THE PSYCHOLOGICAL EFFECTS OF LAY-OFF FROM TRAINING ON COMPETITIVE SWIMMERS

A Thesis Presented

to the

Faculty of University Schools

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in the

Theory of Coaching

By

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1985

ABSTRACT

The purpose of this study was to examine the psychological effects of lay-off from training on competitive swimmers. The subjects were 20 swimmers (M = 8, F = 12) competing at either a national or provincial level. Subjects were given the Speilberger, Gorsuch and Lushene Self-Evaluation Questionnaire and a Likert Mood Scale Self-Evaluation Questionnaire on four occasions: during training (pre-test), two days into lay-off, five days into lay-off and again during training (post-test). A ten-item scale that measured self-reports of commitment and addiction to swimming using a nine-point Likert-type scale was also administered on days two and five of lay-off. An Activity Assessment Questionnaire was used to determine what activities, if any, the subjects participated in during their lay-off. This was administered on day five of their lay-off. No significance was found using ANOVA ($p < 0.05$) between the pre- and post-tests and lay-off days two and five, for either the mood scale or state anxiety self-evaluation questionnaire. Of the 20 subjects tested, five subjects exercised during the course of the testing period, and one subject became injured. Therefore, analysis was completed for both N = 14 and N = 20. The means for both mood and state anxiety for day two indicated an addiction pattern, while the means for both mood and state anxiety for day five indicated a relief pattern. Subjects were categorized into one of two groups on the basis of the pattern of their state anxiety and mood scores. These patterns were addiction, (low mood, high anxiety) and relief (high mood, low anxiety). T-tests revealed a significant difference between the relief and addiction groups (N = 14) for the level the subjects competed at (relief $\bar{x}$ = 1.6, addiction $\bar{x}$ = 1.1), and for

the number of days per week the subjects trained (relief $\bar{x}$ = 5.4, addiction $\bar{x}$ = 6.0). Data compiled from day five showed a significant difference between the addiction and relief groups for the subjects' preference to taking a day off from training, and from training, and from the subjects' perceived addiction scores. All subjects in the relief group indicated that they felt that they needed a day off from swimming to rest. Half of the subjects in the addiction group indicated the same. The addiction group ($\bar{x}$ = 6.8) perceived themselves more addicted to swimming than the relief group ($\bar{x}$ = 8.6). Subjects who experienced addiction during lay-off tended to compete at higher levels (national) and did not wish to take a day-off from training. Those who competed at lower levels (provincial) experienced relief during lay-off perhaps due to the coach controlled training schedule where time-off was viewed as a welcome relief. Further research in this area should involve a larger sample size across a variety of sports involving elite athletes.

ACKNOWLEDGMENTS

Deepest appreciation and gratitude is extended to Dr. Jane Crossman for her invaluable assistance, direction and support given every step of the way.

Special thanks is extended to Dr. John Jamieson for his constructive criticisms and expertise of statistical analysis.

Appreciation is extended to Bill Humby and Bill Barton head coaches of the Thunder Bay Thunderbolt and Mississauga Aquatic swim clubs, respectively. As well, the author wishes to thank the athletes from both of these clubs who served as subjects.

Finally, the author wishes to thank Sharon Kozak for typing this thesis, and Blair Tucker along with his Kenora Swim Club for their assistance in establishing reliability of the questionnaires used in this thesis.

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Chapter I

INTRODUCTION

Statement of Purpose

The purpose of this study was to examine the psychological effects of lay-off from training on competitive swimmers.

Significance of the Study

Exercise deprivation is a growing topic of discussion among many sport psychologists today. Deprivation or addiction as it is sometimes referred to in the literature, may be defined as, "addiction of a psychological and/or physiological nature, upon a regular regimen of exercise, characterized by withdrawal symptoms after 24-36 hours without participation" (Sachs, 1982, p. 12). Some reported withdrawal symptoms include feelings of guilt, anxiety, tension, irritability and discomfort (Sachs, 1982).

Exercise addiction can be of either a positive or negative nature. Positive addiction adds strength and creativity to an individual's life (Glasser, 1981). Negative addiction according to Glasser, is associated with the satisfaction of certain physical activities that can no longer be attained.

Many studies to date have investigated the effects of exercise deprivation on runners (Sachs and Pargman, 1979; Thaxton, 1982; Morgan, 1979). This thesis studied the effects of lay-off on competitive swimmers. The subject's moods and levels of state anxiety were measured during four specific times: (a) during a regular week of workouts; (b) at the beginning of the subject's time-off period; (c) at the end of the

subject's time-off period; (d) during a regular week of workouts following the subject's time-off period.

By making coaches aware of the effects of lay-off on swimmer's anxiety and mood, proper strategies can be implemented to overcome any problems. In addition, specific results could help an athlete understand and cope with feelings experienced during the lay-off period.

This study was also undertaken to satisfy the investigator's curiosity in this area, as most studies in the past (Crossman and Jamieson, 1983) have used only 24-36 hours as a lay-off period. Researchers have recommended that 24-36 hours is not sufficient time to assess the psychological effects of lay-off from training. A study designed to assess the effects of lay-off on competitive swimmers over a five day period will be an important contribution to the literature.

Delimitations

This study was delimited to the testing of 8 male and 12 female competitive swimmers ranging in age from 10 to 19 years. The swimmers compete at either a provincial or national level.

The independent variable was the time-off the subjects took during their lay-off. This time-off totalled five days.

Alternative variables which were considered were age, sex, distances covered in workouts, and the level of the swimmer (national or provincial).

The dependent variables were state anxiety as measured by the Spielberger, Gorsuch, and Lushene Self-Evaluation Questionnaire (see Appendix A), and mood as measured by a Likert Scale Self-Evaluation Questionnaire (see Appendix B).

The possibility existed that the subjects might have gotten injured

or stopped swimming while the study was in progress.

Limitations

This study was limited to the following assumptions:

(a) the subjects were representative of competitive swimmers;

(b) that the subjects were able to understand and interpret correctly the terms used in the self-evaluation questionnaires and mood scales;

(c) that the subjects scored all questionnaires honestly;

(d) that all the subjects were representatives of either a provincial or national level of swimmers;

(e) that an alpha level of .05 was set for statistical significance;

(f) that the questionnaires were reliable if the reliability coefficient exceeded $r = .8$ for each item; and

(g) that content validity of the questionnaires was established by comparison with other scales of the same nature and by soliciting the appropriateness of each item from several experts.

Definitions

Addiction is based on the experience a person derives from something (e.g., the need to exercise); it is also based on the person's need for that experience and the way in which the experience fits in with the rest of the person's life.

Exercise Addiction is addiction of a psychological and/or physiological nature, upon a regular regimen of exercise characterized by withdrawal symptoms after 24-36 hours without participation.

Positive Addiction is an experience that is thought to provide psychological strength and creativity to one's life.

Negative Addiction is an experience that is thought to provide psychological weaknesses (e.g., fatigue, listlessness, the ability to concentrate) to one's routine in life.

Withdrawal is the shock of adjustment to the body and mind in facing an environment shorn of the familiarity, constancy, and reassurance of an experience.

Meditation is a process in which we free the mind from all of its normal, mandatory activity.

State Anxiety is an empirical process of reaction taking place at a particular moment in time, and at a given level of intensity; a transitory emotional state of tension and apprehension.

Depression is the emotional correlate of a partial or complete collapse of self-esteem.

Lay-off for the purpose of this study refers to the time taken off (a total of five days) from regular workouts, in which no exercise activity takes place.

Time-off for the purpose of this study refers to the participation or non-participation of exercise activity by the subjects during their lay-off.

Top Squad is the highest level or group of swimmers in a swim club, competing at the national or provincial level.

Chapter 2

REVIEW OF LITERATURE

Exercise Addiction

Use of the term addiction with respect to exercise has received criticism from some authorities who suggest that associating these two concepts is inappropriate (Cooper, 1980). However, the term addiction has remained in popular usage (Glasser, 1976, 1978; Sachs and Pargman, 1979), and while it may be preferable to use a term such as dependence or compulsion upon exercise, the three words will be used interchangeably herein.

Addiction to exercise is most often discussed in relation to the physical activity of running, although one may become addicted to any physical activity (Sachs, 1979). Exercise addiction according to Sachs (1979, p. 12), is defined as,

> addiction of a psychological and/or physiological nature, upon a regular regimen of exercise, characterized by withdrawal symptoms after 24-36 hours without participation. These withdrawal symptoms appear to be critical in the determination of the degree of addiction to exercise. Reported withdrawal symptoms include feelings of anxiety, guilt, tension, irritability, restlessness, bloatedness, muscle twitching, and discomfort. The development of exercise addiction may take place within a period of a few weeks or months, or may require many years.

Addiction is a process rather than a condition (Peele, 1979). It is not an all-or-none state of being, unambiguously present or absent (Peele, 1979). It is a pathological habit, dependence, or compulsion (Peele, 1979). Peele (1979) has also noted that addiction is not characteristic of drugs or activities per se, but of the involvement a person forms with these events or substances. When involvement

eliminates choice in all areas of life, then an addiction is formed (Peele, 1979).

Research evidence on exercise addiction is limited because of the newness of the concept, and because of the difficulty of studying addicted exercisers (Sachs, 1979). For example, Baekeland (1970) could not get regular exercisers to stop exercising for any amount of money. It appears that for many individuals, regular, vigorous, physical activity is a psychological necessity as well as a physiological necessity (Pargman and Burgess, 1979). Without it, a general uncomfortableness and a feeling of disappointment and deprivation prevails (Pargman and Burgess, 1979).

The concept of exercise addiction has also been addressed in nonscientific sources. Fixx (1977), Henderson (1974) and Sheehan (1975, 1978) have published popular books about running which include treatment of psychological factors. Other sports where exercise dependence has been discussed are tennis (Stillman, 1977) and rowing (Tuite, 1978).

Positive Exercise Addiction

The concept of positive addiction used in relation to such experiences as exercise and meditation, was first popularized by William Glasser (1976) in his book, Positive Addiction. Positive addiction according to Glasser (1976) is something that adds strength and creativity to one's life. Once achieved through a powerful meditation, it becomes a regular way not only to relax, but to tap the creativity that lies within all of us (Glasser, 1981).

Positive addiction is thought to provide psychological strength

and increase the satisfaction derived from life (Glasser, 1976). The thesis of Glasser's work which deals mainly with runners, is that, "Many people, weak and strong, can help themselves to be stronger, and an important new path to strength may be positive addiction" (Glasser, 1976, p. 11).

Description of the positive addiction state provided by Glasser (1976) include a general feeling of "high" or euphoria experienced by runners, a loss of sense of oneself, floating, and a total integration with running. Glasser (1976) recommends running for anyone, both psychologically strong and weak, who desires a positively addicting activity.

Negative Exercise Addiction

Addiction to exercise, and to running in particular, is not always positive in nature (Sachs, 1979). Morgan (1979) has identified the negatively addicting aspects of exercise in an article he wrote entitled "Negative Addiction in Runners". He cited such symptoms as decreased ability to concentrate, lapses in judgment, listlessness, fatigue, constant thought about exercising, impaired social and work activity, and skipping appointments because of the need to run, as just a few examples. Morgan (1979) also noted runners who altered their daily schedules dramatically to run, those who continued to run when seriously injured, and those who ran and neglected the responsibility of home, work and family.

For the negatively addicted person, exercise has moved from an important but considered aspect of the person's existence, to a controlling factor, eliminating other choices in life (Sachs, 1979).

The concept of control is critical because the positively addicted person has control over the activity, while the negatively addicted person has progressed to the point where the activity controls him/her (Sachs, 1979).

Mood and Exercise Addiction

Early research done by Cureton (1953, 1963) on the psychological benefits of regular phyisical exercise has recently been supported by numerous people (Lion, 1978; Folkins, 1976). These researchers have noted that psychological states such as the "feeling better syndrome" less anxiety, less depression and more vigor were associated with participation in physical activity (Wilson, Morley and Bird, 1980).

Recent popular literature also raises the possibility that exercise reduces the undesirable mood states such as anxiety, depression, anger, confusion and fatigue as well as enhancing positive characteristics such as vigor and self-concept (Berger, 1982). Approximately half of the studies examining the psychological benefits of jogging, indicate that indeed it does enhance well-being (Griest, Klein, Eischens, Faris, Gurman, and Morgan, 1979; Berger, 1982; deVries, 1981; Wilson, Berger, and Bird, 1981). A particular study investigated by Nowlis and Greenberg (1979) looked at changes in mood, before and after a 12.5 mile run of 18 experienced joggers. It was found through the completion of the mood adjective checklist, designed by Nowlis (1965), that there was an increase in pleasantness, an increase in activation, and a decrease in relaxation after the run.

Anxiety and depression are major components of personal unhappiness (Berger, 1982). The possibility that exercise decreases these undesirable affective states presents a new perspective of career

opportunities for specialists in applied sport psychology (Berger, 1982). In addition to reducing the undesirable mood states of anxiety and depression, exercise enhances feelings of vigor, clear-mindedness, self-concept and self-esteem (Berger, 1982).

The state of anxiety is characterized by high levels of activation and somatic complaints of nausea, fatigability and headaches (Berger, 1982). In contrast, depression is characterized by feelings of hopelessness, despair and self-hate (Berger, 1982).

In a study by Morgan, Roberts, Brand, and Feinerman (1970) it was found that college students enrolled in either beginner or intermediate swimming classes, significantly decreased their levels of anxiety, depression, anger and confusion, and increased their vigor when measured before and after class. Another study by Morgan (1973) measured the state anxiety of male subjects through self-reports before, immediately after and 20-30 minutes after a 45 minute exercise program. It was found that state anxiety increased slightly but not significantly from pre-exercise to immediate exercise and was significantly lower 20-30 minutes post-exercise in comparison with pre-exercise and immediate post-exercise values. Morgan (1973, 1976, 1979) completed similar studies varying the subjects sex, length of time in which the post-exercise state anxiety tests were given and the type of exercise performed. He found that exercise provoked a significant elevation in state anxiety above the baseline levels. Anxiety, however, began to decrease within a few minutes following exercise, and was significantly below baseline levels by 20-30 minutes post-exercise. These data are, therefore, in the direct contradiction to the predictions of Pitts and McClure (1967). Morgan also proposed that reductions in state anxiety may represent the

"exercise high" or "feeling better" sensation reported by many exercisers (Carmack and Martens, 1979). It is also noteworthy that Morgan, Roberts and Feinerman (1971) did not observe a decrease in state anxiety as a consequence of light exercise, and Morgan (1979) also debated that light exercise did not alter state anxiety. Wood (1977) reported that male college students demonstrated a significant decrease in state anxiety after a 12 minute run, but that college women did not.

Griest et al. (1979) regard the prescription of running for the treatment of depression as merely an experimental procedure. These authors suggest that walking as opposed to running may be just as effective a treatment for depressed patients. Brown, Ramirex and Taub (1978) proposed that the effectiveness of exercise as a treatment for depression is directly related to exercise intensity.

Many other studies dealing with mood changes and exercise using a variety of subjects including emotionally disturbed, alcoholics, ex-drug users and coronary heart patients are being investigated (Folkins, 1976; Blue, 1979).

Short-Term Lay-Off

Some attempts have been made to study the effects of short-term lay-off on both recreational and competitive runners (Thaxton, 1982; Crossman and Jamieson, 1983). Thaxton's study examined through quantitive measures, exercise dependancy in subjects who had been running at least a year and ran five times a week. Thirty-three subjects were studied and were randomly assigned to four different groups. Two of the groups ran on the day of the experiment and two of the groups did not. (The runs were 30 minutes in length.) Pre-tests were given to one of the groups who ran on the day of the experiment and to one of the groups who did not

run. Tests included a mood scale, a questionnaire in regard to the runner's background and a galvanic skin response physiological test. The results indicated that slight variations from running schedules may have had a negative effect on the mood of habitual runners.

Crossman and Jamieson (1983) studied competitive runners who took a 24-hour lay-off from training. A state anxiety questionnaire and mood scale were completed before the lay-off, 24 hours after the completion of each subject's last workout and once the subjects had returned to training. The study found no true addiction effect. Those that reported addiction were usually competing at higher levels.

Carmack and Martens (1979) completed a study which developed and validated a commitment to running using a commitment to Running Scale. Information generated from the scale examined changes in the state of mind during different segments of a run. Subjects responded to a questionnaire which requested information regarding demographics, attitudes and mental states encountered during a run as well as perceived outcomes of running. A 12-item Commitment to Running Scale was also included in the questionnaire. Significant differences were found on a number of variables which were expected to predict commitment to running. These included the length of the run, the discomfort experienced when a run is missed and perceived addiction to running. The analysis indicated that perceived addiction, the state of the mind and the length of the run were significant predictors of to commitment to running. As well, popular notions regarding "positive addiction" to running and changes in mental state were supported.

Physiological Considerations

Researchers have also explained the possibility that psychological changes which occur when a trained athlete is not exercising are bio-

chemical in nature. When athletes train they increase their level of endogenous opiod peptides, commonly referred to as endorphins. Endorphins are defined as any substance that exhibits opiate characteristics when subjected to classic tests (Riggs, 1981). Researchers speculate that during exercise endorphin levels increase (Farrel, Cates, Maksud, Morgan and Tseng, 1981), mediating a sense of well-being (Stein and Belluzazi, 1978) and decrease anxiety (Pargman and Baker, 1980). When exercise is terminated for a period of time, endorphin levels decrease. Therefore, the athlete experiences withdrawal symptoms often reported as feelings of irritability, depression and anger.

Summary

In summary, it should be noted that the majority of the studies completed in the past with regards to exercise addiction and lay-off periods, have dealt with recreational type individuals and not with competitive athletes. In addition, the majority of these studies have been analyzed through self-reports. Examples of these types of studies were previously mentioned (Morgan, 1973, 1976, 1979; Morgan et al, 1970; Wood, 1977; Berger, 1982; deVries, 1981; Griest et al, 1979; Nowlis and Greenberg, 1979; and Wilson, Berger and Bird, 1981).

It is also apparent that very little research has been done on the psychological effects of a lay-off greater than 24-36 hours. Researchers who have studied the effects of lay-off on athletes have generally felt that one to one and a half days (off from regular exercise) is not a long enough period of time to see if there is a true addiction effect. Therefore, more research incorporating longer lay-off periods is needed before conclusions can be drawn assessing the psychological effects of lay-off from training for competitive athletes.

Chapter 3

METHODS AND PROCEDURES

Experimental Aims

The purpose of this study was to investigate the psychological effects of lay-off from training on competitive swimmers.

Subjects

The subjects were 20 top squad, competitive swimmers (8 male/12 female) from the Thunder Bay Thunderbolt and Mississauga Aquatic swim clubs. The subjects were 14 national level swimmers and six provincial level swimmers ranging in age from 10-19 years ($\bar{x}$ = 14.3). Subjects were chosen on the basis of their suitability and availability for the study.

Materials

The Spielberger, Gorsuch and Lushene Self-Evaluation Questionnaire which measures state anxiety, a Likert Mood Scale Self-Evaluation Questionnaire which is a 14 item scale that measures general mood and a ten item questionnaire (see Appendix C) which measures self-reports of commitment and addiction to swimming using a nine point Likert-type scale were used in this study. An Activity Assessment Questionnaire (see Appendix D) was used to determine what activities, if any, the subjects participated in during their time-off.

Experimental Design

This experiment utilized a repeated measures design ($A_1B_1B_2A_2$) under four different conditions. A repeated measures design is one in which all subjects in a group receive all treatments (Clarke and Clarke,

1984). If several experimental treatments are to be investigated, it is desirable for all subjects to be exposed to each treatment, as was the case in this study (Clarke and Clarke, 1984).

This design can also serve to control intersubject variability which is sometimes a problem when different subjects are used. This did not occur, however, in this particular experiment because all the subjects used were from the same group (Clarke and Clarke, 1984).

This design allowed any experimental effects to be directly observed, and the subjects served as their own control.

There were four testing periods to this study: (a) pre-test; (b) second day of lay-off; (c) fifth day of lay-off; and (d) post-test.

The pre-test involved the administration of a state anxiety self-evaluation questionnaire and a mood scale self-evaluation questionnaire.

During the second day of lay-off the subjects completed the pre-test materials (anxiety questionnaire and mood scale) and an information questionnaire which asked the subjects to rate their perceived addiction and commitment to their sport.

During the fifth day of lay-off the subjects again completed the pre-test materials and the first day of lay-off materials. An activity assessment questionnaire to determine what activities, if any, the subjects participated in during their time-off period was also completed at this time.

The post-test involved the re-administration of the state anxiety and mood scale self-evaluation questionnaires.

Independent and Dependent Variables

The independent variable was the time-off the subjects took during

their swimming lay-off. This time-off totalled five days.

The dependent variables were the state anxiety and mood changes which occurred during the subjects' time-off.

Alternative independent variables which were also studied were age, sex, distances covered in workouts and the level of the swimmer (provincial or national).

Controls

The following controls were used to ensure that any changes in anxiety or mood were due to the lay-off period and not to any extraneous variables.

A pilot study using the Spielberger, Gorsuch and Lushene State Anxiety Questionnaire was administered to a fourth year physical education class at Lakehead University in order to familiarize the author with the State Anxiety scoring procedures.

A test, retest using three of the four questionnaires to be used in this study (the State Anxiety Self-Evaluation Questionnaire, the Likert Mood Scale Self-Evaluation Questionnaire and Questionnaire B) were administered to the Kenora Swim Club to assess reliability. This club was of similar structure, age group and ability to the clubs that were tested. The coach was asked, through both a letter (see Appendix E) and a telephone call, to administer all three tests to his top squad athletes in an afternoon workout prior to the actual practice. The athletes were required to fill out the questionnaires as honestly as possible and to return them to their coach. Two days later, at exactly the same time and place, the coach was asked to administer all three tests again to his top squad athletes. They were instructed to fill

them out as honestly as possible and return them to their coach. After all the results were completed they were sent back to the author so the results could be correlated. A correlation coefficient was calculated to assess the reliability of the questionnaires. In addition, the Kenora coach was asked to report any vocabulary or terminology problems the swimmers had difficulty interpreting.

An activity assessment questionnaire was administered on the last day of the subject's time-off period to assess what activities, if any, the subjects participated in during their time-off. If it was found that a subject did exercise, then the type, quality and quantity were indicated for possible discussion purposes and their results deemed invalid for analysis purposes.

The author supervised all collection of data.

Experimental Procedure

This experiment consisted of four stages in the form of an $A_1B_1B_2A_2$ design.

Stage One - The Pre-test

The subjects filled out the Spielberger, Gorsuch and Lushene State Anxiety Questionnaire and the Likert Mood Scale Self-Evaluation Questionnaire in an afternoon workout prior to their five day lay-off. The questionnaires were administered in an area where no distractions occurred prior to the subjects' workout. At this stage the subjects were told that they MUST NOT EXERCISE AT ALL during their lay-off period.

Stage Two - The Second Day Into Lay-off

The subjects again filled out the State Anxiety Questionnaire by Spielberger, Gorsuch and Lushene and the Likert Mood Scale Self-Evaluation

Questionnaire. In addition, they completed Questionnaire B. This questionnaire asked the subjects to rate their perceived addiction and commitment to swimming, and it also provided other information about their general training programs (e.g. distances covered in workouts, number of times the subjects train per week). The administration of these questionnaires took place in the same testing environment as in stage one and occurred after the first full day of the subjects' five day lay-off.

Stage Three - The Fifth Day Into Lay-off

The subjects once again filled out the State Anxiety Questionnaire and the Likert Mood Scale Self-Evaluation Questionnaire. They filled out Questionnaire B again to determine their perceived addiction and commitment, and they completed the Activity Assessment Questionnaire which determined whether or not the subjects exercised during their lay-off. It provided information regarding what type of physical activity, if any, the subjects took part in during their time-off. Once again the testing environment was the same as it was for stages one and two and took place on day five of the subjects' lay-off period.

Stage Four - The Post-test

The subjects completed the State Anxiety Questionnaire and the Likert Mood Scale Self-Evaluation Questionnaire. This took place after the subjects had resumed their daily swimming routines. The subjects were tested in the same environment as they were in stages one, two and three prior to their workout.

Data Analysis

The data were analyzed in several ways. A One-Way Analysis of Variance was completed to determine if there was a significant difference between pre- and post-tests, and days two and five of lay-off, for both the mood scale and the state anxiety self-evaluation questionnaire.

Overall mood and state anxiety scores were calculated for pre- and post-tests, and for days two and five of lay-off. Means, variance, range and standard deviation were included in these calculations.

Further analyses were conducted where scores were calculated to determine the difference between pre- and post-tests, and days two and five of lay-off, for both mood and state anxiety. These were calculated using the formulas $(B_1-(A_1+A_2)/2)$ and $(B_2-(A_1+A_2)/2)$.

Subjects were next categorized into one of two groups based on the patterns of their mood and state anxiety scores for days two and five of their lay-off. These were:

1. addiction pattern, which showed low mood scores and high state anxiety scores;
2. relief pattern, which showed high mood scores and low state anxiety scores.

T-tests involving the analysis of relief and addiction groups for all the variables studied were completed for days two and five for state anxiety. And in addition, correlations between variables using the Pearson Product Co-efficient were completed.

Chapter 4

RESULTS

No significance was found using ANOVA ($p < 0.05$) between pre- and post-tests, and lay-off days two and five for either the mood scale or state anxiety self-evaluation questionnaire (see Table 1). Of the 20 subjects tested, five subjects exercised during their lay-off and one subject became injured during the course of the testing period. Therefore, analysis was completed for both N=14 and N=20.

Table 1. A One-Way Analysis of Variance For Mood and State Anxiety

	N	F	Probability
Mood	20	0.621	0.604
	14	0.593	0.622
State Anxiety	20	0.376	0.770
	14	0.641	0.592

Overall mood scores for pre-test, days two and five of lay-off and post-test ranged from 14 to 126 ($\bar{X} = 91.8$). Low mood scores indicated a less favourable mood compared to high scores which indicated a favourable mood. Overall state anxiety scores for pre-test, days two and five of lay-off, and post-test ranged from 20 to 80 ($\bar{X} = 39.5$). Low anxiety scores reflected a lower than average level of anxiety on the self-evaluation questionnaire and high anxiety scores reflected a higher than average level of anxiety on the same questionnaire. See Tables 2 and 3 for a summary of means, variance, range and standard deviation for overall mood and state anxiety scores (N=20).

Table 2. Means and Standard Deviations of Overall Mood Scores for Pre-test, Post-test and Lay-off Days (N = 20)

	Pre-test	Day Two	Day Five	Post-test
Mean	90.4	89.9	93.8	93.3
Variance	198.8	251.6	263.9	292.0
Range	54.0	54.0	63.0	61.0
Standard Deviation	14.1	15.8	16.2	17.0

Table 3. Means and Standard Deviations of Overall State Anxiety Scores for Pre-test, Post-test and Lay-off Days (N = 20)

	Pre-test	Day Two	Day Five	Post-test
Mean	40.3	38.5	40.5	38.9
Variance	102.7	70.3	83.7	55.8
Range	46.0	24.0	30.0	24.0
Standard Deviation	10.1	8.3	9.1	7.4

Further analyses were conducted where scores were calculated to determine the difference between pre- and post-tests, and day two or day five for both mood and anxiety. Values were determined by subtracting the mood or anxiety scores for each day from pre-test and post-test scores for the same variable, divided by two. For example, MTCH = Mood Day Two - (pre-test mood + post-test mood/2). Tables 4 and 5 illustrate the means, variance, range and standard deviation for each of these calculated scores for both N=14 and N=20.

Table 4. Pre- and Post-test Differences For Mood and State Anxiety for Days Two and Five of Lay-off (N = 20)

	Mean	Variance	Range	Standard Deviation
MTCH	-1.97	117.2	42.0	10.8
MFCH	1.97	304.3	72.5	17.4
ATCH	-1.07	83.0	36.5	9.1
AFCH	0.92	88.5	31.5	9.4

Table 5. Pre- and Post-test Differences For Mood and State Anxiety for Days Two and Five of Lay-off (N = 14)

	Mean	Variance	Range	Standard Deviation
MTCH	-3.57	92.2	34.0	9.6
MFCH	0.92	289.9	72.5	17.0
ATCH	-1.75	105.1	36.5	10.2
AFCH	2.32	104.3	31.5	10.2

The means for both mood and state anxiety for day two (N = 14 and N= 20) indicated an addiction pattern reflected by the negative scores.

Females showed significantly more positive moods than males during day two of lay-off on two dimensions (elation and self-confidence) (t = 2.25 and 2.48 respectively), although the overall mood score was not significantly different.

The means for both mood and state anxiety for day five (N = 14 and N = 20) indicated a relief pattern reflected in the positive scores.

Correlations between variables were also done using the Pearson Product Coefficient and significance was found between certain variables (see Tables 6 and 7).

Table 6. Significant Pearson Product Correlation Coefficients of Variables (N = 20)

	MTCH	MFCH	ATCH	AFCH	Sex	Club	Number Days/Wk SS Train (5 or 6)	Do You Need To Take A Day Off From Swimming For Your Body To Rest?	Perceived Addiction Score	Perceived Commitment Score	Are You Angry If You Miss A Workout?	Are You In A Good Mood If You Miss A Workout?
MTCH	--	0.002	-0.014	--	--	--	--	--	-0.046	--	--	--
MFCH	0.002	--	-0.033	-0.029	0.040	-0.006	--	--	--	--	0.027	--
ATCH	-0.014	-0.003	--	0.003	--	0.027	--	--	--	--	--	0.033
AFCH	--	-0.029	0.003	--	--	--	0.045	0.045	0.005	0.035	0.049	--

Table 7. Significant Pearson Product Correlation Coefficients of Variables (N = 14)

	MTCH	MFCH	ATCH	AFCH	Number of Workouts/Day SS Train (1 or 2)	Do You Need To Take A Day Off From Swimming For Your Body To Rest?	Perceived Addiction Score	Perceived Commitment Score	Are You Regretful If You Miss A Workout?	Are You Sluggish If You Miss A Workout?
MTCH	--	0.017	-0.023	--	--	--	-0.044	--	--	--
MFCH	0.017	--	--	--	0.044	--	--	0.025	--	0.043
ATCH	-0.023	--	--	0.008	--	--	--	--	--	--
AFCH	--	--	0.008	--	--	0.025	0.012	--	-0.040	--

Subjects were then categorized into one of two groups on the basis of the pattern(s) of their state anxiety and mood scores. These patterns were addiction and relief. The addiction pattern was one in which the mood scores were low and the state anxiety scores were high on days two and five. The relief pattern was one in which the mood scores were high and the state anxiety scores were low on days two and five. As illustrated in Tables 8 and 9 (N = 14 and N = 20), the results indicated that the mood scores on day two for both N = 14 and N = 20 showed a higher addiction pattern, and on day five showed a higher relief pattern. The state anxiety scores for N = 20 on day two showed a split of 10 subjects showing relief and 10 subjects showing addiction, whereas N = 14 showed a higher relief pattern. Day five for state anxiety illustrated a higher addiction pattern for both N = 14 and N = 20.

Table 8. The Number of Subjects Showing Addiction and Relief For Days Two and Five of Lay-off For Mood and State Anxiety (N = 20)

	MTCH	MFCH	ATCH	AFCH
Number of Subjects Showing Addiction	13	9	10	11
Number of Subjects Showing Relief	7	11	10	9

Table 9. The Number of Subjects Showing Addiction and Relief For Days Two and Five of Lay-off For Mood and State Anxiety (N = 14)

	MTCH	MFCH	ATCH	AFCH
Number of Subjects Showing Addiction	9	6	6	8
Number of Subjects Showing Relief	5	8	8	6

T-tests for state anxiety and all the variables previously discussed for both relief (Group 1) and addiction (Group 2) were also completed. An addiction pattern was evidenced by either having day two anxiety greater than the pre- and post-test anxiety or by having day five anxiety greater than the pre- and post-test anxiety. A relief pattern was evidenced by either having day two anxiety less than the pre- and post-test anxiety or by having day five anxiety less than the pre- and post-test anxiety.

A T-test revealed a significant difference between the relief and addiction groups (N = 14) for the level the subjects competed at (Group 1 $\bar{X}$ = 1.6, Group 2 $\bar{X}$ = 1.1), and for the number of days per week the subjects trained (Group 1 $\bar{X}$ = 5.4, Group 2 $\bar{X}$ = 6.0).

Data compiled from day five showed a significant difference between the addiction and relief groups for the question "Do you need to take a day off from swimming for your body to rest?", and from the subjects' perceived addiction scores. All subjects in the relief group indicated that they felt they needed a day off from swimming to rest. Half the subjects in the addiction group indicated the same. The addiction group perceived themselves more addicted to swimming than the relief group (Group 1 $\bar{X}$ = 6.8, Group 2 $\bar{X}$ = 8.6).

See Appendix F for a further summary of the number of cases, means, standard deviation, range, variance and T-values for each group under each variable.

The reliability test which was carried out on the Kenora Swim Club for the mood scale, revealed that ten out of the 14 questions examined were indeed reliable at the $r = .8$ level. Questions two, six, eight and twelve were found to be unreliable and were therefore excluded from the study. The other two tests (State Anxiety and Questionnaire B) carried out proved to be reliable.

Chapter 5

DISCUSSION

The present study showed no significant difference between pre- and post-tests and lay-off for days two and five for either the mood scale or state anxiety self-evaluation questionnaire. This finding would suggest there was no general exercise addiction effect across all subjects. This was in direct agreement with a similar study which was carried out by Crossman and Jamieson (1983). This study involved competitive runners and a 24-hour lay-off period.

Five of the 20 subjects tested in this present study did exercise during their lay-off, participating in activities including jogging, skiing, dancing, swimming and soccer. Despite the fact that the subjects were clearly instructed not to exercise during lay-off, 25 percent did which may indicate that they experienced an exercise addiction effect.

In addition to the five subjects who exercised, one subject became injured during the course of the study, decreasing the subject number to 14.

No consistent pattern for the mood and anxiety scores for the lay-off period emerged. The addiction pattern reflected positive pre-test, post-test scores (high mood, low anxiety) and negative lay-off scores (low mood, high anxiety). The relief pattern however reflected that the lay-off scores were more positive (high mood, low anxiety) than the pre-test and post-test scores (low mood, high anxiety). The inconsistency may have been due to the varied testing times utilized within the study. Testing days were completed before and after Junior Nationals and/or Nationals, and before and after a scheduled March school break for the

provincial swimmers. These testing times may have contributed to the inconsistency or lack of pattern of the overall scores because of the interruption in their daily routine and training schedule.

During day two of the lay-off the mood scores reflected an addicted pattern (low during lay-off, high during pre-test, post-test) and the anxiety scores reflected a relief pattern (high during pre-test, post-test and low during lay-off). The opposite occurred during day five of lay-off. If an overall addiction pattern had emerged during the lay-off period the above results would have been consistent. However, this was not the case.

The finding that females tended to show a relief response to lay-off, while males tended to show withdrawal-like effects was unexpected and should be explored further. It may simply reflect the females in the present samples being relatively more overtrained than the males, or it may be related to hormonal influences on the release of endorphins, which have been suggested to underly the addiction effects (Stein & Belluzzi, 1978).

Worth noting is that subjects experienced an addiction effect early into their lay-off (day two) and then relief into day five of their lay-off as indicated on the mood scale. The mood scale is an indication of how the subjects have generally felt lately.

This could have been attributed to the fact that the subjects initially showed withdrawal symptoms which related to the addiction pattern on the first few days of lay-off. However, as the lay-off period continued the addiction effect was replaced by relief. This again may be attributed to the level of competition and the intensity of training where time-off was viewed as a welcome relief.

The data clearly indicates that some subjects experienced relief during lay-off and some experienced an addiction effect. The relief that some subjects experienced was contradictory to the findings of other studies investigating the effects of lay-off on athletes (Sachs & Pargman, 1979; Thaxton, 1982).

The relief some subjects experienced may have been because the subjects viewed the lay-off as a welcome break from the rigors of a coach-imposed training schedule. The studies which found an addiction pattern after 24 to 36 hours of training, involved recreational athletes who self-impose their training schedule.

The level and training preference seemed to influence whether an addiction or relief pattern was evidenced during lay-off. The higher the level the swimmer was competing at, the more likely he/she experienced an addiction effect. These subjects indicated that they preferred to train six days a week. Conversely, the subjects who experienced relief during lay-off were competing at lower levels and indicated a preference for training less than six days a week. The above finding is the same pattern which emerged in the study by Crossman and Jamieson (1983).

The subjects seemed to be accurate in their perceptions of their addiction to exercise. The relief subjects perceived themselves as less addicted than the addicted group. This finding suggests that athletes can self-report their level of addiction to exercise. The subjects who reported higher levels of addiction also experienced significantly higher anxiety levels. Finally, those who indicated they did not want to take a day off from training experienced more anxiety.

In summary, a pattern seemed to emerge for those who experienced

an addiction effect and those who experienced relief during lay-off. Subjects who experienced addiction were generally competing at a higher level, preferred to train more and were accurate in their assessment of their addiction level. These individuals also experienced higher anxiety levels. Subjects who were categorized in the relief group generally competed at a lower level and did not wish to train as often as those who were in the addiction group.

Although no consistent pattern emerged between mood and anxiety scores for pre- and post-test for mood and anxiety scores, a pattern was evident for those subjects categorized as experiencing an addiction pattern or relief pattern during lay-off.

Chapter 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to examine the psychological effects of lay-off from training on competitive swimmers. This was completed by administering a Mood Scale Self-Evaluation Questionnaire and a State Anxiety Self-Evaluation Questionnaire (Spielberger, Gorsuch and Lushene, 1970) on four occasions. These four occasions included the pre-test given before the lay-off, the second day of lay-off, the fifth day of lay-off and the post-test given after the subjects had returned to swimming. Prior to the testing the subjects were instructed that they must not exercise at all during their up and coming lay-off.

Twenty swimmers ranging in age from 10 to 19 years were the subjects who participated in this study (M = 8, F = 12). There were 14 national level swimmers and six provincial level swimmers. In addition to the above-mentioned questionnaires, two other questionnaires were administered. One was a questionnaire (Questionnaire B) that involved obtaining background information on each subject (e.g., days per week the subjects train, distances covered in workouts, age, sex and level of competition) and it also involved asking each subject to rate his/her self-perceived addiction and commitment to the sport of swimming. This questionnaire was administered on days two and five of the lay-off. The other questionnaire administered was an activity assessment questionnaire used to indicate whether or not the subjects exercised during their lay-off. If it was found that they did indeed participate in any form of exercise, the type and intensity was noted. This activity assessment questionniare was administered on the fifth day of lay-off.

The data was analyzed in several ways. A one-way analysis of variance was completed to determine if there was a significant difference between pre- and post-tests and days two and five of lay-off for both the mood scale and the state anxiety questionniares. Means, variance, range and standard deviation were included in the calculations of the overall mood and state anxiety scores.

T-tests involving the analysis of relief and addiction groups for all the variables studied were completed for days two and five for state anxiety. Correlations between the variables studied were completed using the Pearson Product Coefficient.

Additional analyses involving the mood scale and state anxiety questionnaires were conducted where scores were calculated to determine the difference between pre- and post-tests, and days two and five of lay-off. These were calculated using the formulas $(B_1 - (A_1 + A_2/2)$ and $(B_2 - (A_1 + A_2/2))$ where A_1 = pre-test, A_2 = post-test, B_1 = day two of lay-off and B_2 = day five of lay-off. Once this was completed, subjects were categorized into one of two groups based on the patterns of their mood and state anxiety scores. These were:

1. addiction pattern, which showed low mood scores and high state anxiety scores; and
2. relief pattern, which showed high mood scores and low state anxiety scores.

The results from this study indicated that no significance was found using a one-way ANOVA ($p < 0.05$) between pre- and post-tests and lay-off days two and five for either the mood scale or state anxiety self-evaluation questionnaire. This indicated that there was no strong addiction effect found among the subjects who did not exercise. However, it was found

that 25 percent of the subjects did indeed exercise during their lay-off even though they were clearly instructed not to. In addition, one subject became injured during the course of the study bringing the subject total down to 14. Therefore, throughout the study both N = 14 and N = 20 were the subject numbers that were analyzed.

Overall mood scores which ranged from 14 to 126 ($\bar{x}$ = 91.8) and overall state anxiety scores which ranged from 20 to 80 ($\bar{x}$ = 39.5) illustrated no consistent pattern of addiction or relief over the four testing days. These results may have occurred because of the varied testing times utilized within the study.

Low anxiety scores and high mood scores during lay-off which resulted in scores higher than zero indicated relief was experienced during lay-off. High anxiety scores and low mood scores during lay-off which resulted in scores lower than zero indicated an addiction trend during lay-off.

The majority of subjects did not show either an addiction nor relief pattern during lay-off. The mood scores which reflected how the subjects felt generally, were low on day two and high on day five of lay-off. This trend may suggest that the subjects initially experienced addiction, followed by relief several days into lay-off. It is possible that recreational athletes who self-impose their training schedule, do experience addiction during a lay-off period. However, competitive athletes whose training schedules are coach-controlled may indeed experience relief following a welcome lay-off period.

T-tests revealed a significant difference between the relief and addiction groups (N = 14) for the level the subjects competed at and for the number of days per week the subjects trained. It was found that the

addiction group was comprised mainly of national swimmers who preferred to train six days per week and the relief group was comprised mainly of provincial swimmers who preferred to train less than six days per week.

It was also found that there was a significant difference between the addiction and relief groups on day five of lay-off with regard to needing to take a day off from swimming for their bodies to rest and with regard to the subjects' perceived addiction scores. All subjects in the relief group indicated that they felt they needed a day off from swimming to rest, whereas only half of the subjects in the addiction group indicated the same. With regard to the perceived addiction scores. the addiction group perceived themselves more addicted to swimming than the relief group.

There were other significant differences found using the Pearson Product Correlation Co-efficient for such variables as the amount of anger or regretfulness experienced when a workout is missed or the degree to which sluggishness is experienced when a workout is missed. These are summarized in Tables 6 and 7 in Chapter 4.

Conclusions

In conclusion, the results revealed that no consistent exercise addiction effect was found among the subjects who did not exercise during lay-off. However, a possibility does exist that some exercise addiction may be evident as 25 percent of the subjects elected to exercise during the lay-off after clearly being instructed not to.

As well, it was found that athletes addicted to exercise tended to compete at a higher level than those who experienced relief during lay-off and that the addicted athletes preferred to train six days per week as compared to the relief athletes who preferred to train less than six

days per week. Both the relief and addiction groups accurately predicted their amount of addiction to exercise. Finally, no clear pattern emerged from self-reports of state anxiety and mood during the lay-off period.

Recommendations

1. Further studies be carried out using a larger sample size across a variety of sports.

2. Competitive athletes be used in future studies of this nature to further the knowledge of the effect of lay-off on athletes.

3. Incorporate a physiological parameter, e.g., blood pressure, to substantiate the data from psychological tests.

4. Choose a time in the training season when extrinsic variables, e.g., upcoming competition, are not present to affect the results.

5. Wherever possible use athletes older than 16 years of age, or alter the wording of the questionnaires to increase the comprehension by the athletes.

6. More studies be carried out using lay-off periods which are greater than 24 to 36 hours.

REFERENCES

Bækeland, F. (1970). Exercise deprivation: Sleep and psychological reactions. Archives of General Psychiatry, 22, 365-369.

Berger, B. G. (1982, November/December). Facts and fancy. Mood alteration through exercise. Journal of Physical Education, Recreation, and Dance, 47-48.

Blue, F. R. (1979). Aerobic running as a treatment for moderate depression. Perceptual and Motor Skills, 48, 228.

Brown, R. S., Ramirez, D. E. and Taub, J. M. (1978). The prescription of exercise for depression. The Physician and Sports-medicine, 6, 34-35.

Carmack, M. A. and Martens, R. (1979). Measuring commitment to running: A survey of runner's attitudes and mental states. Journal of Sport Psychology, 1, 25-42.

Clarke, D. H. and Clarke, H. H. (1984). Research Processes in Physical Education (Second Edition). Englewood, New Jersey: Prentice-Hall.

Cooper, A. (1980). Running and nacissism. Presented at the Third Annual Psychology of Running Seminar, Cornell University Medical College, New York. (As cited in M. L. Sachs, Compliance and addiction to exercise, The Exercising Adult, 1982.)

Crossman, J. and Jamieson, J. (1983). The effects of short-term lay-off on elite runners. Unpublished manuscript, Lakehead University, Thunder Bay, Ontario, Canada.

Cureton, T. K. (1953). Physical training produces important changes, psychological and physiological. Sports Medicine, 46-63.

Cureton, T. K. (1963). Improvements of psychological states by means of exercise-fitness programs. Journal of the Association for Physical and Mental Rehabilitation, 17, 14-25.

deVries, H. A. (1981). Tranquilizer effects of exercise: A critical review. The Physician and Sportsmedicine, 9 (11), 46-55.

Farrel, P. A., Cates, W. K., Maksud, M. G., Morgan, W. P., and Tseng, L. F. (1981). Plasma beta-endorphin/beta lipotropin immunoreactivity increases after treadmill exercise in man. Medicine and Science in Sports and Exercise, 13, 134.

Fixx, J. F. (1977). The Complete Book of Running. New York: Random House.

Folkins, C. H. (1976). Effects of physical training on mood. Journal of Clinical Psychology, 32 (2), 385-388.

Gay, L. R. (1981). Educational Research (Second Edition). Columbus, Ohio: Charles E. Merrill.

Glasser, W. (1976). Positive Addiction. New York: Harper and Row.

Glasser, W. (1981, March/April). Are you positively addicted to running? The Jogger, p. 10.

Griest, J. H., Klein, M. H., Eischens, R. R., Faris, J., Gurman, A. S. and Morgan, W. P. (1979). Running as a treatment for depression. Comprehensive Psychiatry, 20, 41-54.

Hanna, E. A. (1979). Potential sources of anxiety and depression associated with athletic competition. Canadian Journal of Applied Sport Sciences, 4 (3), 199-204.

Henderson, J. (1974). Run Gently, Run Long. Mountain View, California: World Publications. (As cited in M. L. Sachs and D. Pargman, Commitment and dependence upon regular running, 1979.)

Lion, L. S. (1978). Psychological effects of jogging: A preliminary study. Perceptual and Motor Skills, 47, 1215-1218.

Mihevic, P. M. (1982). Anxiety, depression, and exercise. Quest, 33 (2), 140-153.

Morgan, W. P. (1973). Influence of acute physical activity on state anxiety. Proceedings of the National College Physical Education Meeting, 113-121. (As cited in P. M. Mihevic, Anxiety, depression, and exercising, Quest, 1982, 33 (2), 140-153.)

Morgan, W. P. (1976). Psychological consequences of vigorous physical activity and sport. Proceedings of the American Academy of Physical Education. (As cited in P. M. Mihevic, Anxiety, depression, and exercise, Quest, 1982, 33 (2), 140-153.

Morgan, W. P. (1979). Negative addiction in runners. The Physician and Sportsmedicine, 7 (2), 55-70.

Morgan, W. P., Roberts, J. A., Brand, F. R. and Feinerman, A. D. (1970). Psychological effect of chronic physical activity. Medicine and Science in Sports, 2 (4), 213-217.

Morgan, W. P., Roberts, J. A. and Feinerman, A. D. (1971). Psychological effects of acute physical activity. Archives of Physical Medicine and Rehabilitation, 52, 422-425.

Nowlis, V. (1965). Research with the mood adjective check list. In S. Tomkins and C. Izard (Eds.). Affect Cognition and Personality. New York: Springer, 352-389.

Nowlis, D. P. and Greenberg, N. (1979). Empirical description of effects of exercise on mood. Perceptual and Motor Skills, 49, 1001-1002.

Pargman, D., and Baker, M. C. (1980). Running high: Enkephalin indicated. Journal of Drug Issues, 10, 341-351.

Pargman, D. and Burgess, S. (1979). Hooked on exercise: a psycho-biological explanation. Motor Skills: Theory into Practice, 3 (2), 115-122.

Peele, S. (1979). Redefining addiction II. The meaning of addiction in our lives. Journal of Psychedelic Drugs, 11 (4), 289-297.

Pitts, F. N. and McClure, J. N. (1967). Lactate metabolism in anxiety neurosis. New England Journal of Medicine, 277, 1329-1336. (As cited in P. M. Mihevic, Anxiety, depression, and exercise, Quest, 1982, 33 (2), 140-153.)

Polivy, J. (1981). On the induction of emotion in the laboratory: Discrete moods of multiple affect states? Journal of Personality and Social Psychology, 41, 803-817.

Riggs, C. E. (1981). Endorphins, neurotransmitters, and/or neuro-modulators and exercise. In M. H. Sacks and M. L. Sachs (Ed.), Psychology of Running, (pp. 224-230). Champaign, Illinois: Human Kinetics.

Sachs, M. L. (1979). An examination of the relationship of commitment to and dependence upon running to a model for participation in running and personality typology of regular runners. Unpublished manuscript, Florida State, Florida, U.S.A. (As cited in M. L. Sachs, Compliance and addiction to exercise, The Exercising Adult, 1982.)

Sachs, M. L. (1982). Compliance and addiction to exercise. In R. C. Cantu (Ed.). The Exercising Adult. Massachusetts: The Collamore Press.

Sachs, M. L. (1982). Exercise addiction: models and treatments. Running Psychologists, 5 (1/2), 12-13.

Sachs, M. L. and Pargman, D. (1979). Running addiction: A depth interview examination. Journal of Sport Behavior, 2 (3), 143-155.

Sachs, M. L. and Pargman, D. (1979, March). Commitment and dependence upon regular running. A paper presented at the annual convention of the American Alliance for Health, Physical Education, and Recreation, New Orleans, Louisiana.

Sacks, J. H. and Sachs, M. L. (1981). Psychology of Running. Champaign, Illinois: Human Kinetics.

Sheehan, G. (1975). Dr. Sheehan on Running. Mountain View, California: World Publications.

Sheehan, G. (1978). Running and Being: The Total Experience. New York: Simon and Schuster.

Spielberger, C. D., Gorsuch, R. L. and Lushene, R. E. (1970). STAI Manual. Consulting Psychologist Press.

Stein, L. and Belluzzi, J. D. (1978). Brain endorphins and sense of well-being: A psychobiological hypothesis. In E. Costa, and M. Trabucchi (Eds.). Advances in biochemical psychopharmacology. New York: Raven Press.

Stillman, M. A. (1977, September). A man's addiction and its hold on him. The New York Times, Section 5.2.

Thaxton, L. (1982). Physiological and psychological effects of short-term exercise addiction on habitual runners. Journal of Sport Psychology, 4, 73-80.

Tuite, J. (1978, June). Rowing: Bond of rare mystical, tough breed. The New York Times, Section 5.

Websters New World Dictionary, College Edition. (1966). Toronto: Nelson, Foster and Scott.

Wilson, V. E., Berger, B. G., Bird, E. I. (1981). Effects of running and of an exercise class of anxiety. Perceptual and Motor Skills, 53, 472-474.

Wilson, V. E., Morley, N. C., Bird, E. I. (1980). Mood profiles of marathon runners, joggers and non-exercisers. Perceptual and Motor Skills, 50, 117-118.

Wood, D. T. (1977, May-June). The relationship between state anxiety and acute physical activity. American Corrective Therapy Journal, 31 (3), 67-69.

APPENDICES

APPENDIX A

SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

STAI FORM X-1

NAME _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I am regretful	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel rested	①	②	③	④
9. I feel anxious	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel "high strung"	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel over-excited and "rattled"	①	②	③	④
19. I feel joyful	①	②	③	④
20. I feel pleasant	①	②	③	④

APPENDIX B - MOOD SCALE SELF-EVALUATION QUESTIONNAIRE

NAME: _____ AGE: _____ DATE: _____

Complete the following scales according to how you have generally FELT LATELY:

1. 1 2 3 4 5 6 7 8 9
depressed elated

2. 1 2 3 4 5 6 7 8 9
fatigued energetic

3. 1 2 3 4 5 6 7 8 9
inadequate self-confident

4. 1 2 3 4 5 6 7 8 9
anxious calm

5. 1 2 3 4 5 6 7 8 9
angry happy

6. 1 2 3 4 5 6 7 8 9
lonely loved

7. 1 2 3 4 5 6 7 8 9
apathetic interested

8. 1 2 3 4 5 6 7 8 9
comtemplative unconcerned

9. 1 2 3 4 5 6 7 8 9
egotistic modest

10. 1 2 3 4 5 6 7 8 9
doubtful (skeptical) certain

11. 1 2 3 4 5 6 7 8 9
socially accepted socially unaccepted

12. 1 2 3 4 5 6 7 8 9
bad mood good mood

13. 1 2 3 4 5 6 7 8 9
irritable good natured

14. 1 2 3 4 5 6 7 8 9
regretful satisfied

APPENDIX C - QUESTIONNAIRE B

Name: _____ Date: _____

Age: _____ Sex: M F

Club: _____

Level of Competition (circle one):

a) international
b) national
c) provincial
d) age group

PLEASE ANSWER THE FOLLOWING QUESTIONS AS TRUTHFULLY AS POSSIBLE:

1. Are you presently injured in any way? If so, please specify in what way.

_____

_____.

2. On the average, how many meters per day do you swim?

a.m. workout _____

p.m. workout _____

TOTAL WORKOUT _____

3. How many days a week do you train?

_____

4. How many workouts per day do you participate in? (Place the correct number beside each day - i.e., Sun. 0, Mon. 2).

Monday _____ Friday _____
Tuesday _____ Saturday _____
Wednesday _____ Sunday _____
Thursday _____

5. Would you prefer to train 7 days per week?

YES ☐ NO ☐

6. Do you feel that you need to take a day off from swimming, for your body to rest?

YES ☐ NO ☐

7. Do you feel that you need to take more than one day off from swimming, for your body to rest?

YES ☐ NO ☐

8. Indicate on the scale below how "addicted" you feel you are to swimming.

1 2 3 4 5 6 7 8 9

Not at all — Slightly — Moderately — Considerably — Extremely

9. Indicate on the scale below how "committed" you feel you are to swimming.

1 2 3 4 5 6 7 8 9

Not at all — Slightly — Moderately — Considerably — Extremely

10. Circle either "yes" or "no" to indicate how you feel when you miss a workout.

angry	yes	no	guilty	yes	no
regretful	yes	no	depressed	yes	no
bad mood	yes	no	sluggish	yes	no
happy	yes	no	satisfied	yes	no
good mood	yes	no	energetic	yes	no

others (please specify) _____

APPENDIX D - ACTIVITY ASSESSMENT QUESTIONNAIRE

Name: _____ Date: _____

Club: _____ Time: _____

IT IS IMPORTANT THAT YOU ANSWER THE FOLLOWING QUESTIONS AS TRUTHFULLY AS POSSIBLE:

1. a) When was the last time you swam?
   Day: _____ Time you finished: _____

   b) If you swam during your "time off",
   i) how many times (per week) did you swim?

   _____

   ii) how far did you swim each time?
   (list each separately, i.e., Monday - 2000 metres, Tuesday - 3000 metres)

   _____

   iii) how long did you swim each time? (approximate hour(s) and minute(s)
   (list each separately, i.e., Tuesday - 2 hrs. & 25 min., Wednesday
   3 hrs. & 10 min).

   _____

   iv) At what intensity did you swim?
   (please specify for each day you swam, i.e.,

Monday	1	2	3	4	5	6	(7)	8	9
	low				medium				high
Tuesday	1	(2)	3	4	5	6	7	8	9
	low				medium				high

Monday	1	2	3	4	5	6	7	8	9
	low				medium				high
Tuesday	1	2	3	4	5	6	7	8	9
	low				medium				high
Wednesday	1	2	3	4	5	6	7	8	9
	low				medium				high
Thursday	1	2	3	4	5	6	7	8	9
	low				medium				high
Friday	1	2	3	4	5	6	7	8	9
	low				medium				high
Saturday	1	2	3	4	5	6	7	8	9
	low				medium				high
Sunday	1	2	3	4	5	6	7	8	9
	low				medium				high

2. a) Did you participate in any other form(s) of exercise during your "time-off"?
   i.e., cross country skiing, squash, soccer, dance)

   YES ☐ NO ☐

b) If so, please specify the following:

i) what sport or activities:

_____

ii) how many times per day and/or per week you participated:
(please be specific, i.e., Monday - twice, Tuesday - once,
Wednesday - once)

_____

iii) how long you participated each time (approximate hour(s) and minute(s),
i.e., Monday - 2 hrs. & 15 min, Thursday - 1 hour):

_____

iv) at what intensity you participated each time:

	1	2	3	4	5	6	7	8	9
Monday	low				medium				high
Tuesday	low				medium				high
Wednesday	low				medium				high
Thursday	low				medium				high
Friday	low				medium				high
Saturday	low				medium				high
Sunday	low				medium				high

APPENDIX E - RELIABILITY LETTER

December 31, 1983

Dear Blair:

I am presently working on my masters degree in the Theory of Coaching at Lakehead University, and require your assistance in completing my thesis. My thesis topic deals with, "The Effects of Short Term Lay-off on Competitive Swimmers". The subjects I will be using are the top squad of the Thunderbolt Swim Club.

What I am sending you, are three of the four of the same questionnaires that I will be using on the Thunderbolts. These are:

(1) Self-Evaluation Questionnaire (developed by C.D. Spielberger, R.L. Gorsuch and R. Lushene)

(2) Self-Evaluation Questionnaire (mood scale)

(3) Questionnaire B

(I am <u>not</u> sending you Questionnaire A which I will be using only as a control for my actual testing.)

What I require you to do, is to help me establish reliability and validity with these questionnaires. To establish reliability, a test retest situation where the results can be correlated between the two sets of data, must take place. To establish validity, two things must be done. The first is to use a group that is of the same structure, sport, and age group as my subjects, the Thunderbolts, to administer the questionnaires on. That is why I have selected the Kenora Swim Club. The second, is to use the results obtained from your swim club, to determine if there are any terms or questions which the swimmers may have difficulty with. If there are any difficulties, the appropriate changes can then be made to correct this.

To ensure that both reliability and validity <u>are</u> established, I would like you to administer the questionnaires <u>EXACTLY</u> as follows:

(1) Pick an area free from distractions to administer the questionnaires.

(2) Use a P.M. workout so that the athletes are not too fatigued.

(3) Hand out all three questionnaires to each TOP SQUAD athlete.

(4) Have them complete all questions, and then have them hand back all of the questionnaires to you.

(5) 2 DAYS LATER (no more, no less) at the EXACT same time at the exact same location, administer the three questionnaires again.

It is very important for the testing situations to be EXACTLY the same on both days. It is also important that you do the test retest, 2 days apart to ensure that the proper reliability can take place. (For example, test on a Monday and retest on a Wednesday, or test on a Tuesday and retest on a Thursday.)

Once both sets of the questionnaires have been completed, I would appreciate having you send them back to me immediately. I have enclosed a stamped self-addressed envelope to ensure this.

If you have any further questions or problems, please feel free to contact Dr. Jane Crossman, who is my thesis advisor, at Lakehead University. The number is: 1-345 - 2121 extension

Thank you for your co-operation. It is very much appreciated.

Sincerely,

Linda Henderson

APPENDIX F - SUMMARY OF RESULTS

Table 1. Summary of the Results from Mood Scale (Pre-test) (N = 20)

Questions from Mood Scale	Mean	Variance	Range	Standard Deviation
(depressed--elated)	6.8	2.0	5.0	1.4
(fatigued--energetic)	7.0	3.2	6.0	1.8
(inadequate--self-confident)	7.1	1.3	4.0	1.1
(anxious--calm)	4.5	5.3	7.0	2.3
(angry--happy)	6.6	3.1	6.0	1.7
(lonely--loved)	7.0	2.3	6.0	1.5
(apathetic--interested)	6.6	2.9	7.0	1.7
(contemplative--unconcerned)	5.0	6.2	7.0	2.4
(egotistic--modest)	5.7	2.3	5.0	1.5
(doubtful--certain)	6.2	3.0	6.0	1.7
(socially accepted--socially unaccepted)	6.9	3.4	7.0	1.8
(bad mood--good mood)	7.1	2.4	6.0	1.5
(irritable--good natured)	6.8	2.8	5.0	1.6
(regretful--satisfied)	6.9	2.2	5.0	1.4

Table 2. Summary of the Results from Mood Scale (Day Two of Lay-off) (N = 20)

Questions from Mood Scale	Mean	Variance	Range	Standard Deviation
(depressed--elated)	6.6	2.4	6.0	1.5
(fatigued--energetic)	5.9	5.1	7.0	2.2
(inadequate--self-confident)	6.6	2.7	7.0	1.6
(anxious--calm)	6.2	2.8	6.0	1.6
(angry--happy)	6.4	4.4	7.0	2.1
(lonely--loved)	6.9	2.2	6.0	1.4
(apathetic--interested)	6.8	2.7	8.0	1.6
(contemplative--unconcerned)	5.5	3.6	7.0	1.9
(egotistic--modest)	5.9	2.3	5.0	1.5
(doubtful--certain)	6.3	2.5	5.0	1.5
(socially accepted--socially unaccepted)	7.2	1.3	4.0	1.1
(bad mood--good mood)	6.1	4.3	6.0	2.0
(irritable--good natured)	6.5	4.7	7.0	2.1
(regretful--satisfied)	6.7	3.6	7.0	1.9

Table 3. Summary of the Results from Mood Scale (Day Five of Lay-off) (N = 20)

Questions from Mood Scale	Mean	Variance	Range	Standard Deviation
(depressed--elated)	7.0	2.4	5.0	1.5
(fatigued--energetic)	7.1	2.8	5.0	1.6
(inadequate--self-confident)	6.8	2.0	6.0	1.4
(anxious--calm)	5.4	5.3	8.0	2.3
(angry--happy)	6.4	4.7	7.0	2.1
(lonely--loved)	7.2	2.6	6.0	1.6
(apathetic--interested)	7.1	1.9	5.0	1.3
(contemplative--unconcerned)	5.1	5.0	8.0	2.2
(egotistic--modest)	5.7	2.2	5.0	1.4
(doubtful--certain)	7.0	1.6	4.0	1.2
(socially accepted--socially unaccepted)	7.4	2.4	6.0	1.5
(bad mood--good mood)	7.0	3.2	6.0	1.7
(irritable--good natured)	7.2	2.7	5.0	1.6
(regretful--satisfied)	7.1	2.9	7.0	1.7

Table 4. Summary of the Results from Mood Scale (Post-test) (N = 20)

Questions from Mood Scale	Mean	Variance	Range	Standard Deviation
(depressed--elated)	6.7	3.3	7.0	1.8
(fatigued--energetic)	5.7	10.5	8.0	3.2
(inadequate--self-confident)	7.3	2.1	5.0	1.4
(anxious--calm)	6.1	4.8	7.0	2.2
(angry--happy)	7.1	2.8	5.0	1.6
(lonely--loved)	6.8	4.3	7.0	2.0
(apathetic--interested)	6.6	5.5	8.0	2.3
(contemplative--unconcerned)	5.1	5.4	8.0	2.3
(egotistic--modest)	6.2	2.8	7.0	1.6
(doubtful--certain)	7.0	3.1	6.0	1.7
(socially accepted--socially unaccepted)	7.4	3.0	6.0	1.7
(bad mood--good mood)	6.7	3.7	7.0	1.9
(irritable--good natured)	7.2	3.5	6.0	1.8
(regretful--satisfied)	7.1	2.6	6.0	1.6

Table 5. Summary of the Results from Questionnaire B and the Activity Assessment Questionnaire (N = 20)

Questions from Questionnaire B and the Activity Assessment Questionnaire	Mean	Variance	Range	Standard Deviation
Age (10-19 years)	14.3	5.0	9.0	2.2
Club (Tomac (2) or Thunder Bay Thunderbolts (1))	1.3	0.2	1.0	0.4
Sex (Male (1)/Female (2))	1.6	0.2	1.0	0.5
Level (National (1) or Provincial (2))	1.3	0.2	1.0	0.4
Are you presently injured? (Yes (1)/No (2))	1.9	0.05	1.0	0.2
On the average, how many metres per day do you swim? (2,000metres - 13,000 metres)	8035.0	14592921.0	11000.0	3820.0
How many days a week do you train? (1-7)	5.8	0.16	1.0	0.4
How many workouts per day do you participate in? (1 or 2)	1.5	0.2	1.0	0.5
Would you prefer to train 7 days per week? (yes/no)	2.0	0.0	0.0	0.0
Do you feel that you need to take a day off from swimming for your body to rest? (yes/no)	1.2	0.1	1.0	0.4
Do you feel that you need more than one day off from swimming for your body to rest? (yes/no)	1.9	0.09	1.0	0.3
Indicate on a scale of 1 to 9 how addicted you feel you are to swimming	7.6	1.3	4.0	1.1
Indicate on a scale of 1 to 9 how committed you feel you are to swimming	7.7	0.6	3.0	0.7
Circle "yes" or "no" to indicate how you feel when you miss a workout: yes - 1 no - 2				
(a) angry	1.7	0.22	1.0	0.47
(b) regretful	1.4	0.25	1.0	0.50
(c) bad mood	1.7	0.19	1.0	0.44
(d) happy	1.8	0.16	1.0	0.41
(e) good mood	1.6	0.25	1.0	0.50
(f) guilty	1.2	0.16	1.0	0.41
(g) depressed	1.8	0.16	1.0	0.41
(h) sluggish	1.5	0.26	1.0	0.51
(i) satisfied	1.8	0.16	1.0	0.41
(j) energetic	1.6	0.25	1.0	0.50
Did you exercise during your time-off? (yes (1)/no (2))	1.3	0.22	1.0	0.47