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Exercise addiction in high school runners and multi-sport athletes

Barbra L. Whittier
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**EXERCISE ADDICTION IN
HIGH SCHOOL RUNNERS
AND MULTI-SPORT ATHLETES**

A Thesis

Presented to

The Faculty of the Department of Human Performance

San Jose State University

In Partial Fulfillment

of the Requirements of the Degree

Master of Arts

by

Barbra L. Whittier

August 1998

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ABSTRACT

EXERCISE ADDICTION IN HIGH SCHOOL RUNNERS AND MULTI-SPORT ATHLETES

by Barbra L. Whittier

The concept of negative addiction to exercise among high school runners and multi-sport athletes was investigated. Gender and history of participation as factors in addiction were also examined. Subjects included 96 high school athletes (50 multi-sport and 46 runners). Runners completed the Running Addiction Scale developed by Rudy and Estok (1989). Multi-sport athletes completed a revised version of the same scale. Demographic characteristics such as gender and history of participation were also obtained. A 2 (athletic status) x 2 (gender) x 2 (history of participation) ANOVA was used to determine statistically significant differences among the selected variables.

Runners scored significantly higher than multi-sport athletes. Females also scored significantly higher than males. No significant differences were found between athletes who had participated for less than 2 years as compared to athletes who had participated for 2 or more years. Likewise, no significance was found for interaction of the variables.

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TABLE OF CONTENTS

<u>Chapter I</u>	1
Introduction	1
Statement of Purpose	5
Hypotheses	5
Delimitations	6
Limitations	6
Assumptions	7
Operational Definition	7
Study Rationale	7
Summary	8
<u>Chapter II</u> Review of Literature	9
Introduction	9
Addiction Literature	10
Positive Addiction Literature	12
Negative Addiction Literature	21
Exercise Deprivation Literature	24
Summary	28
<u>Chapter III</u> Methodology	29
Introduction	29
Participants	30

Instrumentation	30
Running Addiction Scale	30
Instruction Sheet	32
Demographic Form	32
Procedure	32
Research Design	33
Statistical Analysis	34
<u>Chapter IV</u> Results	35
<u>Chapter V</u> Summary, Discussions, Recommendations	38
Summary	38
Conclusions	39
Discussion	39
Recommendations	44
Sports Medicine Application	46
<u>Appendices</u>	48
Appendix A: Running Addiction Scale (Runners)	48
Appendix B: Running Addiction Scale (Multi-sport)	51
Appendix C: Instruction Sheet	54
Appendix D: Demographic Sheet	57
Appendix E: Address Form	59
Appendix F: Tables	61
Table 1: Percentages by Age and Athletic Status	62

Table 2: Addiction Scores for Athletic Status by Age	63
Table 3: Percentages by Grade and Athletic Status	64
Table 4: Addiction Scores for Athletic Status by Grade	65
Table 5: Percentages by Athletic Status and History of Participation	66
Table 6: Percentages by Sport	67
Table 7: Mean Addiction Scores for Variable Groups	68
Table 8: Percentages of Subjects by Addiction Category	69
Appendix G: Figures	70
Figure 1: Rudy and Estok (1989) graph	71
Figure 2: Multi-sport scores	72
Figure 3: Runners scores	73
Figure 4: Males scores	74
Figure 5: Females scores	75

CHAPTER I

Introduction

Addiction is a term used to describe the overuse of a substance. Orford (1985) used the term “excessive” when referring to addiction and suggests that excessive use can occur not only with substances but also with behaviors such as eating. Sachs (1981) stated that addiction is an extension of ordinary behavior in that, initially, the behavior is normal but over time becomes a pathological habit or that the person becomes dependent on the behavior. This excessive or addictive behavior, according to Breteler (1991), is a learned response. When there is a constant reward for a particular behavior, one will learn that the particular behavior produces the reward (Breteler). If that reward is a pleasurable stimulus, one will want to continue the behavior in order to continue the stimulation.

In relating this concept of learning and reward to exercise, pleasurable rewards can be obtained by taking part in exercise regimens. These rewards include, but are not limited to, increased sense of self-worth, better state of health, and increased self-confidence.

Glasser (1976) was first to suggest that an addiction to exercise is possible, and when encountered it is positive in contrast to the negative addictions of drugs and alcohol. Glasser stated that the positive addiction “strengthens us and makes our lives more satisfying,” while the negative addiction “always weakens and destroys us” (p. 2).

For a positive addiction to occur, one has to reach what Glasser (1976) terms the “PA state,” or brief periods of satisfaction or perfection while taking part in the addictive

activity. Glasser says the PA state is better known as “euphoria” or “runner’s high” and can be considered a reward of exercise that can lead to addiction. In order for Glasser’s positive addiction to occur, the PA state needs to be experienced several times a week for periods of minutes to hours. If this pleasurable reward is continually achieved, one will begin to yearn for the pleasure more often, hence an addiction will take place. It is suggested that if this PA state is not achieved for periods longer than 3 or 4 days, both mental and physical withdrawal effects will occur (Glasser). These withdrawal effects are viewed as negative in nature (Morgan, 1979), and therefore the term “negative addiction” has now been used to describe a dependency to exercise.

Since the concept of negative exercise addiction was initially theorized by Morgan (1979), there have been various studies undertaken regarding its existence in endurance athletes (Hailey & Bailey, 1982; Pierce, Daleng & McGowan, 1993; Pierce, McGowan & Lynn, 1993). The symptoms that manifest with deprivation of exercise have also been examined (Dorsen, 1992; Hauk & Blumenthal, 1992; Morgan, 1979; Morris, Steinberg, Sykes & Salmon, 1990; Pierce, 1994; Sacks, 1990). In these studies results are presented indicating the presence of a negative addiction in athletes who take part in endurance type activities.

Morgan (1979), was the first researcher to delve into the notion that exercise addiction had negative ramifications. In his 1979 article entitled “Negative Addiction in Runners,” he stated that two requirements must be met for an athlete to be considered negatively addicted to exercise. First, athletes believe that they have to exercise to cope with life on a daily basis, and second athletes will experience withdrawal symptoms such

as depression, anxiety, and irritability if they are deprived of the exercise. According to Hailey and Bailey (1982), the negatively addicted athletes will continue to participate in their given activity even if it disrupts other areas of life such as health, career, and relationships.

In his 1979 review, Morgan related the addictive process of exercise to that of smoking. He said that just as beginning smoking will have side effects of dizziness and nausea, exercise produces aches and pains. As the process continues, the body adapts to the harmful agent and, as stated previously, the stimulus begins to produce pleasurable changes both psychological and physiological in nature (Morgan). At this point people are addicted negatively because they believe that if they discontinue the stimulus they will not be able to cope with daily life. In the event the stimulus is discontinued, withdrawal symptoms, which are critical in determining the existence of an addiction to exercise, become evident (Morgan).

As stated previously, addiction to exercise can exhibit negative psychological symptoms and affect personal areas of life such as health, career, and relationships (Hailey & Bailey, 1982). As a demonstration of these consequences, Morgan (1979) referred to a number of case reports supporting this phenomenon of addiction in runners. The first case described the symptom of depression and referred to a runner who had been deprived for 6 months due to injury. The runner stated that he found it hard to adjust mentally to the inability to run and that he soon found himself in a deep state of depression (Morgan).

Anxiety and the effect addiction has on the career are demonstrated in this next report of a runner who initially began running to lose weight and gradually worked his way up to two workout sessions a day (Morgan, 1979). This subject reported feeling very tense and uneasy at work between noon and 2:00 p.m. and found himself going for a run during this time, in addition to his morning and evening sessions. However, this run exceeded his lunch break by 30 minutes. The subject concluded by saying that he felt guilty but that he needed his midday run (Morgan).

The last case is report in an article by Callahan and Steptoe (1995), printed in Sports Illustrated. It is a report of a multi-sport athlete who participated in three sports at a Division I Ivy League school. This athlete was involved continuously throughout the school year in practice and games and worked sport camps throughout the summers. The school coaches established a policy requiring this athlete to take a week off in between seasons, although she would continue to work out on her own (Callahan & Steptoe). In the Callahan and Steptoe article, she said her schedule was very intense yet did not know if she would be happy if she quit a team. She stated that part of her wished to take a break but another part of her wanted to keep playing. Unfortunately, to take the break she wanted, she felt she had to take her own life and did so on July 10, 1995.

Pierce (1994) has suggested that there is an assumption that negative addiction is not limited to runners. In the few studies that have examined non-endurance running populations, such as field hockey players (Pierce, Daleng, et al., 1993) and health club members (Anshel, 1991), evidence of negative addiction has been found. The last case report, by Callahan and Steptoe (1995) cited above, indicated the possibility that this

addiction may also occur in multi-sport athletes. As a majority of the literature has examined only runners and single sport athletes, there is little documentation that would suggest that multi-sport athletes could be possible candidates for becoming negatively addicted to exercise.

Statement of the Purpose

The purpose of this study was to examine the concept of negative addiction to exercise among high school endurance runners and multi-sport athletes in an effort to determine if there was a difference in the mean addiction scores as a function of athletic status. Because Hailey and Bailey (1982) suggest that runners who have been running for longer periods of time demonstrate higher levels of addiction, the possibility of history of participation as a factor in addiction was also examined. Gender differences in addiction scores have also been noted in a number of studies (Anshel, 1991; Carmack & Martens, 1979; Crossman, Jamieson & Henderson, 1987; Masters & Lambert, 1989; Summers, Machin & Sargent, 1983). Other studies have indicated that no significant differences between males and females were found (Chapman & DeCastro, 1990; Fung, 1992). In light of these equivocal results, this study examined gender differences as well.

Hypotheses

It was hypothesized that there would be no statistically significant difference in mean addiction scores as a function of athletic status. It was also hypothesized that there would be no statistically significant difference in mean addiction scores as a function of either history of participation or gender or statistically significant differences related to interactions among the independent variables.

Delimitations

The subjects chosen for this study consisted of two separate groups of high school students. One group consisted of students involved in sports based on endurance running such as cross country and distance track events. The other group included students who participated in a number of team sports. These sports were based on skills other than endurance running such as football, basketball, and baseball.

Limitations

The following were possible limitations of this study:

1. The subjects may have been unable to respond honestly to all 17 statements.
 2. The subjects may have been in the off season and therefore responded differently than if they were in season.
 3. The sample may not have been representative of the general population.
 4. Some of the athletic directors and/or administrators selected the subjects from their school, which lead to the disqualification of certain subjects who did not meet the criteria of the study.
 5. While the runners completed the original version of the RAS questionnaire the multi-sport subjects completed a revised version of the RAS questionnaire.
- Therefore, all subjects may not have viewed the questions in the same way.

Assumptions

The following were assumptions of this study:

1. All subjects responded to all 17 statements of the Addiction Scale honestly and to the best of their ability.
2. The statements on the Addiction Scale were interpreted the same by all subjects.
3. The responses of the off season athletes were analogous to how they would have responded if they were in season.
4. The psychological aspects of addiction were present in high school athletes.
5. The psychological aspects of addiction were present in multi-sport athletes.
6. The sample was representative of the general population.

Operational Definition

Athletic Status: The grouping of athletes as either endurance runners (participate in endurance running sports such as cross country and/or track), or multi-sport athletes (participate in more than one team sport, excluding endurance running sports).

Study Rationale

As previously discussed, many studies have indicated the presence of negative addiction in endurance runners (Hailey & Bailey, 1982; Morgan, 1979; Pierce, Daleng, et al.; Pierce, McGowan, et al. 1993). In addition, there have been relatively few studies examining this concept in other exercise populations. In light of this and the case report of the multi-sport athlete, the purpose of this study was to examine the concept of

negative addiction to exercise among high school runners and multi-sport athletes and to determine if there was a difference in mean addiction scores among these two groups.

It has also been mentioned in the literature (Botterill, 1995; Dorsen, 1992; Hauck & Blumenthal, 1992; Morgan, 1979; Pierce, 1994; Sacks, 1990), that exercise addicts will continue to exercise at great physical cost. Even when injured, exercise addicts will continue to take part in their athletic activities in spite of pain and warnings from medical professionals. Therefore, the roles of sports medicine personnel in dealing with these addicted athletes will also be discussed.

Summary

Negative exercise addiction is a phenomenon shown numerous times in the literature to exist in endurance athletes (Hailey & Bailey, 1982; Pierce, Daleng, et al., 1993; Pierce, McGowan, et al., 1993). The effects of exercise deprivation on the negatively addicted runner have also been revealed (Dorsen, 1992; Hauck & Blumenthal, 1992; Morgan, 1979; Morris et al., 1990; Pierce, 1994; Sacks, 1990). Pierce has suggested that there is an assumption that this type of addiction is not limited to runners. However, it is evident that research emphasizing other exercise populations is scarce. Therefore, examining the existence of negative exercise addiction in the multi-sport athlete was the focus of this study.

CHAPTER II

Review of Literature

Introduction

Negative addiction to narcotics and other forms of drugs is well-known.

Although addiction to exercise was viewed initially as positive because exercise is perceived as healthy and therefore has positive outcomes (Glasser, 1976), it was later suggested that as addictions to drugs result in withdrawal, so will addiction to exercise, and therefore it, too, can be negative because the symptoms of withdrawal are negative (Morgan, 1979). In looking at withdrawal, a number of studies have examined the effects of exercise deprivation in an attempt to further understand the process of withdrawal. This review will examine literature pertaining to addiction in general as well as both positive and negative addiction in members of the exercise population. Furthermore, literature pertaining to the effects of exercise deprivation will also be reviewed.

Peele (1979) stated that addiction is not a result of the drug itself, but of the experience the drug elicits. In other words, the person becomes addicted to the pleasant effect of the stimulant, not to the stimulant itself. Therefore according to Peele, it can be conceived that addiction is not limited to drugs, but encompasses anything that results in a pleasurable experience.

With this in mind, the feasibility of an addiction to exercise is realistic in that it can produce a pleasurable effect. This concept of addiction to exercise was first brought to light by Glasser in 1976. He classified this addiction as positive because of the ability of exercise to bring about good feelings, which ultimately makes our lives more

satisfying. However in 1979, Morgan reported that an addiction to exercise can be negative. Morgan suggested that when a person cannot cope with life, if the stimulation does not occur on a daily basis and if withdrawal symptoms are encountered when the activity providing the stimulation is not experienced, then that person is addicted negatively to that activity because the results of the addiction are negative.

In the following literature review, both positive and negative aspects of addiction to exercise are discussed. In addition, reference is made to descriptive work on addiction in general, along with other studies completed that have examined the withdrawal effects produced with deprivation of exercise.

Addiction Literature

In 1979 Peele explored the meaning of addiction. Peele contended that addiction is a result of the experience obtained from the drug and not due to the drug itself. Also he described the addiction cycle. Peele stated the addiction begins when the individual uses the drug for the effect it produces in an attempt to hide from the life's problems. Once the pleasurable effect wears off, the problems are still there; hence the individual turns to the drug again. As this continues each time the person comes down from the drug, the problems seem bigger and harder to deal with. As abuse continues, the person becomes acclimated to the experience derived from the drug so more of the drug is needed. This cycle continues to a point where the individual cannot get through every day life without the help of the drug. At this point the individual is addicted, and if the addiction is not satisfied by the use of the drug, withdrawal occurs. The withdrawal, according to Peele, is a shock to the individual because the lack of the drug causes physical and

psychological disorientation. The individual now has to deal with this disorientation, which Peele contends is worse than dealing with the original problems.

Another area covered by Peele (1979) is the identification of an addictive experience. Peele provided five criteria in identifying an addictive experience:

1. **Eradicates Awareness:** The experience has the potential of eliminating the awareness of the effects a specific problem may bring about, such as tension and lack of self-esteem.
2. **Destroys other Involvements and Gratifications:** The addictive experience grows and destroys the ability to obtain gratification from other involvement's. This lack of gratification of other experiences allows the addictive experience to grow and take over the individual's life.
3. **Detract form Self-Esteem:** The initiation of the experience is an attempt to increase self-image. When the resultant pleasure of the experience is no longer there, the individual will have lower self-esteem, which increases the chance that the individual will partake in the experience again.
4. **Not Pleasurable:** The addictive experience may not always be pleasurable. In describing the fourth criterion, Peele gives an example of a smoker who smokes a number of packs of cigarettes a day. He states that after the initial ingestion of smoke, the experience is not physically pleasurable but that other feelings and stimuli that are undesirable to the individual can be avoided by the continued ingestion.

5. **Predictability:** The experience produces the same effects repeatedly and hence becomes a ritual. Peele says that the ritual of the experience itself is part of the addiction. In making this point, Peele refers to the fact that addicts will attempt to reduce the symptoms of withdrawal by pricking themselves with a needle as it is a part of the ritual of taking in the drug.

Peele concludes by stating that addiction is an abnormal extension of a habit, and because of this, addiction is a part of all of our lives. We all are habitual in one way or another, and that habit can at some point, if the previously mentioned criteria are evident, become an addiction.

Positive Exercise Addiction Literature

William Glasser in 1976, introduced the concept of positive addiction in his book entitled **Positive Addiction**. Glasser discussed the idea that people weak or strong can become physically and/or psychologically stronger simply by achieving a positive addiction. He states that running (physiological) and meditation (psychological) are the two most popular positive addiction populations along with yoga which Glasser believes is both physical and psychological in nature.

Glasser (1976) goes on in his book to state that one can be addicted to anything and there are six criteria that one must meet to obtain that addiction. The first criterion is that the activity in question is noncompetitive and the individual must be able to provide an hour per day to this activity. Second, is that the activity does not require mental effort and can be easily accomplished. Third, the activity should not require other people to do it, however you can do it with other people but this would be on rare occasion. Fourth,

the activity is of value to you, physically, mentally, or spiritually. Fifth, the individual must believe that if they continue the activity they will improve, and this improvement should only be measured by the individuals themselves. Finally, the sixth criterion is that it is an activity in which the individual will not be able to criticize themselves during the time the activity is in progress. It is further stated that even with the presence of these six criteria, an individual may not become addicted if the PA state is not reached at least a few times a week. In order for the addiction to occur the individual must also build up endurance so that the activity can be accomplished without effort, for at least an hour each time.

Glasser (1976) referred to a questionnaire he developed, which was later published in the October 1974 Runners World magazine, to examine the concept of positive addiction. Along with the questionnaire was an excerpt that explained the purpose of the study. In response Glasser received 700 completed questionnaires. By Glasser's terms, 75% of the respondents were addicted. Two questions considered to be key by Glasser were "Do you suffer if you miss a run?" and "Do you always enjoy your run?" In response to these questions, a majority replied yes. When speaking of discomfort, the subjects referred to symptoms of negative addiction as defined by Morgan (1979). One subject stated that at one point he was unable to run for a month because of an operation. He suffered from apathy, sluggishness, appetite and weight loss, insomnia, headaches, and stomachaches. Many respondents also reported that while running they are taken over by something and are unable to describe what that something is. Glasser suggested this something is pleasurable and is the core of the PA experience.

In 1979, Sachs and Pargman examined the concept of exercise addiction through an interview process. The intent of Sachs and Pargman's study was to gain information from the addicted persons that would aid in further research of exercise addiction and to reveal the factors of the various behaviors consistent with exercise addiction.

Subjects consisted of 12 males ranging in age from 23 to 48 years, and partaking in various running routines ranging from occasional running, to running consistently with high mileage and speed. For the interview, a fact sheet was used to record demographic data such as name, place and time of interview. A list of questions was prepared for the interview and additional questions were asked in an attempt to clarify answers.

In regard to why participation in running began, the general consensus was the influence of other people, for health, and staying in shape. Health and keeping in shape were again mentioned when the respondents were asked why it was they continued to run. One subject stated that he felt that running was an alternative to the guilt and anxiety he felt when he did not run. He proceeded to say that it was easier to go out and run than to cope with the feelings of unhappiness and guilt that he experiences when he does not run. Overall, the subjects reported that running was integrated with other roles and was a significant part of their lives. Two subjects stated that they would change their lifestyle to accommodate their running. In examining the responses of the respondents when asked about deprivation of running, feelings of anxiety, restlessness, discomfort, and irritation were expressed.

Sachs and Pargman (1979) concluded by stating that withdrawal symptoms, both physiological and psychological in nature, are the critical factor in exercise addiction and

that these psychophysiological responses will occur regardless of frequency, length, or duration of the run. They also state in their conclusion that it appears an addiction to exercise can take at least 4 to 5 months to become evident.

One of the most referenced studies pertaining to positive addiction is that of Carmack and Martens (1979). The purpose of this study was to develop a scale that measured commitment to running. Other reasons for this study were to examine the relationship of commitment to running and such factors as average length and frequency of run, discomfort experienced when a run was missed, and perceived addiction to running. In addition, the researchers wanted to know how these relationships compared with different sub-samples. To answer these questions, the researchers employed the voluntary help of 315 runners (250 males and 65 females) whose ages ranged from 13 to 60 years. Subjects were recruited from various running events and therefore were varied in competitive level. The instrument used for this study was a five-part questionnaire. Part one consisted of demographic questions; Part two examined the specifics of running such as length and frequency of run; Part three contained Likert scaled items that assessed state of mind during a run; Part four was the Commitment to Running questionnaire containing 12 5-point Likert scaled items; and finally, Part five consisted of a list of 40 benefits or outcomes, both physical and psychological, that are attributed to running. The subjects were asked to check “yes” or “no” in reference to whether or not they experience those stated outcomes.

In looking at the demographic variable of sex, length and frequency of run were greater for males than females, and this same outcome was true for Commitment to

Running scores. The subgroups of over 40-minute runners and those who perceived themselves to be addicted scored higher on the Commitment to Running Scale. In addition, the over 40-minute males had a significantly higher mean score (51.0) than the under 40-minute females (43.8) with the over 40 minute females (48.2) and the under 40-minute males (46.7) not far behind.

Of all the subjects, 233 reported experiencing discomfort when a run was missed. Of the experiences reported, the most frequent were guilt, irritability, depression, loss of training, letting self down, and sluggishness. Carmack and Martens (1979) suggested these feelings confirm the hypothesis that deprivation of running will produce physical and psychological withdrawal.

The Commitment to Running scale developed by Carmack and Martens (1979) has been used in other studies (Corbin, Nielsen, Bersdorf, & Laurie, 1987; Fung, 1992; Masters & Lambert, 1989; Summers et al. 1983). Summers et al. studied the psychological benefits, the concept of running, and the mental states experienced while running in non-elite marathon runners having varying abilities and experiences.

The 459 runners (348 males and 111 females) examined in this study were to be assessed both pre- and post-race. The pre-test assessment consisted of recording demographic information and medical history, answering questions regarding training for the marathon, reasons for beginning to run, outcomes derived from running, and reasons for attempting a marathon. In addition, the subjects were asked to complete the Commitment to Running Scale (Carmack & Martens, 1979) and answer questions related to running addiction and discomfort when missing a run. Finally, the subjects were asked

to rate on a scale of 1 to 7 (very easy to very hard) how difficult they thought the run would be.

After the race the subjects were again asked to respond to a questionnaire. This instrument examined post race illness/injury, medical problems during and after the race, diet and fluid intake immediately prior to and during the race, experience during the race in psychological terms (“runner’s high”), and gains and insights derived from the marathon.

In reporting the results of this study, the researchers mention that the two most frequent reasons for deciding to run were to improve and maintain fitness and to lose weight. When examining outcomes of running, it was determined that females began running to meet people, relieve depression and feel less shy. Under the category of negative consequences of running, 36% of the subjects revealed they had experienced negative consequences as a result of running. Finally, in examining addiction to running, 82% of the subjects thought of themselves as addicted to running, with a higher proportion of the females perceiving themselves as addicted as compared to the males. The runners who feel they are addicted also reported an increased likelihood of having discomfort when a run is missed. Overall 83% of the sample population reported this discomfort. Subjects who had longer histories of running also had higher levels of perceived addiction. The researchers state that the Commitment to Running scores were significantly related to perceived addiction and the experience of discomfort when a run was missed.

In 1989, Masters and Lambert also completed a study that utilized the Commitment to Running Scale (< biblio >). In their study they attempted determine if any gender differences were evident in their sample population.

The sample consisted of 30 men and 18 women ranging in age from 13 to 55 years. The subjects were mailed a packet that contained an informed consent form, the Commitment to Running Scale, and a demographic sheet including training data. In addition, these subjects were refunded the \$11.00 registration fee if they returned the contents of the package with everything completed.

A gender comparison showed women scoring higher than men on the Commitment to Running Scale. In addition, the male commitment scores correlated with training miles, training hours, training years, and finish time, whereas the female scores did not correlate with any of these variables. The researchers had concluded that the more addicted to running a person is, the more he or she would be expected to have behaviors consistent with addiction such as greater amounts of training and increased run time. However, in this study this was not the case because the females scored higher on commitment to running while their scores did not significantly correlate with any of the training variables.

Carmack and Martens (1979) Commitment to Running Scale was used again to examine addiction in 1992. In this study, Fung (1992) used the Corbin et al. (1987) revised version of the Commitment to Running Scale in an attempt to examine the level of commitment to training in wheelchair athletes. This scale, entitled Commitment to Physical Activity, was used by Fung (1992) to determine if it could be a predictor of the

amount of time these wheelchair athletes would spend training and whether there is a difference in addiction scores among this group of athletes as a function of gender.

In addition to the Commitment to Physical Activity Scale, the researcher used a Training Involvement Form to determine hours spent training. In the data analysis, subjects were placed in groups according to training time. Those subjects who trained 15 or more hours a week were placed in the high activity group, those who trained between 9 and 14 hours a week were placed in the medium activity group, and those who trained 8 hours or less were placed in the low activity group.

An ANOVA revealed that there was a significant difference in commitment between the three groups mentioned previously. No significant differences were found as a function of gender. The Commitment to Physical Activity mean scores showed a pattern much like the grouping criteria. The high activity group scored highest, followed by the moderate group, which was followed by the low group. A regression analysis showed the Commitment to Physical Activity Scale and the Training Information Form did correlate; therefore, the conclusion was drawn that commitment score can predict time spent training.

From the results of this study, Fung (1992) stated that although disability is a factor, the disabled athlete can have as much commitment to his/her activity as an athlete who is not physically challenged.

In the majority of the literature reviewed thus far, the Commitment to Running Scale has been used to show evidence of addiction to running or in the case of the Fung (1992) study, activity. However, in 1990 Chapman and De Castro stated that addiction

and commitment are not synonymous. In fact they point out that whereas addiction is a situation in which the athlete is compelled to run even when obstacles appear, commitment refers to the athlete's intention to continue to run. Because of this the authors believe that the Commitment to Running Scale of Carmack and Martens is not an appropriate scale to measure addiction. With this in mind, Chapman and De Castro (1990) conducted a study to examine this difference and to create a different scale that measured addiction to running in contrast to commitment to running.

Questionnaires submitted to the 47 subjects (32 males, 15 females) of the Chapman and DeCastro (1990) study consisted of a demographic questionnaire that also asked for information regarding training, a self-rating scale of how addicted the athletes thought they were, the Commitment to Running Scale, a symptom check list which assessed psychological characteristics, a locus of control scale, and a running addiction scale which possessed 18 statements pertaining to factors associated with running addiction. To determine reliability and validity of the Running Addiction Scale, a pilot study was completed. It was found that reliability of the scale had a coefficient alpha of .82 and it was suggested that the validity of the scale was good because of its strong correlation with self-rated addiction and moderate correlation with discomfort after a missed run. Results also showed a difference in correlations in regards to gender. For the males, scores on both scales correlated with self-rated addiction; however, the females running addiction scores correlated with self-rated addiction while the commitment score did not. In response to this, the researchers stated that, although the concepts of addiction and commitment may be alike in males, they are not in females.

Negative Exercise Addiction Literature

Morgan (1979) was the first to discuss negative addiction to exercise. However, Hailey and Bailey (1982) were the first to quantitatively examine the phenomenon of negative addiction. In a paper reporting the results of their study of negative addiction in runners, Hailey and Bailey stated that research conducted before their study considered only the concept of positive addiction, although Sachs and Pargman actually reported negative symptoms of withdrawal in their 1979 study of exercise addiction.

In light of their belief, Hailey and Bailey (1982) decided to examine the concept of negative addiction and its incidence in runners in regard to length of running history. In doing so, the researchers developed and used the Negative Addiction Scale, which looks at the psychological aspects of running and indicates a negative addiction to running because it focuses on the negative results of addiction. Hailey and Bailey divided 60-male subjects ranging in age from 13 to 60 years into three groups according to length of running history. At the end of a five-mile race, the subjects were asked to complete the Negative Addiction Scale. After statistically analyzing the data, Hailey and Bailey found that there was a significant difference in negative addiction scores as a function of running history. Those runners whose history of running was greater than 4 years scored highest with a mean of 6.38 (out of a possible 10), followed by the runners having a history of running between 1 and 4 years and the runners with a history of less than 1 year. Due to these results, the researchers concluded that the concept of negative addiction can occur in runners and occurs most often in those runners who have been running for longer periods of time.

Pierce, McGowan, et al. (1993) also studied the concept of negative addiction in competitive runners with the use of the Negative Addiction Scale (Hailey & Bailey, 1982). They postulated that those runners exhibiting higher scores of addiction would be more inclined to run in races of greater distance. In their 137 subject study of competitive and non-competitive male runners, the researchers reported results consistent with their hypothesis that competitive athletes participating in races of greater distances will manifest higher scores of addiction to exercise than those athletes competing at shorter distances. Ultra marathoners scored highest (mean 4.6), followed by marathoners (mean 3.8), 5K runners (mean 2.9), and recreational runners (mean 2.2). The researchers concluded that training mileage is significantly correlated with negative exercise addiction. Those running greater distances will tend to manifest higher addiction scores. They further concluded that the profiles of the runners in their survey were consistent with the previously reported characteristics of addiction.

Also in 1993 with the use of the Negative Addiction Scale, Pierce, Daleng, et al. investigated negative addiction in dancers. They proposed that dancers would have a higher level of addiction as compared to endurance athletes. The hypothesis for this study was confirmed as well. In surveying 102 female dancers, endurance runners, and field hockey players, results were consistent with the researchers' theory that the dancers would have higher scores of negative addiction than both the endurance and non-endurance (field hockey) athletes (means of 4.8, 3.5, and 2.5 respectively). In conclusion, the researchers indicated that this higher level of addiction might be due to the body

image demands placed on dancers. In other words, dancers continuously exercise to control their body composition and aesthetic appearance.

In 1989, Rudy and Estok also examined negative addiction in runners; however, they did not use Hailey and Bailey's (1982) Negative Addiction Scale. Their initial purpose in completing their study was to develop a negative addiction scale and show reliability and validity for that scale, because the Negative Addiction Scale (Hailey & Bailey) has not been shown to be valid or reliable.

The methodology for this study began with the formation of a Running Addiction Scale (Rudy & Estok, 1989). This scale contained 14 items that are related to addictive behaviors and were scored dichotomously. After mailing this scale to 158 female subjects, 84 returned them completed. Four of the 14 items were deleted, leaving 10 items, that had an internal consistency of .62.

The next step in this study was the revision of the Running Addiction Scale (Rudy & Estok, 1989). This revision consisted of adding five additional items to the original 14 items. This was done to raise the internal consistency of the scale. In contrast to the original scale, these items were of Likert format. Subjects this time included 112 females and 108 males with an age range 18 to 69 years.

After removing two items, 17 items remained. These items had a reported internal consistency of .66. The construct validity of the scale was determine by looking at the relationship of the scores from the Running Addiction Scale with the scores from Rosenberg's Self-Esteem Scale (1965) and Zuckerman's Anxiety Checklist (1960). After statistical comparison, it was determined that only 7% of the variance in self-esteem and

only 14% of the variance in anxiety were explained by the addiction score, with Pearson correlation coefficients being -.23 for self-esteem and .48 for anxiety. In light of the low variance, the researchers stated that due to past research, which suggests a negative relationship between addiction and self-esteem and a positive relationship between addiction and anxiety, the results of the Pearson correlation coefficient support construct validity.

Exercise Deprivation Literature

Because the effects of addiction are so important in determining whether the addiction is negative or positive, the review of literature dealing with effects of exercise deprivations is paramount.

In 1982 Thaxton looked at both physiological and psychological effects of both running and deprivation of running. Thaxton theorized that within 24 hours of deprivation there would be difference in anxiety, depression, and fatigue between those that were deprived and those who were not, with the deprived group showing higher amounts of these traits.

Subjects consisted of 24 males and 9 females ranging in age from 21 to 54 years. Instrumentation for this study consisted of two surveys. The first was the Profile of Mood States (McNair, Lorr & Droppleman, 1971) survey, which is a psychological questionnaire that assesses transitory mood states of tension-anxiety, depression-dejection, vigor-activity, fatigue-inertia, anger-hostility, and confusion-bewilderment. The second survey, which examined the physiological aspect, was a physiograph to measure galvanic skin response.

A Solomon four-group design was used for the statistical analysis and the four groups consisted of pretest-running-test, pretest-no running-test, no pretest-running-test, and no pretest-no running-test. The testing procedure began with the subjects filling out the Profile of Mood States questionnaire; then galvanic skin responses were taken. Between the hours of 11:00 a.m. and 1:00 p.m., the subjects in the running groups left for a 30-minute run while the subjects in the non-running group did not run. Then between 3:00 p.m. and 5:00 p.m., all subjects were asked to complete the previous tests in addition to Carmack and Martens' (1979) Commitment to Running Scale. Once this was complete, the subjects were then notified of the purpose of the study and asked to rate themselves in terms of addiction on a scale from 0 to 10, 0 being non-addicted and 10 being extremely addicted (Thaxton, 1982).

Results from a univariate F test showed a significant difference between the running and non-running groups in regard to the depression variable supplied by the Profile of Mood states. There were no significant differences, however, in anxiety, vigor, and fatigue scores in the afternoon. Finally, commitment and addiction were not significantly correlated, which agrees with the belief of Pierce, McGowan, et al. (1993).

In a two-part study by Crossman et al. (1987) response to lay-off in training was examined. In the first part of the study, runners were asked to complete the State Anxiety Scale (Spielberger, Gorsuch & Levine, 1970) to assess anxiety felt during the time the scale was being completed. They were also asked to complete a mood scale (Polivy, 1981) to assess their general mood at that time. These scales were completed by the subjects at three different times. The first and third trials were one week apart and the

second trial took place on their day off, which consistently took place on the middle day of the week interval. Also on the third trial, the subjects were asked to complete a questionnaire that assessed their understanding of running addiction as well as their training program. The researchers compared the rest of the scores to the average of the before and after scores, and in doing so they found no significance indicating no evidence of addiction in this sample.

The subjects targeted for the second part of the study were competitive swimmers. The subjects were asked to complete both the State Anxiety Scale along with the Mood Scale at four separate times (before lay-off, second day of lay-off, fifth day of lay-off, and after lay-off) during a 5-day period. An activity assessment questionnaire was also filled out on the last day of the lay-off period in an attempt to determine the types of activities the subjects took part in during the lay-off. After calculating the scores, the swimmers were found not to demonstrate significantly the negative effects of withdrawal. In fact, approximately equal numbers of subjects showed positive moods after the lay-off.

Morris et al. (1990) found the opposite to be true when they investigated the effects of withdrawal during a 2-week lay-off. The 40 subjects included in the study continued to participate in their regular workout routine for a period of 2 weeks. Then they were divided randomly into test and control groups. The test group refrained from running and any other type of workout for 2 weeks while the control group went on with their workout routines. At the end of 2 weeks, the test group began running again. All subjects were asked to complete the General Health Questionnaire to assess somatic symptoms, anxiety/insomnia, social dysfunction, and severe depression. This

questionnaire was filled out each Sunday during the 6-week study. The outcome of this analysis gave evidence of declining emotional states in the test group during lay-off for each symptom assessed in the General Health Questionnaire. This study also found that the variety of symptoms appeared to occur at different phases of the lay-off. For example, the participants' subjective physical state, sleep patterns, and coping abilities weakened by the end of the first week while it took a longer period of deprivation for anxiety and depression symptoms to occur. Finally, the researchers conclude that their study reveals the existence of a withdrawal syndrome after exercise deprivation.

Most of the existing literature that evaluates exercise addiction considers only the running population. However, in 1991 Anshel sought to determine the psychological characteristics and behavioral tendencies of non-athletes. These non-athletes consisted of 60 health club members. Through an interview process the subjects were divided evenly into four groups (male/addicted, male/non-addicted, female/addicted, female/non-addicted). An exercise addict was defined as one who took part in a variety of activities at the club at least 5 days a week, for a minimum of 15 hours a week, over a 20-week period (Anshel). The method of examination consisted of a questionnaire that surveyed attitudes towards exercise as well as what subjects think about their own exercise-related habits and behavioral tendencies. An analysis of the extent to which physical activity alters the subjects' feelings showed that the addicted subjects were more restless, eager, self-confident, and stressed than the non-addicted athletes. The negative withdrawal symptoms of depression, anxiety, and anger were more evident in the addicted versus non-addicted subjects when an exercise session was missed. The final variable examined

was response to injury/illness with the results showing the addicted subjects reporting tendencies to exercise through illness or injury.

Summary

The review of literature contains information regarding the assessment of both positive and negative addiction in runners through the use of various scales and techniques, along with information pertaining to the negative effects of withdrawal when exercise is discontinued for a period of time. The literature supports the contention that addiction to exercise does occur (Hailey & Bailey, 1982; Morris, et al., 1990; Pierce, Daleng, et al., 1993; Pierce, McGowan, et al., 1993), and when that addiction is negative in nature, withdrawal symptoms such as depression, anxiety, irritability, and anger will occur (Morgan, 1979; Morris, et al., 1990; Sacks, 1990; Dorsen, 1992; Hauk & Blumenthal, 1992; Pierce, 1994). These symptoms of withdrawal may not occur initially. As shown in Morris et al., nearly 1 week had passed before some of the symptoms began to show.

As seen in this literature review, most of the research that evaluates the concept of negative addiction and its withdrawal effects has been conducted within the population of runners and endurance athletes that are older, and a majority of this literature assesses positive addiction rather than negative addiction. Therefore, the purpose of this study was to examine the concept of negative addiction in high school runners and multi-sport athletes.

CHAPTER III

Methodology

Introduction

The concept of negative addiction to exercise and its withdrawal effects have been examined and evidence has been offered in the literature with regard to runners. Results of prior research indicate exercise addiction can occur (Hailey & Bailey, 1982; Pierce, Daleng, et al., 1993; Pierce, McGowan, et al., 1993), and when the addicted runner is deprived of exercise, symptoms of withdrawal will be experienced (Dorsen, 1992; Hauk & Blumenthal, 1992; Morgan, 1979; Morris et al., 1990; Pierce, 1994; Sacks, 1990). These symptoms are indicators of a negative addiction (Pierce). Although support for the concept of negative addiction in runners exists, Pierce contends that research examining this concept in other exercise populations is rare. Therefore, the main purpose of this study was to examine the concept of negative exercise addiction and its existence in high school runners and multi-sport athletes. In addition, a comparison of the mean results for both runners and multi-sport athletes were made to determine if there was a difference in the addiction scores for both groups.

Length of an athlete's running history and gender are factors that have been shown to affect mean addiction scores. Therefore, in addition to examining the concept of negative addiction in runners versus multi-sport athletes, number of years participating and gender were also analyzed to determine possible relationships to level of addiction as indicated by mean scores.

Participants

Recruitment procedures for volunteer subjects consisted of contact with San Jose, California, area high school Athletic Directors and/or Administrators. Once permission was obtained to survey athletes, the Athletic Directors and/or Administrators were asked to assist in determining those athletes who participated in two or more team sports throughout the year and those who participated in endurance running sports. In cases where it was possible, the researcher obtained team lists to determine those athletes fitting the subject criteria. However, in some cases the Athletic Directors and/or Administrators felt it would be easier for them to determine which of their athletes fit the stated criteria. Candidates for study were contacted by letter and asked to volunteer in a research study of exercise dependence. The Athletic Directors and/or Administrators or the school office personnel distributed the letters. Those willing to volunteer were instructed in the letter to report to a pre-determined location at a pre-determined time. Along with the letter, candidates also received parental consent forms and were instructed to have them signed by a parent or guardian in the event they chose to volunteer as a subject.

Instrumentation

Running Addiction Scale

The instrument used for this study was the Running Addiction Scale (RAS) (Appendix A), developed by Rudy and Estok (1989). This scale contains 17 items that measure addictive behaviors and running intensity. These 17 items are Likert scaled ranging from 0 to 2 points with respective scoring for choosing no (0), occasionally (1), or frequently (2). Reverse scoring took place for questions two, three, six, seven, nine,

and 10. Points were added so that the minimum score is 0 while the maximum score is 34. In their study, Rudy and Estok examined the RAS for reliability and validity. In assessing reliability, the investigators report a Cronbach alpha of .66 and suggest this to be an acceptable level of internal consistency. Additional reliability was tested by means of the test-retest method to determine stability. The stability of the instrument was found to be .71 for the sample tested. In assessing construct validity, the relationship between the Running Addiction Scale and both self-esteem and anxiety were examined. Self-esteem is considered to be negatively related to addiction (Peele, 1979), while anxiety is positively related to addiction (Morgan, 1979). In examining these relationships, subjects were asked to complete the Rosenberg's Self-Esteem Scale (1965), and the Zuckerman's Anxiety Adjective Checklist (1960). The relationship between these scales and the RAS was analyzed through calculation of Pearson's correlation coefficient. The correlation coefficient between self-esteem and addiction was $r = -.23$, while the correlation coefficient for anxiety and addiction was $r = .48$. Rudy and Estok reported the addiction score can explain only 7% of the variance in self-esteem and 14% of the variance in anxiety. Rudy and Estok stated that the validity of the Running Addiction Scale is further supported in the literature by Peele's (1979) discussion about the negative relationship between addiction and self-esteem and by Morgan's (1979) discussion about the positive relationship between anxiety and addiction.

In assessing addiction in multi-sport athletes, a revised version of the Running Addiction Scale was used. In revising the scale, words such as "run" were replaced with "work out" (Appendix B).

Instruction Sheet (Appendix C).

To assist the participants with proper completion of the questionnaires, an instruction sheet was distributed to each participant along with the questionnaire and demographic form. The participants were directed to read the instructions and ask any questions at any time.

Demographic Sheet (Appendix D).

This form asked for information regarding gender, age, year in school, sports involved in, and how long involved in each individual sport. A separate sheet of paper was provided for names and addresses of those subjects wishing to receive the results of the study.

Procedure.

After determining the number of participants to be surveyed, packets containing an instruction sheet, demographic form, and the RAS questionnaire were assembled. The researcher met with the volunteer participants and gave a research packet to each volunteer who handed in a parental consent form. Participants were instructed to read the information sheet and to ask any questions at any time during the research process. Participants were then asked to fill out the address form if they wished to receive the results of the study. Next, they were instructed to complete the demographic form. Once this was completed, the participants were instructed to complete the RAS questionnaire. When all participants were finished, the completed forms were collected and the participants were thanked for their participation in the research study.

After each data collection, demographic forms were reviewed to determine those athletes meeting the subject criteria. After collection of data from the first four high schools, 31 participants were rejected for any one of these reasons: (1) they did not meet the stated subject criteria, (2) an appropriate number of participants had already been recruited for their specific variable group, or (3) they did not fully complete the RAS scale. Elimination of these participants was the result of inappropriate selections made by the Athletic Directors and/or Administrators. Consequently, two additional high schools were asked to take part in the research study so that the appropriate number of subjects could be obtained.

Research Design

The RAS scale was used in this research as a measurement of the dependent variable of negative exercise addiction. A low score means that a negative addiction was not endorsed while a high score would indicate the presence of a negative addiction. Furthermore, the RAS scale does not measure positive exercise addiction. A low score does not mean that a positive addiction exists. It simply means that a negative addiction to exercise was not endorsed.

The independent variables examined in this study were athletic status, gender, and history of participation. Each independent variable contained two levels. The levels of athletic status were endurance runners and multi-team sport athletes, while the independent variable of history of participation consisted of participants who had been involved for 2 or fewer years and those who had been involved for greater than 2 years..

Statistical Analysis.

After hand-scoring the scales, mean scores and sample standard deviations for the independent variables (athletic status, gender, and history of participation) were calculated using SPSS computer software. Finally, the hypotheses were tested using a 2 (athletic status) x 2 (gender) x 2 (history of participation) ANOVA. This statistical procedure searched for differences in mean scores between runners and multi-sport athletes, males and females, and athletes reporting longer versus shorter histories of participation. In addition, the 2 x 2 x 2 ANOVA also examined for interaction differences between the independent variables of athletic status (runner vs. multi-sport athlete), gender, and history of participation. For this study, alpha was set at .05.

For the purpose of comparing differences between the various subject groups, the lowest addiction score was subtracted from the highest addiction score to determine the range of scores. This range was divided by three to develop three addiction categories (high, medium, and low), as was done in the Rudy and Estok (1989) study.

CHAPTER IV

Results

The purpose of this study was to examine negative addiction to exercise among high school runners and multi-sport athletes, and to determine if there is a difference in mean addiction scores as a function of athletic status. In addition, this study also attempts to examine the role of gender and history of participation as factors contributing to exercise addiction.

The final participant population consisted of 49 (51.04%) males and 47 (48.96%) females ranging in age from 14 to 19 years ($M = 15.98$). Percentages of participants for each year of age are represented in Table 1 (see Appendix F). When examining the mean addiction scores by age (see Table 2 in Appendix F), it is evident that for the total sample there are no notable patterns in addiction scores. The same is true for the group of multi-sport athletes. However, when looking at the means of the runners by age, a gradual increase of mean addiction scores occurs with an increase in age (see Table 2 in Appendix F). Similar results are seen when examining mean addiction scores by grade (see Table 3 in Appendix F for percentages by grade). No synonymous increases or decreases are seen with respect to the participant population as a whole or with the multi-sport group (see Table 4 in Appendix F). Except for a decrease in mean addiction score for grade 11 (see Table 4 in Appendix F), However, there is a gradual increase in the runners' mean addiction score as grade increases, including a dramatic increase above the

other means from grade 11 to 12. There does not appear to be any relationship between percentages within each age or grade group and mean addiction scores.

The variable of history of participation and its levels, show that a majority of those participants taking part in their chosen activity for 2 years or less tend to be in either the 9th or 10th grade (87.88%). Conversely, a majority of those athletes taking part in their chosen activity for greater than 2 years tend to be in the 11th or 12th grade (60.32%). There did not seem to be any evident differences in history of participation when comparing runners and multi-sport athletes (see Table 5 in Appendix F).

The types of sports the multi-sport athletes took part in was another demographic variable examined. For the males, 84% chose to play football while baseball (68%) was the second sport of choice (see Table 6 in Appendix F). A majority of females chose to play softball (84%) with volleyball (60%) as their second sport of choice (see Table 6 in Appendix F).

The null hypothesis that athletic status would not affect addiction scores was rejected, $F(1,88) = 11.02$, $p < .001$, (see Table 7 in Appendix F). Athletic status had a moderate ($\eta^2 = .33$) impact on addiction scores. Approximately 11% of the variance in addiction scores can be explained by knowing athletic status. This means that 11% of the discrepancy in addiction scores can be attributed to whether or not a participant was a runner or multi-sport athlete. The null hypothesis that gender would not affect addiction scores was also rejected, $F(1,88) = 7.33$, $p < .008$, (see Table 7 in Appendix F). Gender had a moderate effect on addiction scores. Approximately 8% of the variance in

addiction scores can be explained by knowing gender. Females ($\underline{M} = 17.66$) tended to score higher on the RAS than did the males ($\underline{M} = 15.49$).

The null hypothesis that history of participation would not affect addiction scores was accepted, $F = 1.57$, $p > .05$ (see Table 7 in Appendix F). In addition, no statistical significance was found in regard to the 2-way or 3-way interactions between athletic status, gender and/or history of participation. Table 7 (see Appendix F) presents mean addiction scores by athletic status, gender, and history of participation. Although statistically significant differences were found for the independent variables of athletic status and gender, the means are not practically different (see Table 7 in Appendix F). After inspection of the means, it is evident that there is only a difference of 2.61 between runners and multi-sport addiction scores. In addition, there is only a difference of 2.17 in addiction scores between males and females.

The range of scores was from 7 to 28, with a difference of 21. After dividing the difference by 3 as was done in Rudy and Estok's (1989) study, three addiction categories were established. These categories were high addiction scores (21 to 28), medium addiction score (14 to 20), and low addiction score (7 to 13). These scores were used to visually compare the different variable groups.

CHAPTER V

Summary, Discussion, Recommendations

Summary

The purpose of this study was to determine if there was a difference between runners and multi-team sport athletes at the high school level in terms of negative addiction to exercise using the Running Addiction Scale. In addition, possible differences in gender and history of participation were also examined.

The participants ($n = 96$) consisted of males and females who were further grouped according to athletic status (endurance runners vs. multi-team sport athletes). To quantitatively measure negative addiction, participants were asked to complete the Running Addiction Scale developed by Rudy and Estok (1989). This scale was chosen due to its reported ability to measure negative changes in one's life as a result of running. In addition, demographic data regarding history of participation was collected to assess whether or not it was a factor in the negative addiction scores.

After the data were collected and scores calculated, a 2 (athletic status) x 2 (gender) x 2 (history of participation) ANOVA was used to test the null hypotheses that there would be no statistically significant difference in mean negative addiction scores as a function of athletic status, gender, or history of participation.

Conclusions

As a result of this analysis, statistically significant differences were found between endurance runners and multi-team sport athletes as well as between males and females. No statistically significant difference was found as a function of history of participation, nor were there any significant interaction effects.

Discussion

Although the purpose of Rudy and Estok's (1989) study was to develop a scale to quantifiably measure negative addiction in runners, the researchers also reported the range of scores. From this range of scores a difference was determined and divided by three to establish three levels of addiction scores. Rudy and Estok were able to categorize the subjects as having high, medium, or low addiction scores. Replicating this process in the present study, allowed for determination of addiction categories and hence comparison of the various groups of subjects. The purpose of these categories is to allow for some means of comparison between groups and does not establish that one is negatively addicted. As stated previously, the RAS scale is one that endorses a negative addiction when a score is high and vice versa when a score is low. Rudy and Estok did not report a specific score that would indicate negative addiction was present if that score or higher was achieved

When the raw data from Rudy and Estok's (1989) study were displayed in graph form, a somewhat normal distribution was shown (see Figure 1 in Appendix G). This is not unlike the raw scores of the runners in the current study. The range of scores and percentages of participants falling in each of the high, medium, and low categories of

negative addiction were also similar the Rudy and Estok sample (see Table 8 in Appendix F). The current results present a slightly larger range, but the percentages are quite comparable to Rudy and Estok's sample, especially within the medium addiction category (see Table 8 in Appendix F). Rudy and Estok reported 61.3% of their runners fell in the medium addiction category, while 63.0% of the running subjects in the present study fell in the same category. The correspondence of the runners' scores in the present study to that of the scores of the runners in the Rudy and Estok (1989) study indicate its ability to be used as a comparative tool.

After graphing the raw scores for the multi-sport athletes, it was determined that the scores were positively skewed (see Figure 2 in Appendix G). This indicates that a large percentage of the multi-sport athletes scored in the low category of addiction (30%).

Multi-sport athletes tended to score lower on the Addiction Scale as compared to runners (see Figures 2 and 3 in Appendix G). Pierce, Daleng, et al. (1993) reported similar results when they examined dancers, runners and field hockey players. Although the dancers scored highest, the runners scored higher than the field hockey players did. Pierce, McGowan, et al. (1993) examined negative addiction and its relationship to running duration. It was found that for their subject population, those who were longer distance runners (ultramarathoners), tended to score higher than the shorter distance runners (recreational, 5K). This finding was the basis for the conclusion that running duration was an indicator of negative addiction level. This finding would seem correct taking into account the biochemical effects on the body as a result of endurance running reported by Morgan (1979). Morgan stated that these biochemical effects lead to what is

known as a “runner’s high.” The greater the duration, the greater the possibility a “runner’s high” will be achieved, hence, the greater chance an addiction will result because of the repeated positive stimulus. If this theory is applied to the multi-sport population, it is understandable that these athletes are not as likely to have high addiction scores. Multi-sport athletes are not involved in continuous vigorous activity as are the runners. Therefore, there may not be enough time for the same biochemical changes to occur; consequently the “high” is not achieved consistently. Since the multi-sport athlete will not crave that “high,” addiction will not result. Those multi-sport athletes who did score at the high end of the range could possibly demonstrate addictive tendencies due to other factors unrelated to physiology, such as competitiveness or the need to be part of team. However, reported studies of athletes other than the endurance running population are rare, and one can only speculate as to why a non-endurance running athlete would elicit a high score. The lack of research in this area, and the high percentage of multi-sport athletes falling in the medium addiction category (60%), indicates the need for further research in multi-sport, as well as in other athletic populations.

With regard to gender, the present study found a statistically significant difference between males and females ($p < .008$). These results are best illustrated in graphic form (see Figures 4 and 5 in Appendix G), as well as the demonstration of categorical percentages (see Table 8 in Appendix F). The graphs for both males and females appear positively skewed. However, in spite of the leptokurtic curve within the lower end of the range, the females scored higher than the males. In fact, the percentages show almost an inverse relationship. While 25.5% ($n = 12$) of the females scored within the high

addiction range, 26.5% ($n = 13$) of the males scored within the low addiction category (see Table 8 in Appendix F). Similarly, 14.9% ($n = 7$) of the females scored within the low addiction category, while 10.2% ($n = 5$) of the males scored in the high addiction category (see Table 8 in Appendix F). Furthermore, 65.3% ($n = 32$) of the male population scored below mid-range, lending additional support for the stated statistical finding of gender differences in terms of negative addiction (see Table 8 in Appendix F).

As was the case in the athletic status category, previous research completed supported the finding that females demonstrate higher levels of addiction than do males. In 1983, Summers, Machin, and Sargent published a study that examined psychological aspects of running. For their subject population, they found that females scored higher in terms of withdrawal if a planned run was missed ($p < .001$). Females also perceived themselves to be addicted more so than the males did ($p < .001$). Masters and Lambert (1989) also reported higher levels of addiction in females after completing their study examining gender comparisons in relation to addiction. The initial response to these findings is that females have higher scores due to aesthetics and the need to be thin, i.e., eating disorders. Although this is valid, one should take into account other considerations as well.

One example would be the rise in female athletics over the past 15 years. As Masters and Lambert pointed out, after the 1984 Olympic games when the first Olympic women's marathon took place, there was an increase in social acceptance of females as athletes. More recently, the increase in scholarship money for female athletes, the rise in female professional sports such as the WNBA, the ABL, professional baseball and

softball, and the recent appearance of women's ice hockey at the 1998 Olympics has most likely increased the drive for women in athletics. However, women may still feel the need for societal approval and consequently work excessively and push themselves harder. In doing so, women may perceive themselves as addicted, as was found in Summers et al. (1983) because they continue to take part in athletics in defiance of society. This "perseverance despite the cost," according to Masters and Lambert (1989) is a behavioral pattern common to addiction. Because the rise in women's athletics is so recent, further research is needed to determine if it, along with the societal approval theory, are factors in the addiction scores.

Another consideration is one brought to light by Jasnoski, Holmes, and Banks (1988). The outcome of their study, which examined changes in personality as a result of aerobic and anaerobic fitness in both males and females, indicated that females with improved fitness levels reported greater feelings of happiness, security, and control. As stated previously, addictive behaviors can be a result of learning (Breteler, 1991). One learns that a particular reward is a result of a particular behavior. In the case of females with improved fitness levels, the rewards are increased feelings of happiness, security, and control and decreased depression. The behaviors that produce the rewards are the aerobic and anaerobic exercise. Therefore, it is possible that females may have higher addiction levels as compared to males because the rewards they experience (happiness, security, and control) are greater.

Throughout the vast research of exercise addiction, there have been many variations among males and females that have been reported. Because the previously

discussed theories are few among many possibilities that may contribute to the significant difference in addiction scores, further research is needed to determine which variations may contribute to the differing addiction scores.

With respect to the third hypothesis, no statistically significant difference was found in regard to history of participation as a factor in negative addiction ($p > .05$). However, both Hailey and Bailey (1982) and Summers, et al. (1983) found running history to be significant with respect to negative addiction. Summers et al. reported that those subjects who had been running seriously for longer periods of time were more likely to perceive themselves as addicted ($p < .001$) and experience discomfort when a run was missed ($p < .01$). Furthermore, Hailey and Bailey also reported that the runners in their study with longer histories of running scored higher on the Negative Addiction Scale ($p < .005$). Although the current study showed no statistical significance, it is interesting to note that only 9.7% of the those subjects participating for less than 2 years scored within the high addiction category, while 21.5% of those subjects participating for greater than 2 years scored in the same category.

Recommendations

The findings of this study appear to support previous research in regard to negative addiction levels of runners (Glasser, 1976; Hailey & Bailey, 1982; Morgan, 1979; Pierce, Daleng, et al., 1993; Pierce, McGowan, et al. 1993). However, available research with respect to other athletic populations is scarce. The present study revealed that, although not as high as the runners, a high percentage of the multi-sport athletes did score within the medium category. This would indicate the possibility that some level of

addiction is present. Future research is needed to examine this concept, as well as why there is a difference. One possible explanation is that runners are individual athletes while the multi-sport subjects in this study were team athletes. When one is part of a team, there is less pressure on the individual to succeed. The winning and losing is a team effort. This is not so in running. Although runners may be a part of a team, the main focus is to better individual time. This factor in itself can be an explanation for the higher addiction scores. Another factor that may play a role in the higher addiction scores of runners is the difference in intensity of workout between running (endurance) and team sports (short bursts). As was previously stated, multi-sport athletes are not involved in continuous vigorous activity, and therefore the “high” which is the stimulus for the addiction, is not consistently achieved. This concept of intensity level as well as team versus individual athletes are topics for future research.

It was also determined in the current study, and supported by previous research, that females show higher addiction levels than do males (Masters & Lambert, 1989; Summers, et al., 1983). Although much of the research suggests that aesthetics and body perception are contributors, only one study indicated the rise in female athletics and the societal approval theory as possible factors (Masters & Lambert, 1989). This idea seems quite feasible indicating the need for additional research that examines this theory.

Additional research in the high school aged subject is also needed. The subjects in the current study were of high school age and scored comparably to the older subjects of the Rudy and Estok (1989) study. This attests to a certain level of addiction even at younger ages. In addition, college level athletes should also be examined. This level of

athlete may show higher addiction levels as compared to the high school athlete due to the higher demands, especially for the multi-sport athlete. The competition at this level is much greater not only between opposing teams but also among teammates as well. This factor alone is incentive enough to push harder and work excessively to meet the demands of college athletics. Furthermore, additional testing of the Running Addiction Scale (Rudy & Estok, 1989) is needed in order to determine a point on the scale that will help indicate an addiction is present in the respective subject. Moreover, another scale needs to be developed that is worded in such a way to assess other groups of athletes as well as runners. This will prevent the problem of subjects not viewing the questions in the same manner, a limitation in this study.

Sports Medicine Application

Research of this nature is very important for various members of the sports medicine profession. The athletic trainer is probably able to benefit the most from this type of research. As stated previously, the literature has suggested that addicted athletes tend to continue their exercise regimen even while injured and at great physical cost (Botterill, 1995; Dorsen, 1992; Hauck & Blumenthal, 1992; Morgan, 1979; Pierce, 1994; Sacks, 1990). In fact, Rudy and Estok (1989) examined the incidence of physical injury in relation to exercise addiction and found that torn ligaments ($p < .02$) and hematuria ($p < .005$) were significantly related to addiction in their study population. The athletic trainer is in a prime position to recognize the characteristics of negative addiction to exercise. The athletic trainer can detect the possible presence of an exercise addiction when he/she sees specific athletes continuously for either the same injury or other

repetitive overuse injuries. Other red flags for the athletic trainer would be the refusal of the athlete to discontinue his/her workout regimen due to injury and the apparent presence of withdrawal symptoms when he/she is unable to take part in a particular athletic activity due to injury.

Booher and Thibodeau (1994) state that under the domain of education and counseling the athletic trainer is “responsible for recognizing situations that require consultations with other health care professionals” (p. 9). Since the first link in the referral system is most likely the team physician or family physician, these members of the sports medicine profession must also be aware of the concept of negative exercise addiction and its symptoms and characteristics. In recognizing the specific features of a negative exercise addiction, the physician can further refer the athlete to a sport psychologist or other professional.

By the recognition of a possible exercise addiction by the athletic trainer and the subsequent referral process, the athlete can receive the needed treatment and counseling. Treatment and counseling are keys to preventing long term physical damage as well as psychological damage that may lead to either contemplation of suicide (Dorsen 1992), or the act of suicide, which quite possibly could have been the situation in the Callahan and Steptoe (1995) article.

APPENDIX A
Running Addiction Scale
(Runners)

Runners Survey

Please circle the appropriate answer following each question based on your own running:
Frequently = FR., Occasionally = OC., Never or No = NO

How often do you run? (FR = 7 days/week, OC = 5-6 days/week,
NO = less than 5 days/week)	FR OC NO
Do you ever get tired of running?	FR OC NO
Are you willing to run with a friend who runs at a slower rate?	FR OC NO
Do you run according to your regular schedule at expense of other
activities?	FR OC NO
Do you find that you run even when injured?	FR OC NO
Do you ever substitute another activity such as tennis, etc. for
running?	FR OC NO
Can you enjoy yourself on a day when you don't run?	FR OC NO
Do you become uneasy, depressed restless, irritable, etc. if you
are unable to run as planned?	FR OC NO
Do other activities in addition to running have value for you?	FR OC NO
Is improving your running time a primary concern for you?	FR OC NO
Do you enjoy yourself in social activities with people who are
not runners?	FR OC NO
Do you feel that you neglect your family, social, or work
responsibilities in order to get to run?	FR OC NO
Has anyone close to you indicated that jogging is interfering
with family, social, or work responsibilities?	FR OC NO
Do you ever fantasize (go into a semi-trance state) while running?	FR OC NO

Have you ever had a “runner’s high” (a feeling of exhilaration or well being that occurs during or after a run)?

FR OC NO

Is the major reason that you run because you love to run?

FR OC NO

When you feel inadequate in other parts of your life, do you use jogging as the means to cope with this?

FR OC NO

APPENDIX B
Running Addiction Scale
(Multi-sport)

Multi-Sport Athletes Survey

Please circle the appropriate answer following each question based on your own workouts. (Frequently = FR, Occasionally = OC, Never/No = NO)

How often do you workout? (FR = 7 days/week,
OC = 5-6 days/week, NO = less than 5 days/week)	FR OC NO
Do you ever get tired of working out?	FR OC NO
Are you willing to workout with a friend who works out at a slower rate?	FR OC NO
Do you workout according to your regular schedule at expense of other activities?	FR OC NO
Do you find that you workout even when injured?	FR OC NO
Do you ever substitute another activity such as aerobics for a workout?	FR OC NO
Can you enjoy yourself on a day when you don't workout?	FR OC NO
Do you become uneasy, depressed, restless, irritable, etc. if you are unable to workout as planned?	FR OC NO
Do other activities in addition to working out have value to you?	FR OC NO
Is improving your athletic ability a primary concern for you?	FR OC NO
Do you enjoy yourself in social activities with people who are not involved in sport?	FR OC NO
Do you feel that you neglect your family, social, or work responsibilities in order to workout?	FR OC NO
Has anyone close to you indicated that working out is interfering with family, social or work responsibilities?	FR OC NO
Do you ever fantasize (go into a semi-trance state) while working out?	FR OC NO

- Have you ever experienced “euphoria” (a feeling of exhilaration or well being that occurs during or after a workout)? FR OC NO
- Is the major reason that you workout, because you love to workout? FR OC NO
- When you feel inadequate in other parts of your life, do you use working out as the means to cope with this? FR OC NO

APPENDIX C
Instruction Sheet

Instruction Sheet

Dear Athlete:

I would like to thank you for participating in this study. This is an important study in that the concept of exercise dependence in high school athletes has not been documented. At the conclusion of this study I would be glad to forward the results to you. Before we begin, I would like to tell you a little bit about myself. My name is Barb Whittier, and I am a certified athletic trainer. I am presently working towards my Master's Degree in Physical Education, with a concentration in Athletic Training at San Jose State University. I am originally from Massachusetts and did my undergraduate work in Vermont. This study is one of the requirements to graduate, and I am planning on graduating this May.

I would like to begin this assessment by having you fill out a background questionnaire. This form asks for your age, gender, year in school, sports you are involved, both in school and outside of school, and how long you have been involved in those sports. There is also a separate form provided for you to fill in your name and address if you are interested in receiving the results of this study.

The next step in this study is for you to fill out the short survey. There are 17 questions in which you will answer by circling either FR OC or NO:

FR = Frequently

OC = Occasionally

NO = Never or No

If at any time while you are responding to the 17 questions you are unclear about something or have a question, please feel free to ask me (this is important). When addressing your question I will make sure that everyone is made aware of the answer in an attempt to have all subjects view the question in the same manner.

Finally, those of you that are in the multi-sport group, you will notice that your questions include the word “workout”. For the purpose of this study, “workout” depicts any type of activity that involves one or more of the sports you are involved in as well as any activity you partake in to better your athletic ability. For example, working out with weights to increase your muscular strength for sport.

Once again thank you for partaking in this study.

Sincerely,

Barbra Whittier, ATC

APPENDIX D
Demographic Sheet

Demographic Information

AGE: _____

GENDER: M F

YEAR IN SCHOOL: 9 10 11 12

WHAT SPORTS ARE YOU INVOLVED IN (BOTH IN SCHOOL AND AWAY FROM SCHOOL)?

SPORT

AT SCHOOL/ AWAY FROM SCHOOL

HOW MANY YEARS HAVE YOU BEEN INVOLVED IN THESE SPORTS?

SPORT

OF YEARS

APPENDIX E

Address Form

Address Form

**IN THE EVENT YOU WISH TO RECEIVE THE RESULTS OF THIS STUDY,
PLEASE RECORD YOU NAME AND ADDRESS BELOW:**

APPENDIX F

Tables

Table 1

Percentages by Age and Athletic Status

<u>Age</u>	<u>Athletic Status</u>	
	<u>Multi-sport</u>	<u>Runners</u>
14 (n = 10)	60.00%	40.00%
15 (n = 29)	58.62%	41.67%
16 (n = 24)	58.33%	41.67%
17 (n = 21)	28.57%	71.43%
18 (n = 10)	70.00%	30.00%
19 (n = 2)	0.00%	100.00%

Table 2

Addiction Scores for Athletic Status by Age

Age	<u>Multi-sport</u>			<u>Runners</u>			<u>Overall</u>		
	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>
14	14.17	3.56	6	17.00	1.87	4	15.30	3.29	10
15	16.94	4.14	17	16.58	4.31	12	16.79	4.21	29
16	13.29	2.27	14	17.90	4.76	10	15.62	4.02	24
17	16.17	2.03	6	18.47	4.87	15	17.81	4.38	21
18	14.29	3.49	7	19.00	1.63	3	15.70	3.74	3
19	-----	-----	0	22.00	5.00	2	22.00	5.00	2

Table 3

Percentages by Grade and Athletic Status

Grade	<u>Athletic Status</u>	
	Multi-sport	Runners
9	56.00%	44.00%
10	62.07%	37.93%
11	43.48%	56.52%
12	57.89%	42.11%

Table 4

Addiction Scores for Athletic Status by Grade

Grade	<u>Multi-sport</u>			<u>Runners</u>			<u>Overall</u>		
	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>
9	15.50	4.14	14	17.00	3.72	11	16.16	4.03	25
10	15.67	4.00	18	18.18	4.80	11	16.62	4.49	29
11	15.20	3.22	10	16.92	4.30	13	16.17	3.96	23
12	17.06	4.90	8	19.73	4.65	11	17.47	4.90	19

Table 5

Percentage by Athletic Status and History of Participation

Athletic Status	<u>History of Participation</u>	
	2 or < years	> 2 years
Multi-sport	42.94% (n = 13)	56.92% (n = 37)
Runners	58.06% (n = 18)	43.08% (n = 28)

Table 6

Percentages by Sport

<u>Male</u>		<u>Female</u>	
Sport	Percentage	Sport	Percentage
Football	84%	Softball	84%
Baseball	68%	Volleyball	60%
Basketball	48%	Basketball	40%
Soccer	28%	Soccer	36%
		Field Hockey	16%
		Water Polo	12%

Table 7

Mean Addiction Scores for Variable Groups

<u>Groups</u>	<u>M</u>	<u>SD</u>	<u>p Value</u>
Athletic Status			.001
Runners (<u>n</u> = 46)	17.91	4.53	
Multi-sport (<u>n</u> = 50)	15.30	3.81	
Gender			.008
Males (<u>n</u> = 49)	15.49	4.05	
Females (<u>n</u> = 47)	17.66	4.42	
History of Participation			.213
0-2 years (<u>n</u> = 31)	16.13	4.19	
>2 years (<u>n</u> = 65)	16.75	4.44	

Table 8

Percentage of Subjects by Addiction Category

	<u>Low</u>	<u>Medium</u>	<u>High</u>
Rudy & Estok (1989)	18.3% (<u>n</u> = 37)	61.3% (<u>n</u> = 124)	20.3% (<u>n</u> = 41)
Runners	10.9% (<u>n</u> = 5)	63.0% (<u>n</u> = 29)	26.1% (<u>n</u> = 12)
Multi-Sport	30.0% (<u>n</u> = 15)	60.0% (<u>n</u> = 30)	10.0% (<u>n</u> = 5)
Females	14.9% (<u>n</u> = 7)	59.6% (<u>n</u> = 28)	25.5% (<u>n</u> = 12)
Males	26.5% (<u>n</u> = 13)	63.3% (<u>n</u> = 31)	10.2% (<u>n</u> = 5)
< 2 years	22.6% (<u>n</u> = 7)	67.7% (<u>n</u> = 21)	9.7% (<u>n</u> = 3)
> or = 2 years	20.0% (<u>n</u> = 13)	58.5% (<u>n</u> = 38)	21.5% (<u>n</u> = 14)

APPENDIX G

Figures

Figure 1: Rudy and Estok (1989).

Figure 2: Multi-sport scores.

Figure 3: Runners scores.

Figure 4: Males scores.

Figure 5: Females scores.

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