during one week of the study and your reactions to that change will be assessed.

Volunteers may be excluded from the study for two different reasons. First, subjects who report a high number of eating concerns, will be asked to no longer participate in this study. Secondly, failure to follow the investigators' instructions regarding your physical exercise activity will result in being excluded from the study.

Each volunteer will be asked to give their written consent to participate before completing the questionnaires. Each Informed Consent Form will have a numeric code along with their names. The questionnaires and responses will be coded only with numbers. Since personal contact with subjects is necessary during the study, the codes and data will be separated from the names at the conclusion of the investigation. The Informed Consent Forms would then be stored in a locked cabinet in the office of the Principal Investigator at Georgia State University. At no point, will your identity be revealed to anyone except the Principal Investigators. A separate list of all volunteer participants will be maintained with no results or code. This list will be used for the follow-up mail; at the

conclusion of the investigation and analyses. I will send all participants on this list a brief letter sharing the results of the study. This list will also be the source of the entries for the drawing for prizes explained below.

Your participation in this study will be greatly appreciated. It is also completely voluntary. You may withdraw from the study any time you wish. All individuals who complete the study and follow the investigators' instructions will be eligible to win one of two prizes through a drawing; a 13-inch remote control color television or a $50 gift certificate to a local sporting goods store. A list of study participants that has no results or codes will serve as the source of entries in this drawing. Winners will be notified at the conclusion of the study via mail.

If you are interested in participating in this study, please call me at a number listed below. If I am not available, please leave your name and number.

(404) 651-2215

Thank you for considering to participate in this research. I will be looking forward to speaking with you further about the study and answering any questions you may have. Thank you.

Sincerely,

J. Kip Matthews

Appendix C

Informed Consent Form

You have been invited to serve in a study of the psychological effects of exercise participation. Your part in this research will consist of responding to several brief questionnaires that will take less than one hour to complete. These questionnaires include the following instruments: the Profile of Mood States, the Eating Attitudes Test, the Exercise Participation Scale, the Eysenck Personality Questionnaire, and the daily Exercise Activity Log. These questionnaires will be returned to the researchers in two self-addressed stamped envelopes provided by the researchers. In addition, you may be asked by the investigator to make changes in your physical activity participation for one week. Specifically, subgroups of randomly selected study participants will be contacted and asked to decrease or eliminate exercise for a one-week period.

Volunteers may be excluded from the study for two different reasons. First, subjects who report a high number of eating concerns, will be asked to no longer participate in this study. Secondly, failure to follow the investigators' instructions regarding your physical exercise activity will result in being excluded from the study.

Since your participation in this research involves only a confidential response to the instruments and possible modifications in your exercise participation, there should be minimal, if any, risk or discomfort on your part. If you should experience any distress from your participation in this study, appropriate referral to a qualified counselor will be made. Your participation is completely voluntary, and you may withdraw from the study at any time without penalty or prejudice.

The sharing of information about your thoughts and feelings regarding your experiences of having regularly engaged in physical exercise can aid the psychological and medical communities in gaining a better understanding of the effects of exercise participation. Please understand that your identity will in no way be revealed to anyone except the researchers. The Informed Consent Forms will be coded numerically to match volunteer's identifying information with their questionnaire results which will have just numeric codes. Since personal contact with subjects is necessary during the study, the codes and data will be separated from subjects' names at the conclusion of the

investigation. At that point, the Informed Consent Forms, the only place where both the names and codes appear together, will be stored separately from the subjects' data in a locked cabinet in the office of the Principal Investigator at Georgia State University. Upon completion of the study, the researcher will send you an explanation of the findings. Any further questions you might have concerning this study or your participation may be answered by contacting Kip Matthews at (404) 651-2215 or Dr. Mark Hector at (615) 974-5131.

****

I have read and understood this explanation of the research project and have had my questions regarding the study and/or my participation in it answered to my satisfaction. I voluntarily agree to participate.

_____ _____

Name Date

_____

Signature

Appendix D

General Information Questionnaire

1. What is your gender?
   Male Female

2. What is your age? _____

3. What is your marital status?
   Single Married/Partnered Separated
   Divorced Widowed

4. What is your ethnicity?
   White (Euro-American)
   African-American
   Asian descent
   Hispanic
   Native American

5. In what sports or physical activities do you regularly participate? (List up to three): _____

   _____

6. How many days per week do you exercise? _____

7. How many minutes per day do you engage in sport or exercise? _____

8. For what length of time have you been at your current level of exercise participation? _____

9. How much money do you invest each year in exercise-related goods/ materials (club membership, clothing, equipment, etc.)? _____

10. Do you work? YES NO If yes, how many hours per week do you spend at work? _____

11. If given a choice, would you prefer to exercise by yourself or with a partner(s)?
    By myself
    With other(s)

Appendix E

Exercise Addiction Scale

Please indicate on the line at left the answer which applies best to each of the numbered statements. All of the results will be *strictly* confidential. Most of the questions directly relate to exercise or physical activity, although other types of questions have been included. Please answer each question carefully. Thank you.

1 - Strongly Agree
2 - Agree
3 - Undecided
4 - Disagree
5 - Strongly Disagree

1.____ I exercise on a regular basis.
2.____ I feel that I need to exercise at least once every day.
3.____ If the weather is too cold, too hot, or too windy, I will not exercise on that day.
4.____ On some days, even though I do not feel like exercising, I do anyway.
5.____ I would not reschedule activities with my friends in order to exercise.
6.____ I would continue to exercise while an injury healed.
7.____ I have stopped exercising for a period of at least a week for a reason other than injury.
8.____ After I exercise I "feel" better.
9.____ I would exercise with intense pain.
10.___ If there were another way to maintain my present physical fitness, I would not exercise anymore.
11.___ I have not spent much money on exercise literature or equipment and accessories.
12.___ My family and friends have rarely complained about my exercising.
13.___ If I miss a scheduled exercise session, I feel guilty.
14.___ I exercise to stay in shape.
15.___ I think of exercising when I am doing other activities, such as working.
16.___ When I miss a scheduled exercise session, I feel that my level of fitness drops.
17.___ I would not miss an appointment in order to exercise.
18. ___ If during an exercise session, if I have to cut back, for even a short period of time, I feel that I have let myself down.

Appendix F

EXERCISE ACTIVITY LOG

DAY	TIME	ACTIVITIES	DURATION OF ACTIVITY
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

Appendix G

EATING ATTITUDES TEST (EAT- 26)

Please indicate on the line at left the answer which applies best to each of the numbered statements. All of the results will be *strictly* confidential. Most of the questions directly relate to food or eating, although other types of questions have been included. Please answer each question carefully. Thank you.

1 = Always	4 = Sometimes
2 = Very Often	5 = Rarely
3 = Often	6 = Never

___ 1. Am terrified about being overweight.
___ 2. Avoid eating when I am hungry.
___ 3. Find myself preoccupied with food.
___ 4. Have gone on eating binges where I feel that I may not be able to stop.
___ 5. Cut my food into small pieces.
___ 6. Aware of the calorie content of the foods that I eat.
___ 7. Particularly avoid foods with a high carbohydrate content (e.g., bread, potatoes, rice, etc.)
___ 8. Feel that others would prefer if I ate more.
___ 9. Vomit after I have eaten.
___ 10. Feel extremely guilty after eating.
___ 11. Am preoccupied with a desire to be thinner.
___ 12. Think about burning my calories when I exercise.
___ 13. Other people think that I am too thin.
___ 14. Am preoccupied with the thought of having fat on my body.
___ 15. Take longer than others to eat my meals.
___ 16. Avoid foods with sugar in them.
___ 17. Eat diet foods.
___ 18. Feel that food controls my life.
___ 19. Display self control around food.
___ 20. Feel that others pressure me to eat.
___ 21. Give too much time and thought to food.
___ 22. Feel uncomfortable after eating sweets.
___ 23. Engage in dieting behavior.
___ 24. Like my stomach to be empty.
___ 25. Enjoy trying new rich foods.
___ 26. Have the impulse to vomit after meals.

Appendix H

July 18, 1996

Georgia State University

James Matthews
PO Box 250
Wadesboro, NC 28170

Dear Mr. Matthews,

I am delighte that you plan to use our Running Addiction Scale in your Doctoral Dissertation. You don't need, but certainly have my permission.

I'd appreciate hearing of your results.

Sincerely,

John M. de Castro, Ph.D.
Professor of Psychology

Georgia State University, a unit of the University System of Georgia, is an equal opportunity educational institution and is an equal opportunity/affirmative action employer.

Appendix I

David M. Garner, Ph.D.
Eating Disorder Program
Central Behavioral Healthcare
7261 W. Central Avenue
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Adjunct Professor
Department of Psychology
Bowling Green State University

Mailing Address:
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Fax: (419) 825-3783

Central Behavioral Healthcare, Inc.

June 27, 1996

J. Kip Matthews
335 Burch Rd.
Fayetteville, GA 30215

Dear Mr. Matthews,

Thank you for your request for information on the Eating Attitudes Test (EAT). You have permission to use the EAT in your research and clinical work and there is no charge for this permission. I would appreciate you providing me with a copy of any reports or publications in which this instrument is used since it may serve as a useful resource for other researchers and clinicians.

I have also enclosed information about the Eating Disorder Inventory (EDI-2) which is a standardized, multi-scale instrument with a much broader focus than the EAT. It is comprised of 3 subscales tapping attitudes and behaviors concerning eating, weight, and shape (Drive for Thinness, Bulimia, Body Dissatisfaction) plus subscales assessing more general psychological traits or organizing constructs clinically relevant to eating disorders (Ineffectiveness, Perfection, Interpersonal Distrust, Interoceptive Awareness, Maturity Fears, Asceticism, Impulse Regulation, and Social Insecurity).

The EDI-2 manual, test booklets, the EDI-2 symptom checklist and profile forms are available from the publisher, Psychological Assessment Resources, P.O. Box 998, Odessa FL 33556. You can call PAR at 1-800-331-8378.

If you have further questions, please do not hesitate to contact me.

Sincerely,

David M. Garner, Ph.D.
Clinical Psychologist

Appendix J

Table J-1. Demographic Information About Exercise Addicts (AD) and Exercise Nonaddicts (NA).

Demographic Variables	AD		NA	
	N	M	N	M
Age	27	41.0	35	39.9
	N	%	N	%
Gender				
Female	19	70.4	22	62.9
Male	8	29.6	13	37.1
Marital Status				
Married	17	63.0	31	88.6
Single	6	22.2	2	5.7
Separated	0	0.0	1	2.9
Divorced	3	11.1	1	2.9
Widowed	1	3.7	0	0.0
Ethnicity				
Caucasian (Euro-American)	26	96.3	34	97.1
Hispanic	1	3.7	0	0.0
Other	0	0.0	1	2.9
Work				
Yes	22	81.5	25	71.4
No	5	18.5	10	28.6
	N	M	N	M
Work Hours / Week	22	37.3	24	45.4
Money Spent on Exercise-Related Goods / Equipment	27	700.5	34	770.4

Note. Above means are unadjusted.

Table J-2. Descriptive Statistics Results for Exercise Addicts (AD) and Exercise Nonaddicts (NA) Across All Treatment Conditions.

Variables	AD		NA	
	M	SD	M	SD
Exercise Addiction Scale	42.8	2.8	35.9	3.1
Eating Attitudes Test - 26	9.9	6.5	5.4	4.6
Profile of Mood States				
Tension - Pretest	42.6	11.6	39.7	7.2
Tension - Posttest	43.2	11.7	39.6	7.0
Depression - Pretest	42.9	8.1	41.5	6.6
Depression - Posttest	42.6	5.9	41.8	6.4
Anger - Pretest	43.7	10.2	40.0	3.9
Anger - Posttest	44.3	7.9	40.9	6.0
Vigor - Pretest	54.6	11.3	51.3	9.0
Vigor - Posttest	49.4	9.3	47.7	9.4
Fatigue - Pretest	43.9	11.5	44.8	10.8
Fatigue - Posttest	47.0	8.2	43.7	8.7
Confusion - Pretest	38.9	7.6	37.3	9.8
Confusion - Posttest	39.0	6.3	40.6	6.6
Eysenck Personality Questionnaire				
Introversion	12.9	6.7	14.1	5.0
Neuroticism	11.0	6.3	8.6	5.5
Psychoticism	2.0	1.9	2.3	2.1
Lie	10.9	4.1	9.0	3.4
Length of Time at Current Level of Exercise Participation (months)	30.7	30.4	35.9	38.9

Note. Above means are unadjusted.

Table J-3. Multivariate Analysis of Covariance for the Addiction Status Main Effect - POMS.

Test Name	Value	Approx. F	Hypoth. df	Error df	p
Wilks	.6802	3.527	6.00	45.00	.006*

Univariate F tests with (1, 50) df

Scale	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	p
Anger	41.789	2093.333	41.789	41.867	0.998	.323 ns
Confusion	199.121	1706.271	199.121	34.125	5.835	.019*
Fatigue	76.580	3406.174	76.580	68.123	1.124	.294 ns
Powtens	0.808	154.558	0.808	3.091	0.261	.612 ns
Vigor	17.934	3634.502	17.934	72.690	0.247	.622 ns
Depression	1.685	1644.170	1.685	32.883	0.051	.822 ns

* = Significant at $\alpha = .05$, ns = Nonsignificant

Table J-4. Multivariate Analysis of Covariance for the Treatment Condition Main Effect - POMS.

Test Name	Value	Approx. F	Hypoth. df	Error df	p
Wilks	.5119	2.982	12.00	90.00	.002**

Univariate F tests with (2, 50) df

Scale	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	p
Anger	360.881	2093.332	180.441	41.867	4.310	.019*
Confusion	294.773	1706.271	147.386	34.125	4.319	.019*
Fatigue	158.134	3406.174	79.067	68.123	1.161	.322 ns
Powtens	85.824	154.558	42.912	3.091	13.882	.000**
Vigor	628.491	3634.502	314.245	72.690	4.323	.019*
Depression	191.299	1644.170	95.650	32.883	2.909	.064 ns

** = Significant at $\alpha = .008$, * = Significant at $\alpha = .05$, ns = Nonsignificant

Table J-5. Post Hoc Analysis 1 (Treatment Condition Main Effect): One-Way Analysis of Variance Test and Duncan Multiple Range Test Results for Anger.

Analysis of Variance for Anger

Source	df	SS	MS	F ratio	F prob.
Between Groups	2	305.401	152.701	3.295	.0441
Within Groups	58	2687.746	46.341		
Total	60	2993.148			

Duncan Multiple Range Test

Adjusted Mean			Groups 1	2	3
38.8	Continued Exercise	Group 1		*	
45.7	Planned Layoff	Group 2			
42.9	Unplanned Layoff	Group 3			

* = Significant difference between groups ($p < .05$)

Table J-6. Post Hoc Analysis 2 (Treatment Condition Main Effect): One-Way Analysis of Variance Test and Duncan Multiple Range Test Results for Confusion.

Analysis of Variance for Confusion

Source	df	SS	MS	F ratio	F prob.
Between Groups	2	154.229	77.115	1.880	.162 ns
Within Groups	58	2378.623	41.011		
Total	60	2532.853			

Duncan Multiple Range Test

Adjusted Mean			Groups 1	2	3
37.4	Continued Exercise	Group 1			
42.1	Planned Layoff	Group 2			
40.3	Unplanned Layoff	Group 3			

Note. The nonsignificant F value above occurred when there was no use of any covariates as compared to the univariate F tests reported earlier in the MANCOVA analysis.

---No two groups are significantly different ($p < .05$)---

Table J-7. Post Hoc Analysis 3 (Treatment Condition Main Effect): One-Way Analysis of Variance Test and Duncan Multiple Range Test Results for Powtens (Tension).

Analysis of Variance for Powtens (power transformed scores for Tension)

Source	df	SS	MS	F ratio	F prob.
Between Groups	2	123.291	61.645	15.362	.000**
Within Groups	58	232.743	4.013		
Total	60	356.033			

Duncan Multiple Range Test

Adjusted Powtens Mean	Adjusted Tension Mean			Groups 1	2	3
8.477	34.3	Continued Exercise	Group 1		*	*
5.410	43.0	Planned Layoff	Group 2			
6.057	40.6	Unplanned Layoff	Group 3			

* = Significant difference between groups ($p < .05$)

Table J-8. Post Hoc Analysis 4 (Treatment Condition Main Effect): One-Way Analysis of Variance Test and Duncan Multiple Range Test Results for Vigor.

Analysis of Variance for Vigor

Source	df	SS	MS	F ratio	F prob.
Between Groups	2	214.278	107.139	1.224	.302 ns
Within Groups	58	5078.476	87.560		
Total	60	5292.754			

Duncan Multiple Range Test

Adjusted Mean			Groups 1	2	3
52.3	Continued Exercise	Group 1			
46.4	Planned Layoff	Group 2			
46.6	Unplanned Layoff	Group 3			

Note. The nonsignificant F value above occurred when there was no use of any covariates as compared to the univariate F tests reported earlier in the MANCOVA analysis.

---No two groups are significantly different ($p < .05$)---

Table J-9. Multivariate Analysis of Variance for the Addiction Status Main Effect - EPQ.

Test Name	Value	Approx. F	Hypoth. df	Error df	p
Wilks	.8620	2.282	4.00	57.00	.072 ns

Univariate F tests with (1, 60) df

Scale	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	p
Introversion	23.205	2010.150	23.205	33.503	0.693	.409 ns
Neuroticism	85.715	2050.171	85.716	34.170	2.509	.118 ns
Psychoticism	1.506	245.543	1.506	4.092	0.368	.546 ns
Lie	50.670	824.379	50.670	13.740	3.688	.060 ns

ns = Nonsignificant

VITA

J. Kip Matthews was born in Wadesboro, North Carolina on August 5, 1965. He attended public schools in the Anson County school system and graduated from Bowman Senior High School in June, 1983. He entered The University of North Carolina at Chapel Hill in August, 1983 and began pursuing a major in both Psychology and Physical Education. Kip Matthews received his A.B. degree in May, 1987 from The University of North Carolina at Chapel Hill. In September, 1987, he then enrolled in the Ph.D. program in Kinesiology at The University of California at Los Angeles with a concentration in sport psychology. After one year, Kip Matthews transferred to The University of Tennessee at Knoxville to pursue a Ph.D. in Education, with a concentration in Counseling Psychology.

J. Kip Matthews' predoctoral internship was at The University of Maryland, College Park Counseling Center from 1992 to 1993. After completion of his internship, Kip Matthews began working as an Assistant Professor at the Georgia State University Counseling Center. His clinical interests are in the areas of health psychology, career counseling, and sport psychology.