

To the Graduate Council:

I am submitting herewith a thesis written by Seth Benton Parrish entitled "Socialpsychological and Psychological Characteristics of Subelite Endurance Athletes." I have examined the final copy of this thesis for form and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Human Performance and Sport Studies.

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SOCIALPSYCHOLOGICAL AND PSYCHOLOGICAL FACTORS
OF SUBELITE ENDURANCE ATHLETES

A Thesis
Presented for the
Master of Science
Degree
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Seth Benton Parrish

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It takes only negatives to make a champion . . .
it's an intensity from insecurity, from seeking

Chris Evert

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ABSTRACT

The purpose of this study was to have subelite endurance athletes complete Mahoney's Psychological Skills Inventory for Sport, PSIS (1991), Carmack and Martens' Commitment to Running Scale, CR (1979), and an Athlete Perceptions scale, AP, designed as a part of the investigation to determine if there were: (a) certain factors that endurance athletes perceived as affecting agents, and/or (b) specific psychological or socialpsychological characteristics of subelite endurance athletes. The study also searched for gender differences in the ways subelite athletes adapted to the endurance-related sport task.

Subjects for the study were 11 female and 14 male endurance athletes. Track (n = 11), swimming (n = 6), and cycling (n = 4) athletes were from one National Collegiate Athletic Association (NCAA) Division I institution. Triathletes (n = 4) from the same area were also included, but they did not necessarily attend the university during the time of the study.

The athletes were analyzed for tendencies which may be found to characterize the subelite endurance athlete by gender. The PSIS measured athletes for degree of tendency to have: anxiety, confidence, concentration skill, mental preparation habits, team emphasis, and motivation. The CS measured athletes' commitment to and enjoyment of their sport. Tendencies to associate or disassociate were measured by using three questions on the AP questionnaire. Crosstabulations compared genders in terms of associativity/dissociativity and in relation to specific factors of the PSIS. Amount of hardship experienced by athletes was assessed through analysis of AP questions. Satisfaction with specific sport experience was measured in relation to demographic background experience through crosstabulations which were run on AP questions.

The results of the data suggested: (a) gender differences existed in anxiety and team emphasis skills based on PSIS factor scores, (b) the subelite endurance athletes

predominantly seemed to perceive themselves as enjoying their sport and the pain involved with the endurance sport, yet able to limit that pain when necessary, (c) most athletes perceived hardship as contributing to their performance capabilities, but only a low percentage indicated that they had actually undergone hardship in their past, (d) the subelite endurance athletes were characterized by approaching performance both psychologically and physiologically confident, and (e) most of the subelite endurance athletes in this study used associative strategies of coping with pain involved with their sport.

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CHAPTER 1

INTRODUCTION

A great deal of research applies either directly or indirectly to factors that contribute to eliteness in the endurance athlete (Durschi & Weiss, 1984; Mahoney & Avenier, 1977; Mahoney, Gabriel, & Perkins, 1987; Morgan & Polluck, 1977; Pate, Polluck, & Jackson, 1980; Tokmakidis, Tsopanakis, Tsarouchas, Klissouras, 1984; Wickelgren, 1988). However, no factors, other than those which are physiological, have been proven to define an elite athlete's ability to endure. Experts imply that physiological, psychological, cultural, and sociological factors combine, at different amounts in different individuals, to either bring out or suppress endurance-related qualities that exist within the athlete (Durschi & Weiss, 1984; Mahoney & Avenier, 1977, Mahoney et al., 1987; Martin, May, & Pilbean, 1984, Morgan & Polluck, 1977; Silva & Applebaum, 1989, Tokmakidis et al., 1984).

Mahoney et al., (1987) found that elite male and female runners (n=126) using associative strategies reported less anxiety, better concentration, more self-confidence and higher motivation than their nonelite peers ($p < .0001$). In contrast, Okwumbua, Myers, Schlester and Cooke (1983) declared that collegiate physical education students (11 males, 20 females) who used disassociative strategies showed greater improvement over trials in fitness testing relative to students who reported using more associative strategies. Pate, Polluck, and Jackson (1980) found that, over time, novice males reduced the lack of ability to associate. He concluded that cognitive strategies are somewhat dependent on the subject's level of physical conditioning. It appeared evident that: (a) the psychological skills of male elite endurance athletes tend to be associative and are better than those of the general population, and that (b) the lesser skilled males and females who use disassociation

tend to have great improvement in performance. However, lesser skilled athletes who adapted to using more associative techniques also tended to improve in skill rapidly.

Park found that endurance athletes' muscles contained their chemical energy reserves better than sedentary individuals' (Wickelgren, 1988). The data of Martin et al. (1984) indicated that highly trained elite runners had a $\dot{V}_E$ max considerably closer to their MVV ($> 85\%$) as compared to that of the typical control group ($< 70\%$). Certainly, physiological evidence for elite superiority exists, but Drake (1990) and Weinburg, Bruya, and Jackson (1985) declared that psychological skill in endurance could increase the muscle capacity to sustain, as well. Drake stated that endurance athletes had the ability to persist through pain because of experience with enduring pain (1990). Weinburg (1985) asserted that elite runners had higher expectations of their bodies, and, thus, performed closer to their potential.

Several cultures consistently produce endurance athletes. The top endurance athletes in the world almost invariably come from backgrounds involving some kind of hardship. Emil Zatopek*, winner of the gold medals in the 5k, 10k, and marathon of the 1952 Olympics, commented, "If there is luxury, there is danger of degeneration. . . . [People are] softened by luxury." (Montville, 1990). An elite runner's capability to endure probably comes from experience in enduring either as a means of adapting to particular cultural norms (e.g., Kenyan endurance habits) or as a means to meet intrapersonal or intracultural needs (e.g., demonstration of strength superior to that of peers), which are not wholly due to some higher level of physiological make-up.

For at least the past twenty years a disproportionately large number of the elite marathon and long distance running population of the world has been comprised of Kenyans (Moore, 1990). This presents the question of how a country with such a small

* Emil Zatopek was noted for both the amount of work that he did and the intensity with which he did it. Probably, no man has ever trained harder than Zatopek. Probably, no man has ever run closer to their potential than Zatopek (Moore, 1990).

population of active athletes could consistently produce a large percentage of the world's top athletes in distance running. The possibility exists that culture may encourage the development of traits that will contribute to great endurance ability in athleticism. Thus, the evidence presented implies the possibility that the demographic, sociocultural, and psychological factors combine to facilitate the elite runners of Kenya.

Research is needed to determine if specific characteristics exist for competitive endurance runners, swimmers, cyclists, and triathletes, or, conversely, to determine whether affecting agents play different roles between the genders. Very few studies of this nature have been done using endurance athletes other than runners (Mahoney & Avenier, 1977; Tomakidis et al., 1984). Also, very few have been done with women (Daniels, Scardina, Hayes, & Foley, 1984; Mahoney et al., 1987; Tokmakidis et al., 1984).

Mahoney et al., (1987) gave the Psychological Skills Inventory for Sport (PSIS) to athletes in 30 different sports, but did not study for specific knowledge about subelite or endurance athletes. The PSIS considered the areas of anxiety, concentration, mental preparation, motivation, and team emphasis within a broad range of athletes. Carmack and Martens (1979) designed the Commitment to Running Scale to study the factors of addiction and psychological well-being within distance runners. More specific knowledge about characteristics of subelite endurance athletes might have come through giving both of these scales, along with a demographic questionnaire, to a population of this level of endurance athletes.

Elite athletes are predisposed to being both physically and mentally healthier than non-elites (Durschi & Weiss, 1984; Jones, Swain, & Cale, 1990; Mahoney & Avenier, 1977; Mahoney et al., 1987; Martin et al. 1984; Mehrabian & Bekken, 1986; Pate et al., 1980; Schomer, 1986; Silva & Applebaum, 1989), and the same should hold true for subelites. However, it has not been determined: (a) why subelite endurance athletes are able to demonstrate higher endurance skills, (b) why subelite athletes choose to participate

in their endurance sports, and/or (c) what characteristics presently describe subelite athletes within the context of endurance athletes.

Statement of the Problem

The purpose of this study was to determine if there were: (a) certain factors that endurance athletes perceive as affecting agents, and/or (b) specific psychological or socialpsychological characteristics of subelite endurance athletes. The study also looked to discover if there were gender differences in the ways subelite athletes adapted to the endurance-related sport task.

The subproblems of the study are addressed in these questions:

1. Are there gender differences in the psychological, sociological, and experiential characteristics of subelite endurance athletes?
2. How do subelite endurance athletes perceive pain?
3. What are the mood characteristics of the subelite endurance athletes?
4. Are there experiential characteristic factors, such as hardship, for subelite endurance athletes?
5. What characterizes the subelite endurance athletes' psychological methods of approaching performance, and do these characteristics differ with those previously determined in the literature?
6. Do subelite endurance athletes tend to use association or dissociation techniques of coping with pain?
7. Are there consistent demographic factors which characterize the subelite endurance athlete?
8. Why do subelite endurance athletes participate in their sports?

Definition of Terms

The following terms are defined within the context of their usage in the present study. Theoretical and operational definitions are included where they are appropriate to the study.

ATHLETE is one who engages in organized competitive sport. This study includes NCAA Division I collegiate level middle to long distance runners and swimmers on scholarship, cyclists meeting at least category II standards, and triathletes from the top five percent of those in the 18-35 age bracket (Appendix A).

NON-ATHLETE is one who does not currently participate in *any type* of organized sport or physical activity on a regular basis.

PERFORMANCE LEVELS of athletes surveyed and discussed in this study included:

ELITE includes athletes skilled enough to be ranked as such by the national governing body for their particular sport (Mahoney et al., 1987). Athletes in this study are asked about their perceptions of their elite status in question 31 of the survey (Appendix A).

SUBELITE athletes are those closest to the elite level. Athlete perception of status will be evaluated through response to question 31 (Appendix A).

COLLEGIATE athletes are any that participate in college athletics at any level. In this study, they are those that participate in track or swimming programs at the NCAA Division I college level, and no consideration of skill is taken other than that athletes must have lettered in their sports.

AVERAGE sport participants have a low level of skill or very little participation in the given sport. Athlete perception of status will be evaluated through response to question 31 (Appendix A).

NOVICE athletes are new to a given sport skill, beginners.

YOUTH is any athlete who is at or below adolescence. In this study, it refers to any athlete at or below the high school level.

ENDURANCE ATHLETE is a middle or long distance athlete engaging in aerobically-oriented competition. In this study, it defines runners, swimmers, cyclists, and triathletes engaging in middle and/or long-distance events in their sport.

ATHLETE PERCEPTIONS (AP) is the functional name of the questionnaire specifically designed for this study (Appendix A) to evaluate psychological, experiential, and socialpsychological characteristics of endurance athletes.

COMMITMENT TO RUNNING SCALE (CRS) is the questionnaire which Carmack & Martens (1979) designed to examine psychological measures and addiction to sport specifically within runners. In this study, the questionnaire, with word changes for specific sport (Appendix C), was used to evaluate these factors within runners in addition to swimmers, triathletes, and cyclists; hence, it is referred to as the Commitment To Sport Scale (CS).

MOOD STATES are temporary states of mind or feeling. Mood is considered in this study as a means of characterizing subelite endurance athletes perceptions of their feeling states. Each of these factors is considered only in relation to Mahoney's previous analysis of them in the PSIS (1984). Two of the six specific factors analyzed in the PSIS (Appendix B) are:

ANXIETY is an uneasy state of distress derived from a situation perceived as threatening or stressful (Spielberger, 1966). In this study it is represented by some of the PSIS scores from questions 6, 11, 15, 20, 25, 29, 32, 38, 40, and 41 (Appendix B).

SELF-CONFIDENCE is an individual's perception of adequacy/inadequacy in successfully meeting performance demands (Scanlan, 1984). In this study it is

represented by some of the PSIS scores from questions 4, 14, 18, 23, 28, 30, 34, 36, and 44 (Appendix B).

MOTIVATION is the intensity and direction of behavior (Silva & Weinberg, 1984). In this study, it is considered in relation to the athlete's perception of what influences his or her participation, success, and continuance in endurance athletics participation. Information about motivation is based on: (a) the sum of the PSIS scores from questions 1, 9, 12, 22, 24, 39, and 42 (Appendix B), and (b) answers to questions on types of motivators evaluated in the AP (Appendix A) which follow.

ADDICTION to exercise is dependence, of a psychological and/or physiological nature, upon a regular regimen of exercise, characterized by withdrawal symptoms after 24-36 hours without exercise (Sachs, 1981). In this study, individuals reported their perceptions of their own levels of addiction (question 29, Appendix A). The score for the CS (Appendix C) also provides information about this factor.

ENJOYMENT is participation for the sake of happiness brought through it. It indicates appropriate intrinsic factors as motivators in performance (questions 30, 32, Appendix A).

EXTRINSIC motivators are rewards from outside of oneself (Weinberg, 1984). In this study, extrinsic motivating factors such as influence of significant others or effects of circumstances surrounding performance are considered (question 9, Appendix A).

FAILURE involves inability to accomplish the individually established goals at hand. In this study, it refers to perception of inability to accomplish athletic performance goals (questions 6, 7, 16, Appendix A).

INTRINSIC refers to motivators which come from within oneself (Weinberg, 1984). In this study, intrinsic motivating factors such as self-confidence, and self-expectation are considered (question 8, Appendix A).

ROLE MODEL is a person to whom others look in choosing their goals in life (McPherson, 1976). In this study, it is an extrinsic motivator which can have positive and negative ramifications (questions 42, 43, Appendix A).

SUCCESS involves meeting of individually established goals. In this study, it refers to aspects of athletic performance (questions 6, 7, 16, Appendix A).

EXPECTATION refers to an occurrence looked forward to or anticipated. In this study, it is evaluated in the AP questionnaire (questions 10, 33, Appendix A), the PSIS factor of Mental Preparation, and the score for the CS. It is expectation which, whether intrinsically or extrinsically based, impels one to action. It may include expectation of self as well as expectation of the team.

GENDER refers to female and male role behavior expectancies in American society. In this study, female and male athletes are surveyed with the assumption that gender is consistent with biological sex.

DEMOGRAPHY is the study of characteristics of human populations. Demographic factors included in this study follow.

SUPPORT is provision for continued participation whether through actual encouragement or through financial means (questions 1, 3, 4, 42, 43, 45, Appendix A).

PERSONAL HISTORY includes factors about athletes, such as age, gender, and sport, which may influence performance (questions 36-41, Appendix A).

PERSONALITY CHARACTERISTICS include personality factors about athletes during their youth which contribute to current success or failure (questions 14, 15, 21, 22, 35, Appendix A).

ECONOMIC SITUATION is the athlete's perception of the financial means of his or her family with whom he or she grew up (question 45, Appendix A).

COGNITIVE MENTAL STRATEGY is the direction in which the endurance athlete chooses, whether consciously or not, to direct his or her mental focus in regard to the physical exertion during competition. Two component mental strategies follow.

COGNITIVE ASSOCIATION refers to consciously thinking about the act in which one is engaging with the goal of correcting any errors and improving any proficiencies (Mahoney & Avenier, 1977; Mahoney et al., 1987); while *COGNITIVE DISSOCIATION* refers to actively focusing on avoiding thoughts about the act in which one is engaging with the purpose of overlooking any painful elements involved (Mahoney & Avenier, 1977; Mahoney et al., 1987). Information was provided by scores from the AP (questions 13, 25, 26, 28, 48, Appendix A) in this study.

CONCENTRATION refers to the athlete's degree of close, undivided attention to performance. In this study, it is one of the six factors analyzed in the PSIS (questions 2, 8, 16, 17, 21, 26, Appendix B).

MENTAL PREPARATION refers to the athlete's mental methods of perceiving him or herself to be ready for competition. In this study, it is one of the six factors analyzed in the PSIS (questions 3, 7, 13, 33, 35, and 45, Appendix B).

AFFECTING AGENT is any factor, negative or positive, which contributes to the formation of a quality which affects endurance performance. In this study, psychological

information about the endurance athletes' perception of potential affecting agents is evaluated throughout the AP questionnaire (Appendix A). Agents include:

PHYSIOLOGICAL factors pertain to the natural biological ability of the body. In this study, different levels of these components will be assumed to exist in those qualified as elite or subelite levels of athletes (Daniels et al., 1984; Martin et al., 1984; Wickelgren, 1988).

PSYCHOLOGICAL factors deal with the mind, emotions, or behavior. These factors should be revealed through analysis of the PSIS (Appendix B) factors of Anxiety, Concentration, and Mental Preparation, and of question 2 of the questionnaire (Appendix A).

SOCIALPSYCHOLOGICAL factors deal with the relation of the individual to society as a whole in terms of their own perception of culture and ethnography. These factors should be revealed through analysis of questions 2-6, 42,43 in the survey (Appendix A) and by the Self -concept and Team Emphasis factors of the PSIS in this study.

PERCEPTION is insight, intuition, or knowledge gained directly through any of the senses (Ryan, 1976). In this study, it is the athlete's mental interpretation of stimuli received via any of the senses. This study assesses perception of pain, failure, commitment to sport, and proficiency. It also looks at strategies of pain perception (questions 6, 7, 11, 14, 17, 18, 19, 25, 27, 28, 30, 44, 46, 48, Appendix A)

ENDURANCE describes carrying on through hardship. In this study, it describes the physical hardship that middle and long distance athletes must endure .

PAIN is the perception of physical discomfort. It is a completely subjective experience (Ryan, 1976). This study focuses on that subjective experience from the perspective of the endurance athlete. The study confronts these means of dealing with pain:

ACCEPTANCE is the willingness to endure pain (questions 13, 14, 17, 24, Appendix A).

DENIAL is refusal to admit existence of pain (question 25, Appendix A).

REMOVAL is effort to escape from pain (questions 26-28, Appendix A).

FEAR is aversion to confronting pain (question 18, Appendix A).

PSYCHOLOGICAL WELL-BEING is a state of sound mental capacity (Carmack & Martens, 1979). In this study, relationships between well-being and performance level are evaluated in the CS (Appendix C).

Assumptions of the Study

1. It is assumed that anyone who has lettered on a National Collegiate Athletic Association Division IA track, cross country, or swimming team meets the standards for subelite status as set by the definition presented within this research.
2. Due to the fact that there are a limited number of studies on subelite, preelite endurance athletes, some assumptions had to be drawn about preelite endurance athletes from studies on other types of athletes (novices, elite, non-endurance).
3. It is assumed that subelite status should be given to triathletes who have finished in the top five percent in the 18-36 year age bracket of a Triathlon Federation certified Olympic distance race with over 200 participants.
4. It is assumed that all athletes in this study have high levels of physiological characteristics necessary for the levels at which they compete in their respective endurance sport.
5. It is assumed that cyclists (age 18-23) meeting the category II standard performance criteria are subelite athletes.

Limitations of the Study

1. The study is limited by the fact that it does not contain longitudinal research on subelite athletes from their childhood, but only a self-report of memory and perceptions. The factors that may contribute the most to athletes' eliteness cannot be viewed from any perspective other than that of the subelite athletes themselves. Self-reports of personal history are not the best means of obtaining information, but they are the only viable option for this initial investigation.

Significance of the Study

Very few studies have been conducted on subelite endurance athletes. However, literature about those studies presents conflicting results. For example, Schomer (1986) posits that subelite athletes tend to use associative techniques when they are goal-centered and focused, but the study of Morgan and Polluck (1977) states that elite athletes (Olympic qualifiers) associate while those at the level just below them tend to dissociate. Regardless, the setting of goals encourages effort to be extended toward achievement in any and all settings, and, therefore, all endurance athletes should be able to endure more pain if a goal exists (Weinburg et al., 1985).

It is valuable to consider what motivates endurance athletes to persist through pain as they must. Morgan and Polluck (1977) found that no one in a group of 27 subelite and elite runners began to run due to the intrinsic appeal of running. Ryan (1976) would have asserted that a difference in the endurance athletes' perception of pain would draw them toward the grueling type of sport in which they participate. The data from Martin et al.'s 1984 study indicated that highly trained elite runners had a $V_{e\max}$ considerably closer to their MVV ($>85\%$) than that of the typical control group ($<70\%$). Ryan (1976) asserts that perception of the pain associated with running would account for the differences. Research needs to establish factors which continually reveal themselves as the most

relevant in the formation of the endurance athlete. Then, those on the verge of becoming elite endurance athletes can seek environments that more effectively tap whatever resources they already have.

A study of this nature may be worthwhile to those who are already subelite or elite endurance performers because it may provide them with information about themselves, helping them discern why they use the psychological association methods that they use. A low percentage of endurance athletes have developed in optimal settings in which to maximize endurance capacities; coaches could use this study to develop techniques to train young athletes to better utilize the psychological resources which they do have. In addition, sport psychology consultants and coaches may use the information to gain more knowledge about subelite athletes. This study may be instrumental to coaches, researchers, and athletes developing mental and physical training techniques.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter was to present a review of the existent literature on characteristics and affectors of elite endurance athletes and/or how they compare to performance of lower skill levels. Studies have been done on all levels of athletes completing endurance tasks, evaluating both their psychological and physiological characteristics of performance. The chapter contains sections regarding: (a) Physiological topics, (b) Psychological and Socialpsychological topics, and (c) Mental Preparation and Performance.

Physiological Aspects of Performance

Morgan and Polluck (1977) indicated that elite endurance runners are characterized by VO_2 max values far in excess of those reported commonly for untrained controls. This higher capacity for endurance resulted from both genetic endowment and long-term training. The researchers noted the importance of being able to clarify whether or not athletes have better physiologically functioning organs, or a higher level of psychological ability to endure the pain involved with training.

In 1980, Pate, Polluck, and Jackson studied physiological differences between good and elite distance runners. Specifically, they studied 20 elite athletes, as designated by their world class status, and 8 good distance runners, as designated by either their collegiate track participation or their consistent participation in road races. It had already been documented by Mahoney and Polluck (1977) that world class distance runners were physiologically superior to the average population and also different than average distance runners in body composition and oxygen intake. World class distance runners may also be metabolically different from one another. Pate et al. (1980) analyzed fat weight, lean

weight, VO_2 during submaximal running, and blood lactic acid concentration after submaximal work, and VO_2 max. They designed several charts to detail the information that they obtained in their research.

All of the elite runners in the study tended to be on the upper end of the physiological dimension. Research indicated that elite runners have a high (in comparison to population norms) VO_2 max, low percent fat values, high fractional utilization of VO_2 max without lactate accumulation. This demonstrated that a certain level of general physiological capacity was a prerequisite to being a distance runner of elite caliber. Lean body weight was highly correlated with VO_2 max ($r = 0.75, p < 0.01$). The researchers suspected that VO_2 max and lactic acid were the variables that differentiated between the two groups of runners. To examine this, VO_2 max and lactic acid were switched to residual variables. The average residualized lactic acid values of the elite marathon runners was 10.4 mg% than that of the average elite middle-long distance runner. Pate et al. (1980) cited Costill's 1973 study which reported that marathon runners were able to utilize an unusually large fraction of their aerobic power for extended periods of time. This helped to support his findings. However, a study had been done on Derek Clayton (marathon runner) who had only average aerobic power ($69.7 \text{ ml/kg} \cdot \text{min}^{-1}$) for a distance runner, but was able to tolerate, for long periods of time, speeds which required 86% of this VO_2 max.

Differences in training may have accounted for some of the differences found between elite distance runners. The study was profitable in that it presented a means to discover areas in which any endurance athlete is likely to attain his greatest success. Pate et al. (1980) also identified areas essential for high level athletic performance in any area.

Wickelgren (1984) reported on the studies of Park. She declares that world class distance runners reached endurance levels attained by all but a very few individuals. Wickelgren (1984) believed that these differences lie largely in the genes of the elite runners. Different individuals have different endurance levels within their muscles (slow

twitch versus fast twitch muscle fibers). It was also shown that training could alter the proportion of these muscle types. Within Wickelgrin's article, Park was reported to have made these claims. She declared that there were no earlier measurements of metabolites in the untrained muscles of athletes. Muscle metabolites are muscle chemicals involved in contraction. Park did a wrist flexion test with endurance athletes ($n = 5$) versus sedentary people ($n = 5$). She used this type of a test because that would be giving no appreciable advantage to the endurance athletes through testing a muscle that they may have developed through training. The endurance athletes still did better on the test. This meant that their muscles contained chemical energy reserves better than the sedentary individual's did. Park used magnetic resonance spectrography to monitor how phosphorous in various muscle metabolites related to the magnet. She was able to study minute to minute changes within muscles better than if she had used a biopsy. She learned that the endurance athletes started out with a bigger storehouse and maintained it all the way through the exercise. Park found that lactic acid increased in the sedentary muscles, but did not build up in the athletes (Wickelgren, 1988). The negative aspect of Park's study was that she did not include exercise pulse or heart rate, and she had a small subject sample.

Martin, May, and Pilbeam (1984) addressed one aspect of the physiological question when they studied 10 elite male distance runners to discover whether or not ventilation was a limiting factor for this group of runners. Specifically, they studied whether or not the V_e max of these runners was far below that of their MVV (if breathing response was well within pulmonary system limitations). The data from their study indicated that highly trained elite runners had a V_e max considerably closer to their MVV ($> 85\%$) than that of typical control groups ($< 70\%$). MVV (maximum volume of ventilation) and PEFR (peak expiration flow rate) were significantly elevated among elite athlete groups ($p < .05$), and DLCO (diffusing capacity) was also significantly higher ($p < .001$). All other pulmonary function means (IC, ERV, FVC, FEV1, FEF, RV, TLC) were well

within normal limits. This data suggested that the arduous training of these athletes stimulated adaptive ventilatory performance in the diaphragm, abdominal, and accessory muscles of breathing. The problem in the study stemmed from the fact that it was impossible to obtain data from these elite athletes before they took up intense training programs; hence, there was no available data to verify the hypothesis that the ventilatory processes had adapted. The authors cited studies by Leith and Bradley (1976, 1977) that indicated that strength and endurance of the ventilatory muscles can be increased by specific muscle training. Martin et al. (1984) only vaguely described why elite runners were physiologically superior to their peers.

Drake (1990) presented ideas on how to push a body to its maximum capacity. He discussed how the body meets its breaking point; i.e., more and more oxygenated blood is pumped to the muscles, but eventually the aerobic system can no longer meet the demand. The body then goes anaerobic. Heart rate increases at a slower rate and waste products begin to be produced. Drake (1990) suggested that this break point could be boosted by training near the breaking point more often. This theory would validate the idea that endurance athletes were able to endure more pain simply because they were used to enduring more. He outlined a training method that keeps individuals as near the breaking point as possible for as long as possible. One reason that it may work is that it provides a difficult goal for the trainee to strive to attain. The pitfall of this workout is that one can train too hard. It is difficult for the body to recover adequately. An individual's body needs rest to continue training at the level demanded in order to push down a "breaking point."

Psychological and Socialpsychological Aspects of Performance

Ryan (1976) studied perception in people involved in vigorous sports. He stated that perception is involved with practically everything in which humans engage. Ryan

(1976) found that, though all received the same objective stimulus, they did not all perceive that stimulus the same way.

Ryan (1976) tested the pain thresholds of individuals by exposing the skin on their arms to radiant heat. Three groups were tested: (a) high school athletes involved in contact sports, (b) those involved in noncontact sports, and (c) those involved in no organized sports at all. Subjects tested were asked when they noticed pain and then tested to see how much pain they *would* endure. There were no differences in the pain thresholds of the groups; they all perceived the pain at approximately the same time, but there was a significant difference in the amount of pain that the groups were able to tolerate. Contact athletes endured the most pain (285.75 mm/Hg); noncontact fell between the two groups (231.00 mm/Hg); nonathletes endured the least (207.50 mm/Hg). After being tested the first time, each subject was told that his score was a bit lower than the rest of the tested group and asked to take the test again. Contact athletes improved a great deal on the second attempt; noncontact improved some, and nonathletes tolerated pain less than the first time they were tested. Ryan (1976) concluded that differences in perception of pain may help to determine why people chose to engage in the activities which they did.

In Ryan's 1976 study people engaged in the activities that they did based on psychological reasons based on environmental and cultural influences. Pain expectancy and pain acceptance were the two culturally determined attitudes of importance. The example of childbirth was given (how different cultures accept it and deal with it). In some cultures the ability to tolerate pain was seen as masculine; it was socially valued. Some actually feared pain less, since they had experienced it more. However, the most intriguing explanation was that there may be differences in the general perceptual characteristic of augmenting or reducing sensory inputs. Some consistently reduced the intensity of their perceptions, others consistently augmented them. Reducers were extroverted and more

delinquent. Ryan (1976) hypothesized that contact sports people would tend to be reducers.

Ryan (1976) examined Petrie's 1971 work, whose interest was in the control of pain and suffering. Petrie had seen that surgery to the prefrontal area of the brain increased tolerance for pain. The source of the pain had not been changed, nor the threshold altered, instead the person experiencing the pain had been altered; that is, they were more extroverted, more tolerant of pain, less tolerant of sensory deprivation.

On this basis, Ryan (1976) identified three types of perceptual characteristics within a study group of contact athletes, noncontact athletes, and nonathletes: (a) reducers, who consistently reduced the sense of pain, (b) augmenters, who accepted the stimulus of pain, and (c) moderators, who fell between the other categories. Augmenters and reducers were determined by measuring the change in kinesthetically perceived size of their grip on a bar after stimulation. The subjects held a bar with one hand and felt along another bar with the other to determine the area which had the same size as the first bar. The augmenter doubled the size; the reducer halved it; the moderator perceived the bar to be about the same size. Possibly this provided generalized evidence that the reducer tended to diminish the perception of stimulation while the augmenter tended to enlarge it.

Ryan (1976) hypothesized that reducer habits would become a handicap if there were a lack of stimuli. To test this, both groups were put into tank-type respirators with stimulation at a minimum. The augmenters tolerated starvation of stimulation better than the reducers as evidenced by the fact that they were willing to stay in the tank for a longer period of time. This was the reverse of the pain testing.

Ryan (1976) also tested children's perceptions of themselves by having them fill out a chart with a list of adjectives. The children had to tell which ones described themselves. It was hypothesized that using this method it may have been possible to predict at a young age whether an individual is a reducer or an augmenter. He summed up

Petrie's study declaring that there is a need to take a "new" approach in assessing sport personality.

Morgan and Polluck (1977) conducted a classic study in regard to defining the psychological aspects of elite long distance runners . Through distribution of a questionnaire, they found runners to be more introverted than most. Endurance performance was found to be governed by both physical capacity and willingness to tolerate the discomfort associated with hard physical work. This study attempted to examine the extent to which psychological factors were useful in characterizing the marathoner.

The researchers compared elite middle distance runners with marathoners for several reasons. They desired: (a) to contrast a marathoner's psychological characteristics with non-world-class runners and athletes from other sports, (b) to examine the perceptual process of effort sense in marathoners, (c) to evaluate the factors responsible for involvement in competitive running for marathoners, and (d) to evaluate adherence to competitive running across time (Morgan & Polluck, 1977).

The subjects studied were 19 world class (middle-long, marathon) athletes, and 8 college middle distance runners. Each athlete was given a questionnaire. The middle-long runners and the marathoners did not significantly differ from one another in their answers to the questionnaire ($p > 0.05$). Neither group's answers varied from the college middle distance runners; so the group was combined for comparative measures (Morgan & Polluck, 1977).

Morgan and Polluck (1977) found that no one began to run because of the intrinsic appeal of the sport. Adherence was found to be related to both intrinsic and extrinsic rewards. Elite runners utilized an associative strategy in both training and racing.

These elite runners reported: (a) that they paid very close attention to bodily input such as feelings, sensations arising in their feet, calves, thighs, as well as their respiration;

(b) they paid attention to "the clock" only by reading their bodies; (c) they identified runners that they would like to race with in certain races, but they did not latch onto these runners; (d) during all races they constantly reminded themselves to stay loose and relax and so forth; and (e) they typically did not encounter "pain zones" when running, and they typically dismissed such phenomenon as myth. These athletes were cognitively active during competition. Elite runners seemed to be characterized by the fact that their mood was better than that of the general population. They did not differ on personality traits, though. It was theorized that the positive effective profiles reflect the consequence of involvement rather than the antecedent or selection factor (Morgan & Polluck, 1977).

The elite runners were involved in a rather unique subculture in regard to consummatory behavior as it relates to the use of caffeine, alcohol, and tobacco. They virtually abstained from each. Their daily involvement in running averaged 2.5 hours a day; this without question had vocational connotations, all runners reported that they would continue running when extrinsic rewards were gone (Morgan & Polluck, 1977).

Non-elite athletes were found to disassociate during competition; the elite were found to associate. Elite marathoners' physiological superiority enabled them to run at a greater percent of their maximum without encountering discomfort. Elite runners had mean lactate levels of 31 mg% on the treadmill at 12 mph, while the less capable runners manifested levels at twice that amount. Lactate was found to be the best predictor of effort sense in the study. It is probable that elite runners avoided "hitting the wall" due to the associative techniques that they employed, on the other hand, the nonelite athlete was not able to afford the luxury of associating (Morgan & Polluck, 1977).

The major distinguishing psychological dimension of the elite marathoner was their effort sense in that these runners employed an associative cognitive strategy during competition. Morgan and Polluck (1977) used the *perceptostat* to define athletes' effort sense. Elite runners appeared to have the ability to employ two rather divergent coping

strategies. At times it was possible for them to dissociate sensory input because of the discomfort that it creates, at other times it was possible for them to associate or pay attention to bodily signals. Elite marathoners seemed to have the ability to employ whichever of the two coping strategies is most advantageous during a particular moment in a race (Morgan & Polluck, 1977).

Kostrubala (1977) moderated a discussion on endurance and sports psychology which took place between several noted scholars in San Diego, California. They discussed intensive effort and its ramifications in terms of association and dissociation. Kostrubala described pain as a uniquely subjective experience. He said it could not be quantified externally. It was defined only by the individual, ". . . the interpretation of that subjective event called pain produces one of the most fruitful areas of understanding of the human psyche" (Kostrubala, 1977).

In the discussion moderated by Kostrubala, Rahe stated that at a low level of training, an individual's mind usually received all kinds of external and internal input (meditation, thoughts about one's life, etc). He also said that at a high level of training people deal with very severe input of painful stimuli and simply cannot think of much else except how to get through the pain. Then they wonder why they would ever engage in such painful activity, promising never to do it again -- until they are through racing, and recover, and then they say that it was kind of fun and start preparing to do it again. Rahe suggested that in high level performance people use all of their coping abilities just to forget the pain so that it is possible to carry on and perform.

Mahoney and Avenier (1977) realized the need to psychologically distinguish between good and elite athletes. Elite endurance athletes are characterized by a certain performance level, but Mahoney & Avenier (1977) recognized the need to delineate factors other than performance that could be used to classify the top endurance athletes in each sport. Mahoney and Avenier conducted a classic study (1977) in which they analyzed a

select group ($n = 13$) of American gymnasts to establish psychological categories to determine differences between the very best and the rest. The gymnasts were trying out for the Olympic team. Two days prior to the final competition, Mahoney gave a questionnaire to the gymnasts inquiring about their personality, self-concept and strategies employed in training and competition.

They found that the better gymnasts tended to be more self confident, have more competitive dreams, and be more successful in these dreams. The better athletes thought more about their sport during daily activities. They engaged in more self-talk, and used imagery extensively (higher internal imagery than external). The better gymnasts underemphasized poor judging as an excuse for poor performance ($r = .59$). The less successful tended to focus more attention on the actual move that they were doing ($r = -.52$). Mahoney and Avenier (1977) made an anxiety ratings chart by which to evaluate the findings. The Olympic qualifiers reported more anxiety, so this could not be established as a negative. However, neither group was nonanxious. The more successful athletes seemed to use their anxiety better (Mahoney & Avenier, 1977). They emphasized the restricted size of the subject sample, but presented the possibility that dreams and fantasies affect attitudes and assessments. Mahoney and Avenier (1977) suggested that athletes could possibly be trained not to fight anxiety. The idea that the elite runners have higher expectations of their bodies, and, thus, perform closer to their potential remains possible.

Weinburg, Gould, and Jackson (1979) studied the importance of self-confidence in motor performance. They related this study to that of Bandura which was conducted in the mid-seventies. Weinburg et al. (1979) tested Bandura's self efficacy theory. The theory related to the proposition that the strength of one's conviction that he/she can successfully execute a behavior required to produce a certain outcome had a great deal to do with his/her success in completing that task successfully. Thirty males and thirty females at NTSU were asked to complete such tasks as sit-up and leg extension tests. They were asked what

they thought their chances of winning the competition were and how confident they were in their prediction. High efficacy groups evidenced high expectancy of success (71.8%); low efficacy groups evidenced a low expectancy (38.2%). Seventy-five percent were confident about their prediction. It should be noted that these tasks had very little to do with endurance; however, the study presented evidence as to how novices responded to what was perceived as endurance (Weinburg et al., 1979).

In the face of adverse experiences, high efficacy people exhibited an increase in persistence; low efficacy evidenced a decrease in persistence. This could result from learned helplessness. It may be an appropriate conclusion by the subject that the future will be no different than the past. When individuals failed to exert control in a situation, they gave up on tasks that they felt were a part of the same type of situation (Weinburg et al., 1979).

Male and female differences were also evaluated. Males perceived that their ego was on the line and were motivated by a need to maintain a high self-image. Females exhibited lower performance expectations than males, and, therefore, poorer performances on motor tasks than males (Weinburg et al., 1979).

Carmack and Martens (1979) conducted a study with the purpose of obtaining descriptive information about runners. This led to the design of a scale to measure Commitment to Running (CR), and examining changes in state of mind during different segments of a run. The subjects, 250 male and 65 female runners between the ages of 13 and 60 ($M = 28.8$), of varying levels of ability and experience, completed a questionnaire requesting information about demographics, mental states during a run, attitudes towards running, and perceived outcomes of running. Subjects also responded to the 12-item Commitment to Running Scale.

Carmack and Martens (1979) grouped their subjects by sex and then by subgroups in terms of: (a) average length of run in minutes for the last two months, (b) average

frequency of run per week, (c) total running experience in years, (d) percent who experienced discomfort when a run was missed, (e) perceived addiction to running, and, (f) commitment to running score (Table 1).

In the analysis of demographics by sex, males reported longer average length, $F(1, 298) = 23.99, p < .001$, and higher frequency of run, $F(1, 311) = 10.71, p < .001$. Females reported more discomfort when a run was missed, $\chi^2(1) = 4.79, p < .05$.

Carmack and Martens (1979) did not find the level of perceived addiction to be significantly different between genders. But, they did find male CR scores to be significantly better than those of females, $F(1, 313) = 8.24, p < .005$. Carmack and Martens (1979) also found a significant difference in total running experience for the sample of males and females, $F(1, 309) = 44.99, p < .001$. Males averaged almost 5 years more experience than the females.

In reporting feelings when a run is missed, athlete responses confirmed the suggestion that deprivation from running could result in withdrawal. In reporting their reasons for running, two trends appeared among high CR respondents toward: (a) a high emphasis on psychological, and (b) a de-emphasis on physical categories of reasons given for continuing to run. Carmack and Martens (1979) expected this stronger psychological component to be evident among more strongly committed runners.

In terms of perceived outcome, high committed runners perceived that they derived more beneficial outcomes from their running than did lower committed runners. The majority of both high and low CR runners indicated that they began running for the sake of physical health and that they continued for the sake of both physical and psychological health.

In a stepwise regression equation, the following variables accounted for 42 percent of the variance in CR scores: (a) perceived addiction, (b) psychological well-being, and, (c) average distance run during the past 2 months (Carmack & Martens, 1979).

Table 1 -- Descriptive Statistics By Sex and Subgroup

Sample	<i>n</i>	Ave. length of run in min. for last 2 mo.	SD	Ave. freq. of run per week	SD	Total running experi- ence in years	SD	% who experience discomfort when a run is missed	Perceived Addiction ____to running____	Very much	Some- what	Not at all	Committ- ment to running	score	SD
A. TOTAL	315	41.1	18.7	5.4	1.26	5.4	5.1	74	30%	54%	16%		47.9	6.3	
B. By sex															
Males	250	43.8	16.2	5.6	1.22	6.3	5.2	72	32%	53%	15%		48.3	6.3	
Females	65	31.4	21.3	5.0	1.31	1.8	2.0	86	23%	59%	18%		45.7	7.1	
C. By subgroup															
Road races	132	44.9	19.2	5.4	1.25	4.1	3.8	77	28%	59%	13%		48.0	6.2	
H.S. track camp	24	42.0	16.5	6.0	.62	2.3	1.1	88	29%	63%	8%		48.0	6.4	
Campus runners	55	32.8	17.4	4.7	1.10	7.9	6.1	78	37%	56%	7%		47.7	7.7	
Olympic athletics	45	49.2	7.2	6.6	.61	7.1	2.5	64	38%	42%	20%		48.2	4.8	

Note. From "Measuring Commitment to Running: A Survey of Runners' Attitudes and Mental States," by Carmack and Martens, 1979, *Journal of Sport Psychology*, 1, p. 30.

Pate, Polluck, and Jackson (1980) studied novice runners, and they did not adopt experimenter-delivered cognitive strategies. However, there were meaningful findings. Novice runners profited from the use of dissociative cognitive strategies, but increasingly used associative cognitive techniques. This supported Morgan and Avenir's 1977 findings that most novice runners did not possess the necessary physical skill to tolerate the cost, in terms of awareness of body fatigue and pain, of using an associative strategy. It did not, however, explain why the novices did not have this ability. The authors suggested that over time the novice may reduce this lack of ability. Pate et al. (1980) concluded that cognitive strategies were somewhat dependent on the subject's level of physical conditioning.

Okwumubua, Myers, Schlester, and Cooke (1983) studied 31 undergraduate physical education students, none of whom had run more than 25 miles in the past year. Okwumubua et al. (1983) organized three groups in this study, i.e., associative, dissociative, and relaxation control. Every group did 2 days of aerobic and 1 day of anaerobic training per week for a 5 week period. Throughout the study, pre-, mid-, and post-tests of increasing difficulty were given to all study groups. Each individual filled out a self-report questionnaire (Okwumbua et al., 1983). Students who reported using more dissociative strategies, independent of initial group assignments, showed greater improvement over trials relative to students who reported using more associative strategies.

Tokmakidis, Tsopanakis, Tsarouchas, and Klissouras (1984) conducted a study which contributed to the formulation of a biological profile of elite athletes and identification of those characteristics which separate elite athletes from the population norms. The researchers studied a total of 590 elite athletes (476 male, 114 female) who made the Greek national teams in 19 different sports over a period of 4 years. The physical performance capacity of the athletes was measured by a treadmill test. Maximal aerobic capacity was assessed from lactate production. This measurement was assessed from a

blood sample taken from the athletes at 4 minutes into a maximal effort. Also, maximal muscular strength and explosive strength were measured (Tokmakidis et al., 1984).

Individuals engaging in sports with high aerobic demands tended to demonstrate the highest VO₂ max values. Females who followed a similar training regimen to the men in their sport ranged from 9% (basketball) to 24% (running) lesser maximal oxygen intake than males. Long distance runners had the fifth highest anaerobic capacity, behind pentathletes and swimmers. In this category, women runners had 18% lower values than men. The results of the study did not shed any new light on characteristics of elite athletes, but it did bring support to other existing studies (Tokmakidis et al., 1984).

Durtschi and Weiss (1984) investigated psychological characteristics, cognitive strategies, and training methods of elite and nonelite marathoners. Their subjects included 18 elite and 48 nonelite marathoner runners who competed in a 1982 marathon in Eugene, Oregon. Male elites had to have previously run a 2:20:00 marathon, females, a 2:50:00. The nonelites were randomly selected from other runners participating in the marathon. Each participant in the study completed five questionnaires - the Running History Questionnaire, Distance Running Questionnaire, Sports Competition Anxiety Test, Profile on Mood States (POMS), and the Competitive State Anxiety Inventory - which collectively assessed personality, training and running involvement patterns, goals and expectations, cognitive strategies, and mood profiles. Responses to the questionnaires were analyzed using descriptive statistics and two-way analyses of variance to compare elite and nonelite male and female runners.

Durtschi and Weiss (1984) found that elite runners were motivated to excel in their sport and to capitalize on their natural talent and psychological strength to endure. They were also motivated by the rewards a successful race brings. The nonelites found satisfaction in attaining personal goals, and mentally and physically feeling better about themselves. They also enjoyed the social interaction of racing. Running offered all groups

self-fulfillment through providing challenges and goals to attain. They found that all groups used some type of association. However, the nonelites were more likely to engage in dissociative strategies. They cite Morgan and Avenir's 1977 study to support these findings.

An anxiety rating graph indicated that nonelite competitors were one to two points higher on the scale than elite. Once the race started, both groups showed a large drop in anxiety ratings. No consistent patterns of state anxiety were found in any of the groups. Also, no major variations existed between elites and nonelites on a mood profile rating revealed by the POMS (Durtschi & Weiss, 1984).

Elite and nonelite runners differed in their levels of commitment and in their motives for running. Elite runners also ran more miles and trained more intensely than nonelites. The four sex by skill level groups were more similar than different for the POMS. Durtschi and Weiss (1984) cited a 1978 study by Morgan which stated that no single measure of psychological characteristics was sufficient for predicting the performance of athletes. Durtschi and Weiss (1984) concluded by saying that further research is needed in the areas of sport personality and athletic performance.

Athletes who participate for the sake of demonstrating competence may also be encouraged to continue pushing themselves and working hard at a specific sport because that is socially demanded of individuals participating in the sport. To attain higher levels of achievement, they may set goals. Weinburg et al. (1985) studied endurance performance of novice athletes to determine the effects of goal proximity and specificity on their performances. Weinberg et al. (1985) tried to determine if individuals who set specific difficult goals perform better than those who set "do your best" goals. They found that, on the whole, the results from the two types of goals were very similar. In this study a goal was defined as what individuals set out to accomplish. A three minute sit-up test was used as the primary dependent measure. Weinburg et al. (1985) presumed three minutes would

give the goal aspect time to sink in. Subjects practiced sit-ups through a fifteen minute session, five week period. The subjects were divided into four study groups. They all did a pre-study test and then were randomly assigned to a group: (a) short term, (b) long term, (c) short/long term, (d) "do your best." A questionnaire was given out every week before the test: (a) to give students information on their progress, and (b) to assess their perceptions of their progress, their commitment, importance of the goal, and their perceived level of effort. They rated each of these items on a 100 point scale. A significant amount of increase was recorded in each group's weekly trials ($p < .001$), which indicated that the group was highly motivated.

Mahoney, Gabriel, and Perkins (1987) studied psychological skill and its relationship to exceptional athletic performance. Mahoney et al. (1987) explored the relationship of psychological skill to exercise efficiency, pain tolerance, patterns of training, and actual performance in athletic competition. They set out to identify skills that reliably differentiated elite athletes from their less exceptional peers. Exceptional athletes and sport psychologists were the subjects of the study. Athletes were divided into three groups: (a) elite, so designated by National Governing Bodies (NGB) of the sports ($n=126$) from 17 sports, (b) preelite, also designated as such by the NGB's ($n=141$) from 11 sports, and (c) college ($n=446$) recruited across 21 sports at 5 universities in 5 regions of the United States. The large, diverse subject group with overall uneven distribution in skill levels, age, gender, and sport provided the study a great deal of credibility. All athletes completed the PSIS individually. The sport psychologists were selected based on their international reputation. Eighteen of these sport psychologists completed the questionnaires as they thought the ideal athlete would respond.

The results of the study were analyzed by compiling the answers that the athletes and sport psychologists gave to Psychological Skills Inventory for Sports (PSIS). The questionnaire addressed anxiety, concentration, self-confidence, mental preparation, and

team emphasis. Hotelling's T^2 statistics were used to test the hypothesis that there were no differences in the mean responses of the four groups. Sample t-tests were run on each of the 51 items in the questionnaire. These sample t's showed that, compared to nonelite athletes, the elite reported less anxiety, better concentration, more self-confidence, and higher motivation. There was little difference between the preelite and the elite athletes; however, preelites reported more dependency on coaching. Sport psychologists predicted ideal athletes to have fewer problems and concerns than the elite athletes themselves actually reported. The views of the experts differed considerably from the actual levels of psychological skill development within the elites.

Mahoney et al. (1987) determined the extent to which groups of individual items differentiated elite and nonelite athletes through discriminant and regression analyses. They further identified a group of items that differentiated elite and nonelite athletes through an all-possible-subsets regression which was used for factor and cluster analyses.

The single most differentiating factor among male and female athletes was that of self-confidence. Female athletes reported that they had lower self-confidence and used more self-talk; they also had more frequent problems with anxiety and tension than their male counterparts. Generally, individual sport athletes reported more problems with anxiety and confidence and different mental habits than team sport participants. Athletes in closed sports reported more concerns with anxiety, confidence, and concentration than those in open sports. The PSIS proved to be useful for assessing psychological skills relevant to training and performance. Of the 51 items on the questionnaire, 48 yielded significant differences in 4 paired group comparisons ($p < .05$). Mahoney et al., (1987) suggested that information compiled on male/female, individual/team, and open/closed sports indicated that these factors should be researched further.

In the years 1973 and 1976, D.S. Butts predicted relationships between various types of psychological (aggression, conflict, competence) and social (competition and

cooperation) motivations in sport. Wrisberg, Donovan, Britton, and Ewing (1984) tested Butts' theories by having 370 subjects fill out a sport-specific questionnaire designed by Butts. The subjects were baseball players, swimmers, and gymnasts. Results were presented on two charts which need to be viewed to understand the findings. Butt's prediction that aggression is strongly related to competition was only mildly supported by the data received by Wrisberg et al. (1984). The strong relationship between conflict and competition was found to hold true only in the large sample groups. The data of this study suggested a weak association between competence and cooperation. Aggression lacks strength as a motive for participation in individual sports. Thus, the status of aggression as a sport motivation remains somewhat equivocal (Wrisberg et al., 1984). An important motivation for sport involvement stems from the perception that athletics gives one the opportunity to demonstrate competence. The researchers suggested that affiliation might also provide incentive for participation.

Clingman and Hilliard (1987) studied athletes who engaged in their sport for some minimum period per week (large amounts of participation). Results of the study indicated that there were outstanding characteristics about those athletes: (a) they were motivated to achieve in everyday life, (b) they had the determination and perseverance to meet their ambitious goals, (c) they were more leaders than followers, (d) they tended to object when prevented from performing tasks in their own way, (e) they viewed physical activity as a serious undertaking, and (f) they were low risk-takers. All elite endurance runners would fall under the defined super-adherer category. These characteristics may be helpful in assessing why these athletes participate and what enables them to endure.

Mental Preparation and Performance Level

Temperament characteristics of those participating in strenuous sports were studied by Mehrabin and Bekken (1986). They presented available findings on the topic then

combined and integrated them. They used a large sample of subjects ($n=293$) from several sports, including track, to test generalized temperament-related hypotheses based on the literature available.

Mehrabian and Bekken (1986) described several personality characteristics which were revealed to be specifically related to track athletes. They were more dominant, less patient, and more introverted than the normal population. The collegiate athletes tended to be more extroverted, stable, tough-minded, self-controlled, conscientious, self-assured, outgoing, having low tension.

The distinguishing characteristics of this study were the large sample group, the fact that three common and strenuous sports were studied together. They studied subjects who devoted a great deal of time and effort to their sport; they studied a wide range of sports; they used a comprehensive system for compiling the data. Mehrabin & Bekken (1986) gave the subjects questionnaires related to personality and temperament, along with a trait pleasure-displeasure measure. The track athletes reported that they ran an average of 17.2 miles per week ($SD= 14.5$) with an average of 7.2 minute miles; they participated in 1.47 sports; their temperament scores were standardized. Compared to the normal population, mean standard trait pleasure score of athletes in the study was .32, which was significantly different from the average population mean of zero ($t(292) = 3.19, p < 0.01$). Track athletes obtained a trait dominance mean standardized score .40 significantly different from the population mean ($t(292) = 4.54, p < 0.01$). They did not differ significantly from the population in general in the area of trait arousability.

Mehrabian and Bekken (1986) questioned whether the differences in athletes resulted from the sports, or if people with certain personality traits gravitate to the sports. This was not answered. Mehrabian and Bekken concluded that athletes were mentally as well as physically healthier than the general population.

Schomer (1986) wrote an instructive article with the purpose of training marathoners in the use of associative thinking based on the precise and directive thought processes found to occur with superior marathoners at high training intensities. Schomer referred to Morgan (1978) who stated that marathoners ran a high risk of injury if they overengaged in the act of dissociating. Schomer found there was a direct relationship between increases in associative thinking and training intensities ($r = 0.0928$). Therefore, training in qualitative associative thinking modeled by superior marathoners was expected to optimize the performance level of other marathoners. He also made reference to the Okwumabua et al., (1983) study in which novice runners were motivated to adapt an associative pattern of thinking, although they did not motivate participants to adapt the experimenter-delivered mental strategy. Schomer (1986) suggested that marathoners must be able to associate to race at their potential. He hypothesized that associative ability may keep runners from overexerting themselves too early in a race and from holding back too much until the end of the race. Schomer believed that to bring out long distance runners' optimal physical skill in a marathon, running associatively should be taught. The study was done to try to help runners to adopt a more efficient, safe mental approach to endurance training.

Schomer (1986) chose research assistants to do the personal aspect of the testing. There were five interventions taken during the runners' race. Each stage of intervention tried to pull the runner farther and farther from a dissociative strategy. In compiling the results, Schomer charted four types of associative subcategories: feelings, body monitoring, command and instruction, and pace monitoring.

Schomer (1987) stated that it would be unwarranted to imply that associative training was the key to marathoning, but it could be realistically stated that it holds a great deal of worth in helping the athlete realize potential. The athlete has to be made aware of the satisfaction that can be derived from conscious control aspects of training that can be

engaged in. Runners also need to see their ability to reduce overuse injuries through associative training. The mental training process has to be accommodative to the athlete's idiosyncratic learning process and instructional requirements. This type of training has been tried by few, but the results are encouraging. Athletes should be able to elevate their physical performance levels through evaluating their mental performance levels.

Silva and Applebaum (1989) also found the associative style of running to be dominant among world-class distance runners. The researchers stated that the mental side of running is as difficult as the physical. Individuals attending to external stimuli recorded better times than those not doing so. In 1983, Morgan suggested that this distraction strategy enabled the dissociation group to tolerate more pain and to run at a higher level (Silva and Applebaum, 1989).

The subjects of Silva and Applebaum's study were 32 US Olympic marathon trial contestants. They represented one quarter of the elite population of marathon runners in America at the time of the study. Questionnaires were given to these runners. A discriminant function analysis determined which questions were worthwhile.

Silva and Applebaum (1989) asked if the cognitive process differed according to one's level of excellence. This study indicated that differences did exist in the cognitive-attentional processes of these contestants. The top 50 finishers engaged in adaptive flexible strategies. Runners finishing 50 or beyond tended to use a dissociative strategy. These runners appeared to be less attuned to the perceptual feedback available from their bodies. The top 50 did not adopt a singular strategy, but rather shift their cognitive strategy according to the demands of the race. They monitored themselves and raced according to how they felt. Early in the race they wanted to know where their pace was and where other runners were so that they could adjust. When pain was felt, the elite runners dissociated more than the lower placers. Lastly, elite subjects engaged in more self-talk to push or psyche themselves through the tough parts of the race (Silva & Applebaum, 1989).

Schomer reported that Beers and Karoly (1979) found that pain tolerance was increased by rational thinking and the use of positive task-relevant self-talk. Also, Jones, Swain, and Cale (1990) examined what caused anxiety in elite middle distance runners. They evaluated feelings and perceptions immediately previous to the race. Five relevant factors emerged from the PRQ: (a) athletes' perception of his readiness, (b) attitude toward previous performance, (c) perception of the difficulty of the position goal he had set and whether he thought he could do it, (d) influence of the coach on recent training and performance, and (e) the suitability of the weather and track conditions. Perceived readiness best predicted cognitive anxiety (mental and physical, fatigue, effectiveness of recent training). Also, attitude toward previous performance helped to predict this. The third predictor was position goal; cognitive anxiety was positively related to the goal difficulty (Jones, Swain, & Cale, 1990).

Jones et al. (1990) also discussed perceived readiness and whether this could be altered without altering actual readiness. They studied to determine whether better athletes are more in tune with their level of readiness. Goal setting has been shown to have a positive relationship to anxiety and motivation. They warned, however, of overmotivation and setting goals that are too high.

When discussing working the body too hard it is good to consider the addicted athlete and the pro's and con's of such an attitude toward training. Anshel (1990) outlined the benefits of fitness to determine what might addict people to exercise. He defined addiction as more than 15 hours per week of participation over at least the past 20 weeks. He gave questionnaires to a group of athletes determined to be addicted ($n = 30$) and to a non-addicted group ($n = 30$). He analyzed emotions both before and after exercise, compared the average score of the addicted with those of the nonaddicted in terms of their responses on the questionnaire, and analyzed rationale for engaging in exercise by both addicted and non-addicted athletes. Increased physiological fitness levels were shown to

improve numerous psychological characteristics, such as: (a) self-esteem, (b) body-image, (c) self confidence, and (d) general health. Improved psychological outlook may be in part due to improved cardiovascular fitness (Anshel, 1990). Anshel defined exercise addiction as psychophysiological addiction to a regular regimen of exercise. It may be positive if benefit is received from the exercise. Sacks and Sachs (1981) stated that the positively addicted person controls the activity, whereas a negatively addicted exerciser is controlled by the activity .

Anshel reported Glasser's 1976 findings which declared that exercise addiction may come from a continual striving for well being. The addict experiences a state of euphoria while exercising. Anshel (1990) did not find the major contrasts that he was looking for between the addicted and the non-addicted athletes, but he was able to more clearly posit several relevant questions: What predisposes an individual to addictive behavior? What is the threshold at which positively addictive actions begin to have deleterious effect on the organism?

CHAPTER III

PROCEDURE

The present study was conducted in order to determine if certain factors reveal themselves as being related to endurance performance of swimmers, runners, cyclists, and triathletes, and to determine if specific psychological and socialpsychological variables characterize such athletes. The procedures used in this study were divided into the following areas: (a) selection of subjects, (b) instrumentation and measurement, and (c) scheduling.

Selection of Subjects

Subjects for this study were 25 male and female endurance athletes aged 18 to 34 years. Varsity letter winners from swimming (3 males, 3 females), and track (5 males, 6 females) teams comprised the collegiate athletes in the study. Additionally, a small number of category II cyclists (4 males, 0 females) and a sample group of triathletes (3 males, 1 female) who had finished in at least the top five percent of a certified Olympic distance race having over 200 participants within the past year make up the study group. Within the study group there were 14 males ($M = 22.64$ years, $SD = 5.94$) and 11 females ($M = 22.45$ years, $SD = 5.82$). Athlete responses were evaluated by gender to determine whether similarities and differences existed. Very little research had previously been done on the psychological characteristics of swimmers, and none had been found on triathletes.

Informed consent of the coaches of the University of Tennessee swim and track teams (Appendix D), and subsequently, every swimmer, runner, cyclist, and triathlete (Appendix E) was obtained. Due to time constraints on the athletes, track and swimming coaches agreed to individually distribute the questionnaires to their athletes. A sample of 25 athletes returned completed questionnaires to their coaches and participated in the study.

All athletes were contacted and received an explanation of the study and an informed consent statement (Appendix E).

Instrumentation/Measurement

The subjects responded to three questionnaires: (a) Athlete Perceptions, developed by the investigator in a preliminary study; (b) Psychological Skills Inventory for Sport (Mahoney, 1987); (c) Commitment to Sport (adapted from Carmack & Martens' CRS, 1979) The questionnaires required 10 to 20 minutes to complete.

As a part of this study, statistical reliability of .871 for the AP, .899 for the PSIS, and .918 for the CS were established based on test-retest data resulting from questionnaires given twice to a collegiate swimming class ($n = 25$). After specific question-by-question analysis of the AP reliability statistics, several questions were edited or deleted due to their lack of clarity to subjects, as indicated by the low rate of same test-retest responses on those questions.

When circumstances were not conducive to completing the questionnaires immediately. Subjects were then given complete instructions about not discussing their answers with other participants until after having completed the questionnaires. Subjects were asked to return the questionnaires to their coach's office as quickly as possible.

A survey questionnaire, Athlete Perceptions, AP, developed by the investigator and consisting of 47 questions was distributed (Appendix A). Each athlete was asked about background information which may have been related to their becoming subelite athletic participants in competitive endurance sports. The questions were demographic, socialpsychological, and psychological in nature. Some questions were open-ended; others were answered on a Likert scale. Athletes were also asked to give a list of their top racing performances in their respective sports. Through this questionnaire a great deal of previously undocumented information about endurance athletes' sociological (family,

financial) histories were determined. Socialpsychological information lead to ideas and further questions about the athletes' social relationships and psychological perspectives of themselves.

After completing the first questionnaire, athletes proceeded to the 45 item PSIS (Mahoney, 1987). This questionnaire produced ratings on anxiety, concentration, confidence, mental preparation, motivation, and team emphasis within athletes. The findings on the subelite athletes in this study were compared to those on elite athletes studied by other researchers who have used the PSIS (Schomer, 1987).

Lastly, each athlete completed a form of the 12-item Commitment to Running Scale, CRS (Carmack & Martens, 1979), which was customized to measure commitment of athletes to their particular sport (Appendix C), and referred to as the Commitment to Sport scale (CS).

Scheduling

Contacting of athletes was begun following Human Subjects Approval. Coaches were presented with the details of the study before their teams received the questionnaires. Upon obtaining the coach's permission, the 48 item AP questionnaire (Appendix A), PSIS (Appendix B), and the CS (Appendix C) were given to each endurance athlete. Data was completely compiled by the end of the Spring semester.

CHAPTER 4

RESULTS AND DISCUSSION

The present study was conducted in order to determine if certain factors reveal themselves as being related to endurance performance of swimmers, runners, cyclists, and triathletes, and to determine if specific psychological and socialpsychological, and experiential variables characterize such athletes. The study evaluated gender differences. Although it was also to evaluate the answers among athlete groups, there were not enough subjects in each sport category to assume the results would be valid.

Crosstabulations for Gender x Question using χ^2 were calculated where appropriate for the questions on the Athlete Perceptions (AP) survey, as subjects answered questions on a 5-point Likert scale. When the crosstabulation tables were evaluated in relation to the principles of applying the χ^2 statistic, none of the tables met the criteria. Therefore, in the presentation of the results and discussion, answers were grouped into positive, neutral, or negative categories, while the graphs/tables contain results of the complete response range (1 - 5). One-way ANOVA's for gender were calculated for the six factors of the Psychological Skills Inventory for Sports (PSIS) and the Commitment to Sport Scale (CS).

Following this, sections of data were analyzed across questionnaires. These analyses were used to determine whether, and to what extent, gender was associated with perceived levels of psychological ability to cope with pain, perceived differences in psychological approach to performance, differences in demographic factors, and differences in reasons for participation. Where applicable, these factors were studied in relation to particular factor scores on the PSIS.

Specifically, these topics were covered: (a) the relationship between level of commitment [CS] and specific characteristics and perceptions [AP], Subproblems 1-4, (b) relationship between the perceived use of associative techniques [AP - 17, 24, 32] and level

of Anxiety, Concentration, Confidence [PSIS], Subproblems 5, 6, (c) relationship between demographic factors and enjoyment of sport, Subproblem 7, and (d) relationship between commitment and enjoyment of sport, Subproblem 8.

Results

Questions from the AP were grouped according to the topics to which they applied: experiential, sociological, psychological, or physiological aspects. Specific question numbers noted in the text (q#_) refer to AP questions (Appendix A). PSIS and CS scores were presented textually in tables and/or figures.

Athlete Perceptions - Experiential

Age-related Experience

Results. The age at which men began to compete (q#38, Appendix A) in their sport preceded the age at which they began to excel (q#39, Appendix A) by 1.8 years (Table 2). The age at which women began to compete in their sport preceded the age at which they began to excel by 2 years (Table 2), which was almost identical to the length of time that it took men to begin to excel. However, the average woman began to compete at her sport almost 1 year before the average man did.

Since the average swimmer was excelling ($M = 11.5$, $SD = 3.01$) before most other athletes had even begun to compete in their sports, swimmers pulled the average age in each category down. The female age averages were probably affected more than the male age averages, as there were a lower percentage (21%) of male who were swimmers than female who were swimmers (27%) in the study.

As youths, 56 percent of the endurance athletes declared that they were sure that they would have chosen another sport at which to excel later in life (Table 3). Only 24

Table 2

Descriptive Statistics by Gender for Athletes Current Age and Age at which Athletes Began to Compete and Began to Excel

	Male (n=14)	Female (n=11)
Age Now*		
<i>M</i>	22.64	22.45
<i>SD</i>	5.94	5.82
Age Compete*		
<i>M</i>	14.50	13.72
<i>SD</i>	7.14	4.42
Age Excel*		
<i>M</i>	16.35	15.72
<i>SD</i>	6.68	3.19

*Age in years.

Table 3

Gender Frequency by Question 4: As a youth, the sport in which you are now involved would have been your first choice of sports at which you could excel later in life.

		strongly agree		don't know		strongly disagree	
Males	Frequency	1	2	3	5	3	
	Row Percent	7.1	14.2	21.4	35.7	21.4	
Females	Frequency	2	1	2	3	3	
	Row Percent	18.1	9.0	18.1	27.2	27.2	
Total	Frequency	3	3	5	8	6	
	Row Percent	12.0	12.0	20.0	32.0	24.0	

percent would have selected the sport in which they had reached subelite status as the sport at which they would have desired to excel later in life.

Discussion. The above findings supported Morgan & Polluck's (1977) study of subelite and elite runners. They found that none of the 27 runners indicated that they began to run due to the intrinsic appeal of running. In the present study, both genders began to compete in their sports during their teen years, and both groups began to excel within approximately 2 years of their first active participation. Apparently, it took some amount of time for these athletes to accommodate their skills to their sport. These athletes, as youth sport participants (below high school age) might also have had to deal with adjustment to adolescent changes. This might be another explanation for the females' excelling at their sport earlier than males, as females physically mature earlier than males (Martens, 1980).

Financial Background

Results. Athletes were asked to indicate whether they were raised in an upper, middle, or lower class financial background (q#45). Although subjects may or may not have known the actual income of their families, they answered as they perceived their family status to have been. This question was designed to give further clarification as to the percentage of athletes that were raised in a state of hardship (here, specifically financial hardship). Answers indicated that the majority, 88%, of the athletes were a part of the middle class, while only 8 percent of the athletes said that they had come from lower class families. Four percent came from the upper class.

Discussion. In America, participation in endurance sports does not provide financial support for any but elite athletes. Therefore, there is less probability of finding endurance athletes from lower socioeconomic levels in this country than in a country where endurance athletes are held in high esteem, provided with greater monetary reward, and are

given the opportunity to use their prowess in endurance sport to move up to higher socioeconomic levels.

Sport Experience

Results. In comparing the sport backgrounds of the male and female subjects in the study, several differences were found (q#48). Males ($n = 14$) had participated in an average of 2.4 sports other than their primary sport. Females ($n = 11$) had participated in an average of 1.9 sports other than their primary sport. Both the male and female group of subjects had competed in a collective variety of 9 sports. Males had engaged in only 1 sport that was available for females, but in which no females in the study had participated, i.e., karate. In comparison, females had competed in 4 sports available to males in which no males in the study had participated, i.e., gymnastics, tennis, rugby, and volleyball. Fourteen percent of the males and 18 percent of the females had not participated in any sport other than their primary sport. Fifty-seven percent of the males and 45 percent of the females had excelled in at least one other sport at some time in their lives. Twenty-one percent and 27% of the males and females, respectively, had excelled at more than 1 other sport (q#48).

Discussion. Of the endurance athletes in this study, almost 50 percent excelled in at least one other sport at some point in their lives. Since 56 percent (Table 3, p) of the endurance sports of these athletes would not have been their first choice, it seems that it would be pertinent to investigate why the athletes did not choose to continue participating in other sports at which they also excelled. The present study provided no information as to whether or not other sports may or could have been chosen as primary sports.

A high percentage of both genders had participated in numerous other sports. While more males had competed in more sports, the females had collectively competed in a greater variety of sports than the males. However, neither gender indicated that they excelled to a

greater extent than the other in those additional sports in which they participated. An equal percentage of males and females had not participated in any sport other than their primary endurance sport. Swimmers participated in fewer additional sports than other sport groups. This was probably due to the early age at which most swimmers began to participate in competitive swimming.

Athlete Perceptions - Physiological

Results. Seventy-six percent of the subjects believed that genetics had something to do with their athletic success (Table 4), and 76 percent felt that they had superior physiological ability to endure pain in athletic competition (Table 5). More felt that their success stemmed from psychological superiority, as indicated by the fact that 88 percent declared that they possessed superior psychological ability to endure pain (Table 6). The 12 percent difference in percentage of athletes attributing success to psychological ability, instead of physiological, was solely because of a difference in some females' perceptions. Specifically, while approximately 85 percent of the males saw themselves as superior to the average person in both psychological (Table 6) and physiological ability (Table 5) to deal with pain; a similar percentage of the females (90%) had confidence in their psychological superiority, but not as many (63%) had confidence in their physiological superiority over the average person.

Discussion. These gender differences may not be statistically significant, and they are difficult to account for, but it is evident that both genders had a great deal of confidence in their superiority over the average person based on their perception of psychological and physical abilities. Without question these endurance athletes should have been confident in their physical superiority because they had proven their physical abilities through performance. Further questions which need to be addressed for subelite endurance athletes include: (a) why are you sure of your psychological superiority, (b)

Table 4

Gender Frequency by Question 1: Your athletic ability in distance events can be attributed to genetics.

		strongly agree		don't know		strongly disagree
Males	Frequency	1	8	1	3	1
	Row Percent	7.1	57.1	7.1	21.4	7.1
Females	Frequency	2	8	0	0	1
	Row Percent	8.0	32.0	0	0	4.0
Total	Frequency	3	16	1	3	2
	Row Percent	12.0	64.0	4.0	12.0	8.0

Table 5

Gender Frequency by Question #12: You have a physiological ability to endure pain in athletic competition which is superior to the average individual's ability to do so.

		strongly agree		don't know		strongly disagree
Males	Frequency	3	9	0	0	2
	Row Percent	21.4	64.2	0	0	14.2
Females	Frequency	3	4	2	2	0
	Row Percent	27.2	36.3	18.1	18.1	0
Total	Frequency	6	13	2	2	2
	Row Percent	24.0	52.0	8.0	8.0	8.0

Table 6

Gender Frequency by Question #11: You have a psychological ability to endure pain in athletic competition which is superior to the average individual's ability to do so.

		strongly agree		don't know		strongly disagree	
Males	Frequency	6	6	1	0	1	
	Row Percent	42.8	42.8	7.1	0	7.1	
Females	Frequency	2	8	1	0	0	
	Row Percent	18.1	72.7	9.0	0	0	
Total	Frequency	8	14	2	0	1	
	Row Percent	32.0	56.0	8.0	0	4.0	

how would you think that you have have proven your superiority in the psychological realm, and (c) for females who are not confident of physical superiority - why not?

Athlete Perceptions - Sociological

Social Contributions to Youth Sport Experience

Results. Most of the athletes, 84 percent, saw their social background as one that encouraged their involvement in athletics while the 8 percent who felt that they definitely were not encouraged were females (Table 7). The other 8 percent were unsure of the contribution of their social background. Providing further evidence that the majority of athletes in the study were supported in their athletic endeavors, 92 percent felt that their family had financially supported their involvement in athletics to the best of their abilities (Table 8). Again, the remaining 8 percent were females who felt that they were not financially supported very well.

Athletes were not asked to give specifics, but 68 percent felt that they had undergone some type of hardship in their background which, in turn, increased their endurance sport abilities later in life (Table 9). Only 20 percent were sure that they did not undergo any type of hardship which contributed to their endurance sport abilities. Twelve percent were unsure about the contribution of hardship to their athletic successes.

Most of the athletes in this study (85%) did not appear to be dissatisfied with their upbringing, at least not in relation to their participation in sports. Although, at some point or another, 76 percent of the athletes had felt driven to excel in their endurance sport by people around them, 24 percent indicated that they were not driven (Table 10). Apparently, athletes were pleased that they had been driven, as 83 percent indicated that they were glad that they were, or wished that they had been driven, while 13 percent were unsure about what they wanted, and only 4 percent wished they had not been driven (Table 11).

Table 7

Gender Frequency by Question 2: Your social background encouraged your involvement in athletics.

		strongly agree		don't know		strongly disagree
Males	Frequency	5	7	2	0	0
	Row Percent	35.7	50.0	14.2	0	0
Females	Frequency	4	5	0	2	0
	Row Percent	36.3	45.4	0	18.1	0
Total	Frequency	9	12	2	2	0
	Row Percent	36.0	48.0	8.0	8.0	0

Table 8

Gender Frequency by Question 3: Your family has financially supported your involvement in athletics to the best of their abilities.

		strongly agree		don't know		strongly disagree
Males	Frequency	7	7	0	0	0
	Row Percent	50.0	50.0	0	0	0
Females	Frequency	7	2	0	2	0
	Row Percent	63.6	18.1	0	18.1	0
Total	Frequency	14	9	0	2	0
	Row Percent	56.0	36.0	0	0	0

Table 9

Gender Frequency by Question 5: You are mentally tougher than the average individual because you had to endure a hard background.

		strongly agree		don't know		strongly disagree	
Males	Frequency	4	6	1	2	1	
	Row Percent	28.5	42.8	7.1	14.2	7.1	
Females	Frequency	3	4	1	2	1	
	Row Percent	27.2	36.3	9.0	18.1	9.0	
Total	Frequency	7	10	2	4	2	
	Row Percent	28.0	40.0	8.0	16.0	8.0	

Table 10

Gender Frequency by Question 9: You have been driven to excel in your sport by people around you.

		strongly agree		don't know		strongly disagree	
Males	Frequency	3	7	0	4	0	
	Row Percent	21.4	50.0	0	28.5	0	
Females	Frequency	3	6	0	2	0	
	Row Percent	27.2	54.5	0	18.1	0	
Total	Frequency	6	13	0	6	0	
	Row Percent	24.0	52.0	0	24.0	0	

Table 11

Gender Frequency by Question 10: You wish you had not been driven to excel by anyone.

		strongly agree		don't know		strongly disagree	
Males	Frequency	0	0	2	4	7	
	Row Percent	0	0	15.3	30.7	53.8	
Females	Frequency	1	0	1	4	5	
	Row Percent	9.0	0	9.0	36.3	45.4	
Total	Frequency	1	0	3	8	12	
	Row Percent	4.1	0	12.5	33.3	50.0	

Crosstabulations were run on the two questions assessing athlete perceptions on being driven, and it was found that though 76 percent of males were driven, 100 percent indicated that they desired to be driven (Table 12). Sixty-six percent of those who were not driven were unsure whether or not they desired to have been driven. Though 82 percent of the females indicated that they had been driven, a slightly lower percentage (82%) than that of the males indicated that they they wished they had been driven. However, the 18 percent of the females that were not driven wished that they had been. A total of 79 percent of the endurance athletes had been driven to excel, while 88 percent desired to have been driven.

Discussion. This data may support the theory (Ryan, 1976) that endurance ability may be developed through becoming socialized to persist through pain. That is, Ryan (1976) suggested that individuals perform according to what their social environment expects or demands of them. Many of the athletes in this study indicated that they had been driven. Therefore, it is probable that high expectations were placed upon them by others. Athletes seemed to believe that being driven contributed to their athletic development. In light of the fact that all of the athletes in this study had excelled in their sport, and most of the athletes indicated that they were driven, it is possible that a relationship exists between being driven and excelling.

Role Models

Results. There was a gender difference in rank order of primary role models (Table 13). The father was identified as a role model by 57 percent of the male athletes. The only other role models to receive mention by over 30 percent of males were coaches (35%). In contrast, only 27 percent of females identified their father as a significant role model, while 63 percent identified their coach. The coach was the only figure to be selected by over 30 percent of the female endurance athletes. Females identified their

Table 12

Frequency of Question 9 (You have been driven to excel in your sport by people around you) by Question 10 (You wish you had not been driven to excel by anyone).

<u>Answer to Question 10:</u>		strongly agree		don't know		strongly disagree	Total
<u>Answer to Question 9:</u>							
strongly agree	Frequency	0	0	1	3	2	6
	Row Percent	0	0	4.2	12.5	8.3	25.0
agree	Frequency	1	0	0	4	8	13
	Row Percent	4.2	0	0	16.7	33.3	54.2
don't know	Frequency	0	0	0	0	0	0
	Row Percent	0	0	0	0	0	0
disagree	Frequency	0	0	2	1	2	5
	Row Percent	0	0	8.3	4.2	8.3	20.8
strongly disagree	Frequency	0	0	0	0	0	0
	Row Percent	0	0	0	0	0	0
Total							
	Frequency	1	0	3	8	5	24
	Row Percent	4.2	0	12.5	33.3	50.0	100.0

Table 13

Role Model Attribution

	Percentage of Responses		
	Male (n=14)	Female (n=11)	Combined
Father	57%	27%	44%
Mother	21%	27%	24%
Brother	7%	27%	27%
Sister	0%	9%	4%
Coach	35%	63%	48%
Peer	7%	0%	4%

Note. Several responded with more than one answer.

mother (27%) as frequently as they did their father (27%). Twenty seven percent of the female endurance athletes also selected their brother as a role model, while only one female chose her sister. In addition, neither male nor female subjects selected a sports star as a primary role model. Others recognized by males as role models included: brothers (7%), mothers (21%), and peers (7%). When those chosen as primary role models were placed in rank order by gender categories, male endurance athletes chose father, coach, mother, brother, peer, while females chose coach, father, mother, brother, and sister, in order.

In identifying those who served as role models, 48 percent of the total group of endurance athletes indicated that a coach had played a major role at some point in their lives. Fathers were the second most influential individuals in the lives of the total group of endurance athletes, as 44 percent named their father as the primary role model.

Discussion. The data revealed that only a low percentage of the female endurance athletes selected their fathers as primary role models. When Lewko and Ewing (1980) gave questionnaires to 370 elementary-age sport participants and found that fathers were the most frequently selected role models by both genders, with girls having the higher *SD*. Lewko and Ewing (1980) did study a different age group with different sport orientation from the subelite athletes in this study. But it is quite possible that female athletes are more likely to be influenced by different individuals as they grow older. Maybe fathers tend to be less likely to encourage their daughters to vigorously participate in sport as girls age. Boys become socialized into sport to a greater extent as they age, while girls become socialized into sport to a lesser extent as they age (Saegert & Hart, 1977).

The fact that no athletes selected sport stars as role models may suggest something about the lack of publicity and media coverage enjoyed by elite endurance athletes in America. This phenomena is possibly due to the lack of revenue which endurance sports bring when they are covered. Endurance athletes from European and African countries

may achieve status far beyond that which American endurance athletes can ever obtain (Moore, 1990).

Other Factors

Results. Sixty-two percent indicated that they competed in their sport, at least partially, for health related reasons (Table 14). In addition, 100 percent either planned to continue, or already were continuing, to stay fit after college (Table 15).

Discussion. Numerous studies have shown elite athletes as being predisposed to being both physically and mentally healthier than non-elites (Durschi & Weiss, 1984; Jones, Swain, & Cale, 1990; Mahoney & Avenier, 1977; Mahoney & Gabriel, 1987; Martin et al. 1984; Mehrabian & Bekken, 1986; Pate et al., 1980; Schomer, 1986; Silva & Applebaum, 1989). The hypothesis was that the same should hold true for subelites. This study indicated: (a) that subelite athletes compete, although not to a great extent, for the sake of health; and (b) that they all planned, whether forced or not, to stay in condition in the future.

Athlete Perceptions - Psychological

Participation Motivation

Results. As youths 43 percent of the males and 18 percent of the females participated in their primary sport, at least partially, to escape from other areas of their lives (Table 16). In addition, 80 percent currently perceived their sport participation, at least partially, as an escape (Table 17). All of the endurance sport male athletes (100%) felt that sport was currently an escape for them, while only 54 percent of the females suggested that their endurance sport was an escape.

When asked why they chose to continue competing in their endurance sport (q#43), 76 percent indicated that enjoyment of the sport kept them involved; 16 percent continued

Table 14

Gender Frequency by Question #28: You compete for the sake of health.

		strongly agree		don't know		strongly disagree	
Males	Frequency	0	9	1	3	1	
	Row Percent	0	69.2	7.6	15.3	7.6	
Females	Frequency	2	4	0	2	3	
	Row Percent	18.1	36.3	0	18.1	27.2	
Total	Frequency	2	13	1	4	4	
	Row Percent	8.3	54.1	4.1	16.6	16.6	

Table 15

Gender Frequency by Question #29: You will continue to stay in shape after college.

		strongly agree		don't know		strongly disagree	
Males	Frequency	10	2	0	0	0	
	Row Percent	83.3	16.6	0	0	0	
Females	Frequency	8	3	0	0	0	
	Row Percent	72.7	27.2	0	0	0	
Total	Frequency	18	5	0	0	0	
	Row Percent	78.2	21.7	0	0	0	

Table 16

Gender Frequency by Question #6: At a young age, you participated in sports, at least partially, to escape from other areas of your life.

		strongly agree		don't know		strongly disagree	
Males	Frequency	3	3	1	5	2	
	Row Percent	21.4	21.4	7.1	35.7	14.2	
Females	Frequency	0	2	0	6	3	
	Row Percent	0	18.1	0	54.5	27.7	
Total	Frequency	3	5	1	11	5	
	Row Percent	12.0	20.0	4.0	44.0	20.0	

Table 17

Gender Frequency by Question #7: You currently see your sport, at least partially, as an escape.

		strongly agree		don't know		strongly disagree	
Males	Frequency	3	11	0	0	0	
	Row Percent	21.4	78.5	0	0	0	
Females	Frequency	0	6	1	2	2	
	Row Percent	0	54.5	9.0	18.1	18.1	
Total	Frequency	3	17	1	2	2	
	Row Percent	12.0	68.0	4.0	8.0	8.0	

because of a quest or love for success; 8 percent continued because they felt driven to do so. Over 90 percent of these endurance sport athletes saw themselves as highly motivated (Table 18) and were committed (Table 19) to doing well in their sport. One hundred percent indicated that they were intrinsically motivated for sport (Table 20), and 67 percent said that they performed only to satisfy themselves (Table 21). Almost all, 87 percent, indicated that they participated in athletics for reasons other than personal recognition (Table 22).

Thirty-seven percent declared that they had always had an intense love for their endurance sport (Table 23). Only 16 percent frequently felt tired of participating in their sport (Table 24). Fifty percent saw themselves as addicted to their endurance sport, 17% strongly so (Table 25). And only 17 percent strongly believed that they were not addicted.

Discussion. The number of athletes who presently perceived their sport as an escape was 48 percent greater than the percentage of those who responded that escape was a motive for youth sport participation [definition of *youth sport* was left to the participants]. This difference in the adult and youth perspectives supported the premise of Gould & Horn (1984) who stated that sports were primarily fun for young athletes while they became increasingly more utilitarian with age.

Morgan and Polluck (1977) found that no one in a group of 27 subelite and elite runners began to run due to the intrinsic appeal of running. However, a majority of the athletes in this study stated that they always enjoyed their sport and were intrinsically motivated to continue participating. The finding that such a high percentage of endurance athletes considered themselves to be highly motivated was similar to the findings of Durtschi and Weiss (1984) who compared elite to nonelite marathon runners.

It was difficult to judge whether or not these athletes would perceive their addiction as positive or negative, but addiction did not have much affect on the intensity with which

Table 18

Gender Frequency by Question #30: You are a highly motivated athlete.

		strongly agree		don't know		strongly disagree
Males	Frequency	7	5	1	0	0
	Row Percent	53.8	38.4	7.6	0	0
Females	Frequency	4	6	0	1	0
	Row Percent	36.3	54.5	0	9.0	0
Total	Frequency	11	11	1	1	0
	Row Percent	45.8	45.8	4.1	4.1	0

Table 19

Gender Frequency by Question #31: You are a highly committed athlete.

		strongly agree		don't know		strongly disagree
Males	Frequency	6	6	1	0	0
	Row Percent	25.0	25.0	4.1	0	0
Females	Frequency	8	2	0	1	0
	Row Percent	72.7	18.1	0	9.0	0
Total	Frequency	14	8	1	1	0
	Row Percent	58.3	33.3	4.1	4.1	0

Table 20

Gender Frequency by Question #8: Your motivation to participate in sports comes from within yourself.

		strongly agree		don't know		strongly disagree	
Males	Frequency	7	7	0	0	0	
	Row Percent	50.0	50.0	0	0	0	
Females	Frequency	7	4	0	0	0	
	Row Percent	63.6	36.3	0	0	0	
Total	Frequency	14	11	0	0	0	
	Row Percent	56.0	44.0	0	0	0	

Table 21

Gender Frequency by Question #20: Your reasons for participating in athletics are intrinsic, rather than extrinsic; i.e. you perform only to satisfy yourself.

		strongly agree		don't know		strongly disagree	
Males	Frequency	2	7	1	3	0	
	Row Percent	15.3	53.8	7.6	23.0	0	
Females	Frequency	1	6	0	3	1	
	Row Percent	9.0	54.5	0	27.2	9.0	
Total	Frequency	3	13	1	6	1	
	Row Percent	12.5	54.7	4.1	25.0	4.1	

Table 22

Gender Frequency by Question #21: You participate in athletics primarily for the purpose of recognition.

		strongly agree		don't know		strongly disagree	
Males	Frequency	0	0	2	9	2	
	Row Percent	0	0	15.3	69.2	15.3	
Females	Frequency	0	1	0	7	3	
	Row Percent	0	9.0	0	63.6	27.2	
Total	Frequency	0	1	2	16	5	
	Row Percent	0	4.1	8.3	66.6	20.8	

Table 23

Gender Frequency by Question #26: You have always had an intense love for your endurance sport.

		strongly agree		don't know		strongly disagree
Males	Frequency	0	5	1	7	0
	Row Percent	0	38.4	7.6	53.8	0
Females	Frequency	0	4	0	4	3
	Row Percent	0	36.3	0	36.3	27.2
Total	Frequency	0	9	1	11	3
	Row Percent	0	37.5	4.1	45.8	12.5

Table 24

Gender Frequency by Question #19: You often feel tired of participating in your sport.

		strongly agree		don't know		strongly disagree
Males	Frequency	1	1	1	7	3
	Row Percent	7.6	7.6	7.6	53.8	23.0
Females	Frequency	0	2	2	6	1
	Row Percent	0	18.1	18.1	54.5	9.0
Total	Frequency	1	3	3	13	4
	Row Percent	4.1	12.5	12.5	54.1	16.6

Table 25

Gender Frequency by Question #25: You are addicted to your endurance sport.

		strongly agree		don't know		strongly disagree	
Males	Frequency	2	5	1	3	2	
	Row Percent	15.3	38.4	7.6	23.0	15.3	
Females	Frequency	2	3	1	3	2	
	Row Percent	18.1	27.2	9.0	27.2	18.1	
Total	Frequency	4	8	2	6	4	
	Row Percent	16.6	33.3	8.3	25.0	16.6	

the athletes enjoyed their sport, as indicated by the fact that over 90 percent of the athletes ranked enjoyment as their main reason for continuing to participate in their sport.

Perceptions

Results. Twenty-five percent believed that they were elite athletes, while 37 percent perceived themselves as somewhat elite, subelite (Table 26). Both genders indicated similar perceptions, with slightly fewer males indicating belief in their eliteness. More than 90% of the males in the study said that they were usually in a good mood (Table 27).

Discussion. It was expected that a higher percentage of the subelite athletes would have seen themselves as elite; however, there was the possibility that a response that indicated that an athlete did not strongly agree that he or she was elite was not always meant to indicate that the athlete did not perceive him or herself to be subelite.

Morgan and Polluck (1977) found that the moods of elite athletes tended to be better than those of lesser skilled individuals. Although the endurance athletes in the present study indicated usually positive moods, the mood state of the subelite athletes were not compared to other levels of endurance athletes. A study of only one specific group of athletes, which only asked one question to determine actual mood state, cannot reveal a pertinent amount of information. This area is important to study further.

Ability to Deal with Pain (A)

Results. Almost 80 percent of the athletes indicated that they enjoyed the pain involved with the challenge of pushing the wall of their physical limits. Only 4 percent were unsure about whether or not they enjoyed it, and 16 percent did not enjoy it (Table 28).

Thirty-eight percent of the males said that during competition the pain was often too great to think about, but only 9 percent of females said the same. This was only 25 percent

Table 26

Gender Frequency by Question #27: You are an elite athlete.

		strongly agree		don't know		strongly disagree
Males	Frequency	4	4	2	2	1
	Row Percent	30.7	30.7	15.3	15.3	17.6
Females	Frequency	2	5	1	3	0
	Row Percent	18.1	45.4	9.0	27.2	0
Total	Frequency	6	9	3	5	1
	Row Percent	25.0	37.5	12.5	20.8	4.1

Table 27

Gender Frequency by Question #22: You are usually in a good mood.

		strongly agree		don't know		strongly disagree
Males	Frequency	1	11	1	0	0
	Row Percent	7.6	84.6	7.6	0	0
Females	Frequency	4	6	0	1	0
	Row Percent	36.3	54.5	0	9.0	0
Total	Frequency	5	17	1	1	0
	Row Percent	20.8	70.8	4.1	4.1	0

Table 28

Gender Frequency by Question #17: You enjoy the pain involved with pushing "the wall" of your physical limits.

		strongly agree		don't know		strongly disagree
Males	Frequency	3	9	0	1	0
	Row Percent	23.0	69.2	0	7.6	0
Females	Frequency	1	6	1	2	1
	Row Percent	9.0	54.5	9.0	18.1	9.0
Total	Frequency	4	15	1	3	1
	Row Percent	16.6	62.5	4.1	12.5	4.1

of the whole group of endurance athletes (Table 29). Sixty-seven percent of the whole group said that the pain never reached a level of intensity which was too great for them to think about, while 8 percent were unsure about their level of pain perception. Also, 69 percent of the males and 91 percent of the females said that during competition, they could limit their perception of pain (Table 30). The 21 percent gender difference was difficult to explain in light of the fact that males perceived themselves to be higher in ability to endure the pain (Table 31).

Crosstabulations were run on these two questions dealing with pain perception. It was found that of the 69 percent of males that felt that they could limit their perception of pain, 44 percent felt that pain during competition often became too great to think about, while 56 percent did not perceive the pain as becoming so great. Of the 15 percent who were unsure about their ability to limit pain perception, 50 percent saw the pain as sometimes becoming too great, and the other 50 percent did not see it as such. The 15 percent who could not limit pain perception did not see pain as becoming too great to think about.

Of the 91 percent of females who felt that they could limit pain perception, only 10 percent felt that pain often became too great to think about; 14 percent were unsure about their perception of pain intensity, and 66 percent did not believe that pain ever became too great to think about. The female (9%) who was unsure of her ability to perceive pain did not see it as becoming too intense to think about during competition.

Discussion. Females seemed to be more accurately aware of their ability to deal with pain than males, and they seemed more confident in their ability to deal with pain. If able to limit their perception of pain, the endurance athletes should have been able to endure more pain. However, Mahoney (1987) revealed that athletes who used associative tactics did not attempt to limit their perception of pain. Rather, they monitored the pain and were

Table 29

Gender Frequency by Question #32: During competition the pain is often too great to think about.

		strongly agree		don't know		strongly disagree	
Males	Frequency	2	3	0	3	5	
	Row Percent	15.3	23.0	0	23.0	38.4	
Females	Frequency	0	1	2	7	1	
	Row Percent	0	9.0	18.1	63.6	9.0	
Total	Frequency	2	4	2	10	6	
	Row Percent	8.3	16.6	8.3	41.6	25.0	

Table 30

Gender Frequency by Question #23: During competition, you can limit your perception of pain.

		strongly agree		don't know		strongly disagree
Males	Frequency	0	9	2	1	1
	Row Percent	0	69.2	15.3	7.6	7.6
Females	Frequency	2	8	1	0	0
	Row Percent	18.1	72.7	9.0	0	0
Total	Frequency	2	17	3	1	1
	Row Percent	8.3	70.8	12.5	4.1	4.1

Table 31

Gender Frequency by Question #14: You endure more pain during athletic competition than the average individual is able to endure.

		strongly agree		don't know		strongly disagree
Males	Frequency	4	7	1	0	2
	Row Percent	28.5	50.0	7.1	0	14.2
Females	Frequency	2	3	4	2	0
	Row Percent	18.1	27.2	36.3	18.1	0
Total	Frequency	6	10	5	2	2
	Row Percent	24	40	20	8	8

more readily able to gauge the amount that they should have given at different points in the race (Mahoney 1987).

Ryan (1976) asserted that differences in the endurance athletes' perception of pain would draw them toward the grueling type of sport in which they participated. The data from the study of Martin et al. (1984) indicated that highly trained elite runners had a $\dot{V}_{E\max}$ considerably closer to their MVV (>85%) than that of the typical control group (<70%). This implies that the athletes participating in the study of Martin et al. (1984) could endure levels of activity closer to body output maximum than the levels that the control group in their study could endure. Ryan (1976) asserted that perception of the pain associated with running accounted for the difference in the level of activity that the body could endure.

Ability to Deal with Pain (B)

Results. Eighty-eight percent of the subjects felt that they had superior psychological ability to endure pain in athletic competition (Table 6, p.49). Less (76%) felt the same about their superior physiological ability (Table 5, p.48). Both genders indicated that they firmly believed in their capacity to push the edge of their physical abilities. However, male athletes (93%) indicated that they enjoyed the pain involved with pushing "the wall" of their physical limits, while only 63 percent of the female endurance athletes indicated that they enjoyed it.

When asked if they were capable of enduring more pain during athletic competition than the average individual was able to endure, 78 percent of the males responded that they were able to do so. In contrast, 44 percent of the females felt either unsure about their ability or unable to endure more than the average person (Table 31, p.72). However, 92 percent of the total group felt that they experienced more pain during athletic competition than the average individual was willing to endure (Table 32).

Table 32

Gender Frequency by Question #15: You experience more pain during athletic competition than the average individual os willing to endure.

		strongly agree		don't know		strongly disagree
Males	Frequency	10	3	1	0	0
	Row Percent	71.4	21.4	7.1	0	0
Females	Frequency	5	5	1	0	0
	Row Percent	45.4	45.4	9.0	0	0
Total	Frequency	15	8	2	0	0
	Row Percent	60	32	8	0	0

Discussion. Athletes were more confident in their strong wills than in their physical abilities. Will power is a more elusive concept than physical ability. Thus, it would seem that athletes would have higher confidence in the more tangible physical element of their performance. But, they did not, as indicated by the answers given in response to questions 14 and 15 (Tables 31 and 32).

Evidence of physiological superiority has been presented (Wickelgren, 1988; Martin et al., 1984), but Drake (1990) and Weinburg (1985) declared that psychological skill in endurance could increase the muscle capacity to sustain, as well. The real point of interest for this study was the extent to which endurance athletes perceived psychological strength to affect their performance. The subelite athletes in this study gave as much credit to their psychological strength as they did their physiological ability. Almost every one of the subjects perceived their superiority as coming from both the physiological elements beyond their control *and* the psychological elements very much within their control. And, 79 percent of these athletes felt like they could limit their perception of pain, which would essentially translate into a manifestation of psychological superiority.

Successful athletes tend to possess more desirable mental health profiles than do unsuccessful athletes (Morgan, 1985). Further research in this area might provide the evidence necessary to delineate manifestations of psychological superiority. Currently, elite athletes are so defined because they have reached a particular performance level. Often, reaching this level is fully attributed to the physiological ability of the athletes. Athletic skill is usually evaluated by performing well in a race or hitting and catching a ball well, and it is not usually attributed to a higher level of psychological strength or motor control. If such characteristics of psychological ability are defined, those predisposed to be mentally elite in athletic competition could be identified at early ages. It has been shown that elite endurance athletes almost invariably evidenced superior physiological ability along with superior psychological ability and an affinity to cope with pain (Martin et al., 1984).

We easily measure how a child performs in comparison to his or her peers simply based on how well he or she completes motor skills in relation to peers (if a child does a skill better than most, he or she is considered to be physiologically highly skilled), but it has never been easy to see beyond physiological aspects in defining why the child achieves at a high level. It may be possible that high levels of confidence and mental health found in collegiate runners and swimmers were acquired due to athletes' experiences at early ages (Morgan, 1985). Possibly, follow up research on this work could form a standard from which psychological ability in sport participation might be evaluated.

Psychological Characteristics

Results. During competition, 100% of male endurance athletes thought about nothing other than the race in which they were involved (Table 33). The male endurance athletes indicated that they associated; so did most of the females (82%). But 18 percent of the females indicated that they thought about things to get their minds off of the race; in other words, they disassociated.

Endurance athletes in this study attributed success at enduring pain (q#42) in sport to two major categories: (a) concentration (44%), and (b) drive (28%). Males (50%) and females (36%) alike saw concentration as the major element contributing to their endurance performance. Second ranked for both genders (males, 35%; females, 26%) was drive which came from either internal or external sources. Just under 70 percent of these endurance athletes attributed success to the two areas listed above. Both of the areas had to do with mental confidence. Other athletes attributed their skill to such elements as: (a) positive influence of others on their lives (12%), (b) mental toughness (4%), and (c) genetics (4%).

Discussion. No research was discovered which showed a gender difference in associative characteristics. The present research found some difference, although it was

Table 33

Gender Frequency by Question #24: You usually think about anything but the race in which you are involved.

		strongly agree		don't know	strongly disagree	
Males	Frequency	0	0	0	7	6
	Row Percent	0	0	0	53.8	46.1
Females	Frequency	1	1	0	5	4
	Row Percent	9.0	9.0	0	45.4	36.3
Total	Frequency	1	1	0	12	10
	Row Percent	4.1	4.1	0	50.0	41.6

not tested statistically. The fact that such a high percentage of the athletes attributed their success to mental confidence seemed to indicate that confidence in ability to endure may affect actual ability to endure. It was interesting that such a low number of athletes attributed success to genetics, especially in light of the fact that 76 percent indicated that genetics had something to do with their athletic success (Table 3, p.44). Merely the fact that athletes had such a high regard for mental confidence may have contributed to the level of importance.

Personal Record

Results. Athletes were asked to describe how they felt while competing during their best performances in comparison to how they usually felt when competing (q#46). The open-ended responses of the athletes were grouped into five general categories: (a) lower fatigue than usual; (b) more mental control over physical output; (c) euphoria, ease of concentration; (d) mental confidence, conditioned and focused; and (e) feeling above the pain and better than others. Males and females responded almost identically. Most athletes (36%) described an unusual feeling of ease. Only one athlete described the lower level of fatigue.

A comparison of gender showed that 42 percent of the males and 27 percent of the females described the unusual sense of ease. Twenty-seven percent of the females described the state of mental confidence while 21 percent of the males described this. A feeling of being above the pain was discussed by 21 percent of the males and 18 percent of the females. Fourteen percent of the males and 18 percent of the females indicated feeling more mental control over physical output.

Discussion. Different external factors for different athletes contributed to creating situations in which these feelings of mental ease and confidence took place. Most of what these athletes described about the unusual sense of ease, they could not be coached to feel;

however, they also described a state of mental conditioning, which could be facilitated by the coach. In the same sense that athletes are physically prepared for a race, the coach could facilitate or enhance mental preparation.

When asked in what way(s) their best performances felt different than their usual performances, athletes indicated that in their best performances they felt focused and stronger than those whom they were competing against. They said that, for some reason, they knew that their bodies would respond when they asked more of them than they ever had before. The pain did not have the fatiguing effect on the body that it usually did. Of course, to some degree, this could be attributed to the fact that athletes were in their best condition at the time of their best performances, but there may be more to it than that. There is a mental strength component that currently cannot be accurately pinpointed. It is not quantitatively analyzable other than by asking athletes about their perceptions of how much affect it has.

This study indicated that subelite athletes believed that being mentally tough was as important as being physically conditioned. Studies have proven that endurance athletes can be trained to mentally perform in the same ways that they can be trained to physically perform (Schomer, 1987). If subelite endurance athletes attributed their success to strength in both mental and physical realms, then it is important that young athletes in these sports are trained in both of the areas.

Most coaches would take a young endurance athlete and simply try to train him or her physically and hope for the best in mental development. That is all that most practitioners know. But, as much as anything, this young athlete needs to learn to focus and to relax at the right times and to mentally engage in competition throughout the race. No athlete or coach will deny that having the mental edge over opponents makes a huge difference in athlete performance. This study did not expand or retest that concept, but it did document the importance of being mentally strong and competitive. It indicated the

need to train athletes in that realm by proving the importance of the mental aspect of endurance sports.

Psychological Skills Inventory for Sports

Results. Descriptive statistics (Table 34) and a one-way ANOVA for gender differences were calculated on the six factors of the Psychological Skills Inventory for Sports, PSIS (Mahoney et al., 1987). The analysis of the data indicated significant ($p < .05$) gender differences for two factors of the PSIS, i.e., Team Emphasis ($F_{1, 23} = 10.19$, $p = .004$), and Anxiety ($F_{1, 23} = 4.74$, $p = .040$). There were no significant gender differences on the other factors of the PSIS: (a) Concentration ($F_{1, 23} = 2.00$, $p = .170$), (b) Confidence ($F_{1, 23} = 1.39$, $p = .250$), (c) Mental Preparation ($F_{1, 23} = 0.01$, $p = .939$), and (d) Motivation ($F_{1, 23} = 0.65$, $p = .429$).

Results indicated that males scored at a significantly higher percentile ($p = .04$) than females on the anxiety factor (Figure 1). In contrast, females scored at a significantly higher percentile ($p = .004$) than males on team emphasis (Figure 2).

Discussion. In the study of Mahoney et al. (1987) elite athletes from 17 sports, compared to nonelite athletes, reported less anxiety, better concentration, more self-confidence, and higher motivation. There was little difference between the preelite and the elite athletes.

In the present study, the subelite endurance athletes scored similarly to Mahoney's elite athletes. The same patterns were revealed in terms of anxiety, concentration, and confidence scores, but there were no significant gender differences in those factor scores. Possibly, the reason that no significant differences were found in this study may be the small size of the sample group.

Mahoney et al. (1987) indicated that individual sport athletes reported more problems with anxiety and confidence and different mental habits than team sport

Table 34

Descriptive Statistics for Gender - PSIS

	Male (<i>n</i> =14)	Female (<i>n</i> =11)
Anxiety		
<i>M</i>	.651	.563
<i>SD</i>	.080	.121
Concentration		
<i>M</i>	.618	.545
<i>SD</i>	.146	.102
Confidence		
<i>M</i>	.665	.564
<i>SD</i>	.224	.196
Mental Preparation		
<i>M</i>	.478	.474
<i>SD</i>	.136	.158
Team Emphasis		
<i>M</i>	.596	.700
<i>SD</i>	.084	.075
Motivation		
<i>M</i>	.538	.493
<i>SD</i>	.160	.103

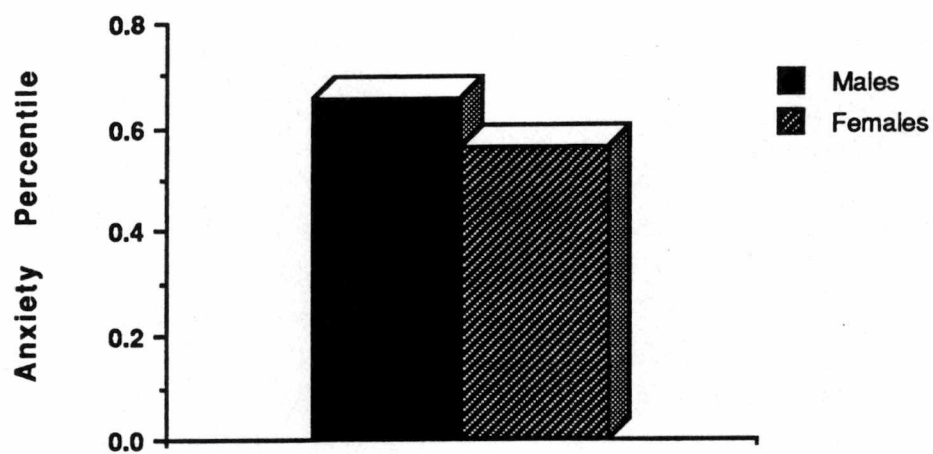


Figure 1. Gender difference for anxiety score on the PSIS.

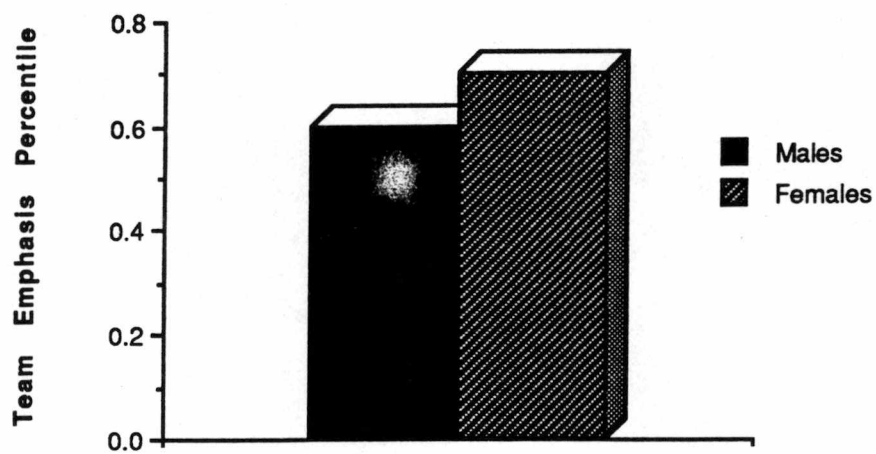


Figure 2. Gender difference for team emphasis score on the PSIS.

participants. All of the athletes in the present study were individual sport athletes, but they scored between .545 and .665 on these PSIS factors. These scores were high in comparison to those that Mahoney (1987) found within individual sport subelite athletes. The significant gender differences in anxiety and team emphasis were not found by Mahoney et al. (1987).

Commitment to Sport

Results. The one-way ANOVA run on the Commitment to Sport (CS) scale did not reveal any significant gender difference ($F_{1, 23} = 0.59, p = .452$). Males ($M = 51.07, SD = 7.79$) and females ($M = 49.00, SD = 5.00$) both evidenced a degree of commitment (Figure 3) to their sport equal to that which elite athletes tend to indicate (Carmack & Martens, 1979).

Discussion. Carmack and Martens (1979) did not find the level of perceived addiction to be significantly different between genders. But, they did find male CS scores to be significantly better than those of females, $F(1, 313) = 8.24, p < .005$. (male, $M = 48.3, SD = 6.3$; and female, $M = 45.7, SD = 7.1$). Carmack and Martens (1979) did not expect to find this difference, but they suggested that the difference could have been due to the significant difference in total running experience for the sample of males and females, $F(1, 309) = 44.99, p < .001$. Males averaged almost 5 years more experience than the females.

In the present study there was very little difference in CS scores between genders, and there was little difference in the number of years of experience between males and females. The lack of this difference would support the hypothesis of Carmack & Martens (1979). Both genders in the present study scored higher in commitment ratings than any subgroup, even Olympic development athletes, did in the study of Carmack and Martens

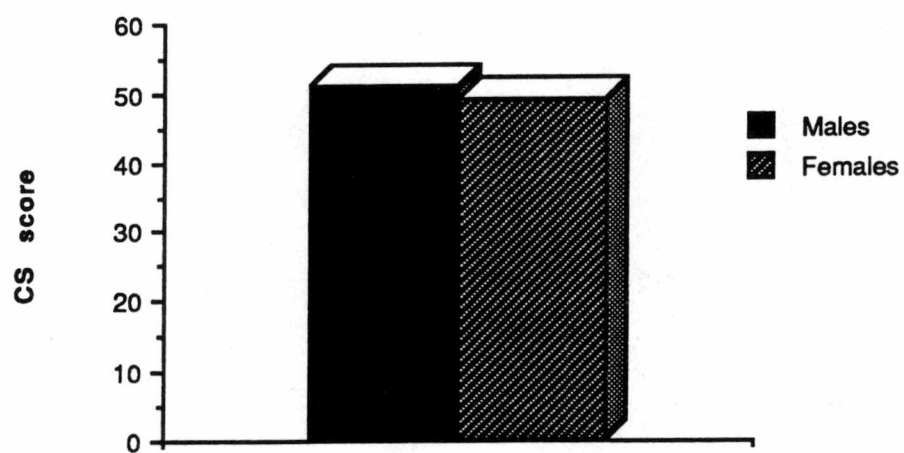


Figure 3. Commitment score by gender.

(1979). Perceived addiction to sport was almost identical to the findings of Carmack and Martens (1979).

Differences Between Perceived Associative Style and Level of Anxiety, Concentration, and Confidence as Identified in the PSIS

Specific Question Analysis

Results. The subproblem evaluated in this section identified which of the athletes in the study could be characterized as consistently using associative techniques (according to intrapersonal perception), and, conversely, which could be characterized as using dissociative techniques. Three questions (#17,24,32) from the AP were evaluated as to their identification of associative characteristics. Answering at least 2 of the 3 questions as associative was determined to identify an athlete as such. Over 90 percent of the athletes identified themselves as engaging in associative techniques. Fifty-four percent of the 91 percent answered all 3 of the questions associatively (Figure 4). The 9 percent that did not so characterize themselves were females.

Specifically, athletes were assessed as to whether they enjoyed confronting the pain involved with endurance sports, whether they thought strategically, and whether the pain often became too great to think about during endurance competition. Enjoyment of confronting the pain, thinking strategically, and pain not often becoming too great to think about were characteristics identifying association; the opposites identified disassociation.

One dissociative athlete indicated that she enjoyed the pain associated with her sport; the other did not. Eighty-three percent of the associative athletes enjoyed the pain; 4 percent were unsure whether or not they did, and 13 percent stated that they did not enjoy it. One dissociative athlete thought about something besides the race in which she was involved during competition; the other did not. Ninety-six percent of associative athletes thought about the race, while 4 percent thought about other things. One of the dissociative

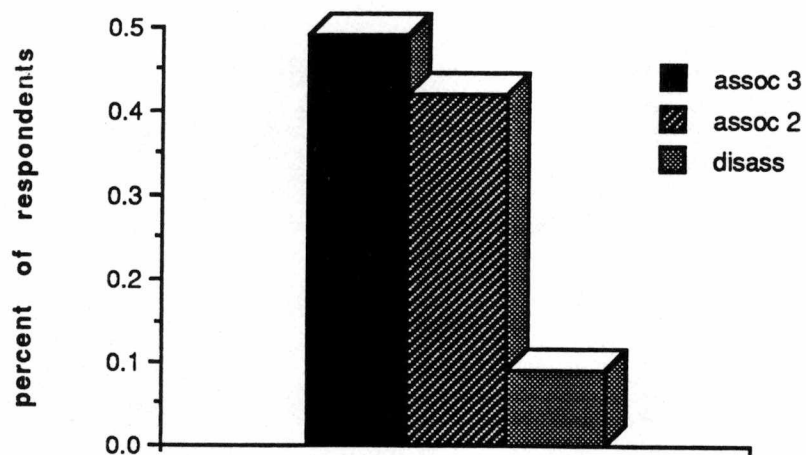


Figure 4. Level of association/dissociation

athletes was unsure about whether or not the physical pain while racing was too great to think about; the other did not think that the pain was too great to think about. Associative athletes did not respond wholly as would be expected as indicated by the fact that 27 percent said that the pain was too great to think about during competition; 4 percent were unsure about the magnitude of the pain, and 69 percent thought that pain never reached such magnitude during competition (Table 35).

Gender x Associative Style

Results. Individual PSIS scores were compared to the average score for the subelite athletes within this study in each of the categories. A Two-way, Gender x Associative Style, ANOVA for the three PSIS factors, i.e., Anxiety, Concentration, and Confidence, was calculated. Athletes were rated as either above or below the 50th percentile in each category and given either a high or low composite rating. It was hypothesized that those with high composite scores would be more likely to be associative due to the fact that associative characteristics should parallel lower anxiety and increase confidence and concentration (Mahoney et al., 1987).

Specifically, associative males scored significantly higher ($F_{1, 23} = 4.98, p = .036$) than dissociative females in anxiety. Concentration and confidence scores followed the same patterns as would be expected, but there were not significant differences in associative styles ($p > .05$). There were no males who characterized themselves as dissociative.

When the group was analyzed by gender on every factor of the PSIS, the trend showed males scoring better than females in every category besides team emphasis. Male scores were identical to those of the male associative group, as all males were associative. Female scores were: anxiety ($M = .563, SD = .121$), concentration ($M = .545, SD = .102$), confidence ($M = .564, SD = .196$), mental preparation ($M = .474, SD = .158$), team emphasis ($M = .700, SD = .075$), and motivation ($M = .493, SD = .103$)(Figure 5).

Table 35

Associative Style by Questions #17, #24, #32

	agree	unsure	disagree
You enjoy the pain associated with your endurance sport.			
associative	83%	4%	13%
dissociative	50%	0%	50%
During competition, you often think about something other than the race in which you are involved.			
associative	4%	0%	96%
dissociative	50%	0%	50%
During competition, the pain is often too great to think about.			
associative	27%	4%	69%
dissociative	0%	50%	50%

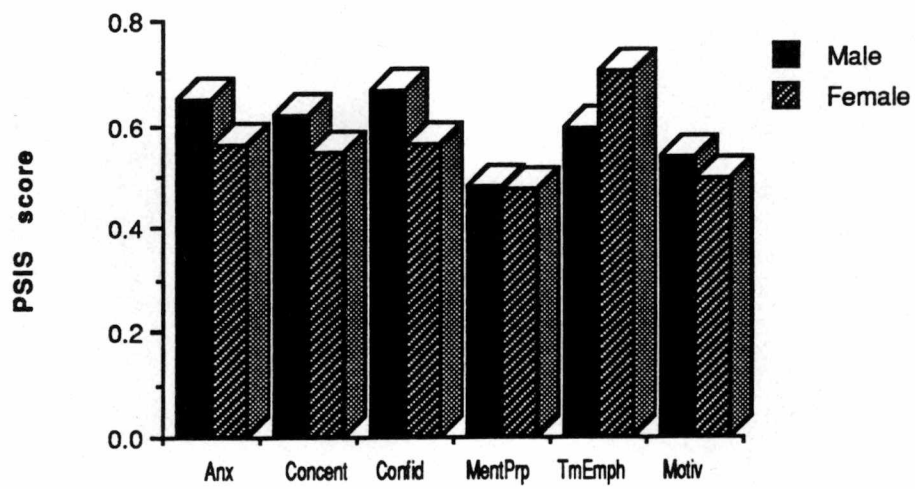


Figure 5. PSIS scores by gender.

Those who used dissociative strategies scored below the 50th percentile in at least 2 of the 3 PSIS categories (Figure 6); i.e. anxiety and confidence. Of the 90 percent characterized as associative, 40 percent scored above the mean in at least 2 of the 3. Of the 54 percent with no dissociative characteristics, only 33 percent scored above the mean in at least 2 of the 3. It was expected that those with fewer dissociative characteristics would have better factor scores (Mahoney et al., 1987).

Discussion. Pate et al. (1980) found that, over time, novice male distance runners reduced the lack of ability to associate. He concluded that cognitive strategies were somewhat dependent on the subject's level of physical conditioning. The subelite athletes in the present study predominantly used associative techniques, which, according to Pate et al. (1980), they should have since they had attained high levels of physical conditioning.

Additionally, Pate et al. (1980) reported that the psychological skills of male elite endurance runners tended to be associative and to be better than those of the general population. Lesser skilled males and females who used disassociation tended to have greater improvement in performance (Pate et al., 1980). But, lesser skilled athletes who adapted to using more associative techniques tended to improve in skill more rapidly (Okwumbua et al., 1983, Pate et al., 1980). Pate's data was not able to be supported by this study due to the fact that no lesser skilled athletes participated in the study. However, it would be interesting to take the subjects from this study who had dissociative characteristics and to chart their improvement over the past few years, then, to teach them to associate. Skill levels should improve more rapidly than they previously had.

Mahoney et al., (1987) found that elite male and female runners (n=126) using associative strategies reported less anxiety, better concentration, more self-confidence and higher motivation than their nonelite peers ($p < .001$). An earlier study (Mahoney & Avenir, 1977) indicated that high anxiety in elite athletes involved in closed skill sports was

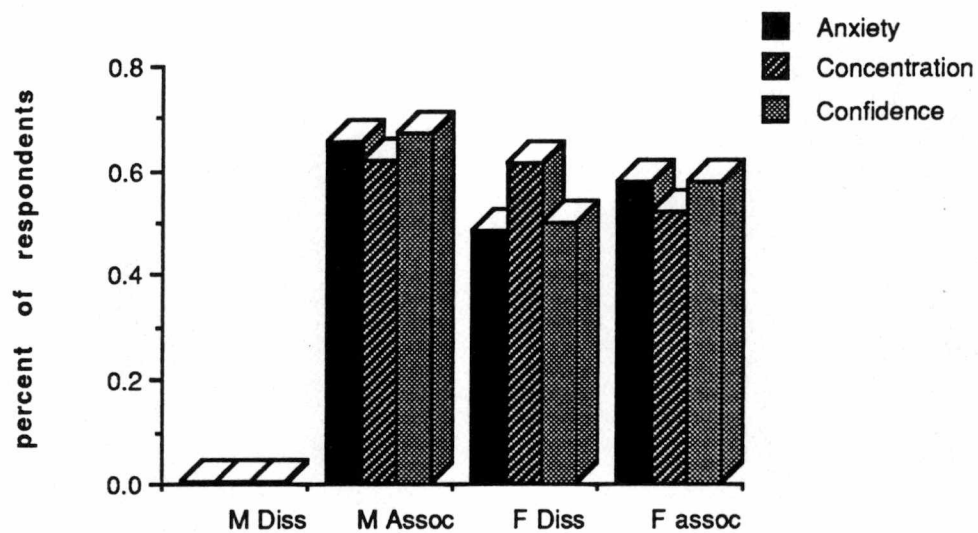


Figure 6. Relationship of gender to personality dimensions.

not necessarily negative. When the same comparison was made within this study group, the same results were found to be true.

Assessment of Hardship

Results. The subproblem analyzed in this section attempted to determine whether specific demographic factors enhanced capability to endure physical hardship in athletics. It was hypothesized that what would be perceived as a difficult background would enhance psychological endurance capabilities. It is possible that having experienced hardship could make someone more ready, more able to forego the experience again.

Every athlete in this study was classified as having had a positive or a negative social background according to their answers on 6 questions on the AP (#2 - #7). Answers to these questions were classified as indicators of "positive" demographic factors when they indicated that athletes were specifically encouraged or supported in their involvement in athletics and vice versa. Answers indicating participation as a means of escape were classified as "negative" and vice versa. When athletes had a greater number of positive responses than negative responses, they were classified as coming from positive demographic backgrounds; when they had a greater number of negative responses than positive, they were classified as coming from negative demographic situations. Some athletes answered "don't know" on one or more questions; therefore, several were unable to be classified due to these types of responses (Figure 7). Twenty-five percent of the athletes in this study had a negative demographic sport experience, 20 percent had an experience which probably did not affect them either positively or negatively, and 55 percent had a positive experience (Figure 7).

Thirty-five percent of the males had positive experiences; 35 percent were unaffected; and 28 percent were negative. A higher percentage (72%) of females had positive experiences, while none were unaffected, and 27 percent had negative experiences.

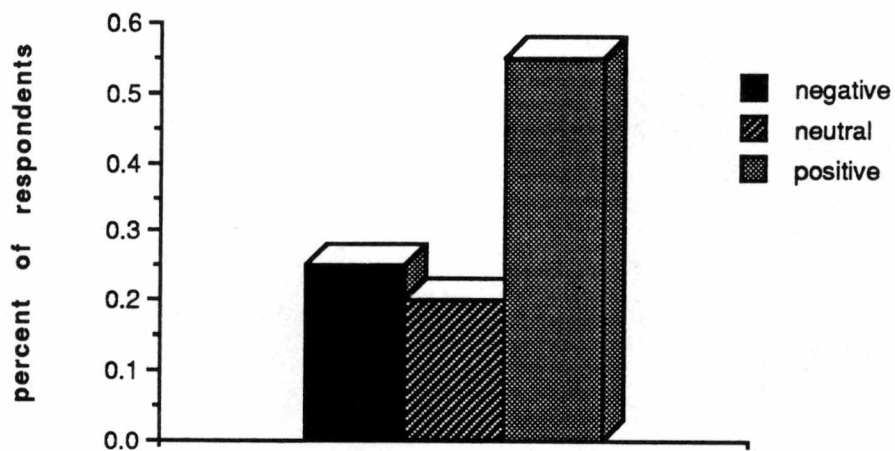


Figure 7. Demographic background.

When the endurance athletes were grouped and crosstabulations were run on each of the questions, several specific group characteristics were more clearly brought out (Table 36). Eighty-five percent of those with negative backgrounds thought that their social backgrounds encouraged their involvement in athletics, and 15 percent thought that they had been discouraged. Sixty percent of the neutral group felt encouraged, and the other 40 percent were unsure how they felt. Ninety-three percent of the positive group felt encouraged, and 7 percent felt discouraged. There were no significant differences.

Eighty-five percent of the negative group had been supported by their families through their athletic involvement. Fifteen percent had not been. All (100%) of the neutral group was supported. Ninety-two percent of the positive group was supported. Eight percent had not been supported. There were no significant differences.

All (100%) of the negative group would have chosen another sport at which to excel. Twenty percent of the neutral group would have chosen their current sport, while 20 percent were unsure what they would have chosen, and 60 percent would have chosen another sport. Thirty-eight percent of the positive group would have chosen their current sport, while 30 percent were unsure what they would have done, and only 32 percent would have chosen another sport.

Seventy-two percent of the negative group felt that they were better endurance athletes because of hardship in their past; 28 percent did not feel this way. Eighty percent of the neutral group felt that they were better; 20 percent were unsure if they were. Sixty-two percent of the positive group felt that they could endure pain better because of hardship in their past, while 8 percent were unsure, and 30 percent felt that no hardship had contributed to their abilities.

Eighty-five percent of the negative group participated in sports, at least partially, to escape from other areas of their lives; 15 percent did not do so. An equal percentage (85%) were still currently using their sport as an escape mechanism. Only 40 percent of the

Table 36

Environmental Background by Questions #2 - 7

	strongly agree		don't know		strongly disagree
Your social background encouraged your involvement in athletics.					
negative	42.8%	42.8%	0%	14.2%	0%
neutral	20.0%	40.0%	40.0%	0%	0%
positive	38.4%	53.8%	0%	7.6%	0%
Your family has financially supported your involvement in athletics.					
negative	42.8%	42.8%	0%	14.2%	0%
neutral	40.0%	60.0%	0%	0%	0%
positive	69.2%	23.0%	0%	7.6%	0%
As a youth, the sport in which you now participate would have been your first choice to excel at later in life.					
negative	0%	0%	0%	28.5%	71.4%
neutral	0%	20%	20%	60%	0%
positive	23.0%	15.3%	30.7%	23.0%	7.6%
You are mentally tougher than the average individual because you endured a hard background.					
negative	28.5%	42.8%	0%	28.5%	0%
neutral	40.0%	40.0%	20.0%	0%	0%
positive	53.8%	13.2%	7.1%	13.2%	11.5%

neutral group used sports as an escape as youths (the other 60 percent did not), while 100 percent currently saw their sport as an escape. Four percent of the positive group was unsure about the role of their sport when they were youths, while 92% of the positive group did not use sport to escape when they were young. The positive group, however, had begun to use their sport as an escape more often as they grew older. Sixty-nine percent did such; 7 percent were unsure whether or not they, and 24 percent did not do so.

Discussion. An elite runner's capability to endure may come from experience in enduring either as a means of adapting to particular cultural norms or as a means to meet intrapersonal or intracultural needs (e.g., demonstration of strength superior to that of peers), which are not wholly due to some higher level of physiological make-up (Montville 1990; Moore 1990). This study looked at demographic characteristics of endurance athletes to study these issues. The hypothesis was that life experiences could train endurance athletes to adapt to the hardships of their sport. The results did not show that the majority of the athletes had experienced negative demographic settings, nor did it show that the majority came from financially difficult backgrounds, but these factors, though not revealed to do so in this study, could still have some bearing on endurance ability. The research, however, needs to be approached differently.

Relationship of Demographics to Level of Sport Enjoyment

Results. A comparison was drawn between the above-mentioned demographic factors (Figure 7, p.94) and sport enjoyment assessments. Of those who had negative experiences, 55 percent said that enjoyment of their sport was their main motivation for continued participation. The others specifically stated that their motivation was enjoyment in addition to either scholarship, challenge, or success. Of those in the middle group, 80 percent declared enjoyment as their main motivation. Of those in the positive group, 84 percent continued for the sake of enjoyment. Those having had negative

experiences had by far the lowest percentage of athletes with enjoyment as a high priority (Figure 8).

Discussion. Although the percentages were low, some athletes in this study said that they: (a) continued to compete at their sport primarily for the sake of enjoyment, (b) felt hardship of some kind had contributed to their ability to endure, and (c) had felt driven to excel in their sport. It is interesting that enjoyment would come alongside either of these other two phenomena. We naturally tend to associate being driven and experiencing hardship as negative experiences, but, in the sense of their contributions to endurance abilities, these phenomena seem to be positive.

Commitment and Enjoyment

Results. The subproblem analyzed in this section identified the commitment ratings (as indicated by CS scores) and compared them to whether or not individuals saw enjoyment as their main reason for continuing with competition in endurance sports (q#43). A mean commitment score was calculated, and the athletes in the study group were classified as scoring higher than or lower than that mean score of 50. It was hypothesized that highly committed athletes would also be athletes that enjoyed their sport experience.

Of the subjects ($n = 14$) that scored above the average score on the CS, 85 percent stated that enjoyment was the main reason that they participated in their sport. Sixty four percent of the male subjects scored above the mean percentile while only 36 percent of female subjects did (Figure 9). Out of the men scoring above the average, 88 percent declared enjoyment as their main reason for participating. Out of the women scoring above the average, 80 percent declared enjoyment was their main reason for participating.

Discussion. The hypothesis seems to be true, as over 80 percent of both men and women who scored above the average also declared enjoyment was their main reason for participating.

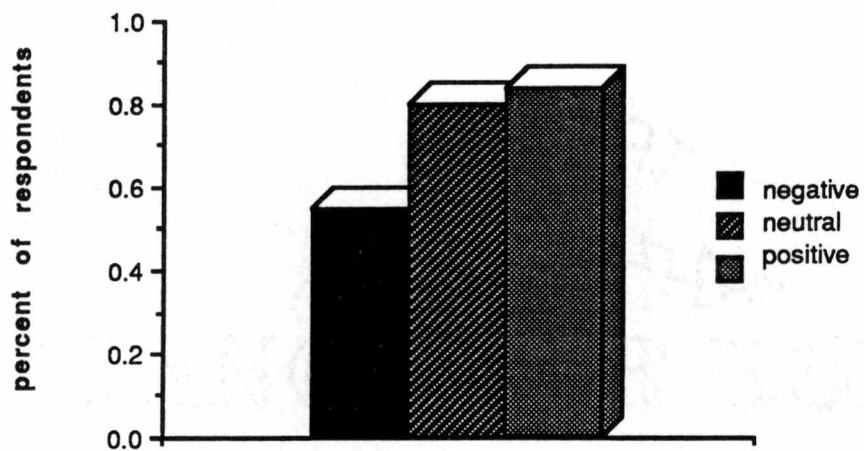


Figure 8. Relationship of demographic type to enjoyment.

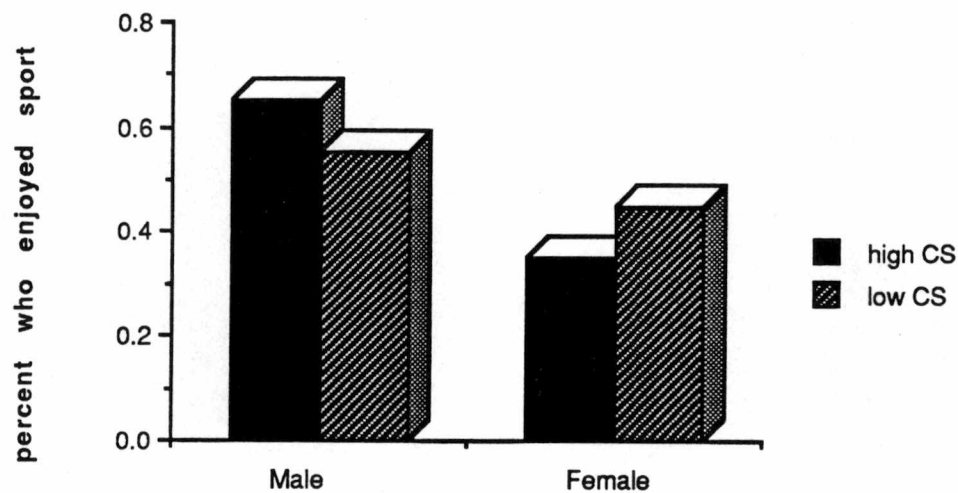


**Figure 9. Gender by Commitment by Enjoyment
crosstabulation of respondents.**

Specific Discussion of Gender Differences

In the present study, females were found to: (a) excel at their sport earlier than males (explanations: females physically mature more quickly than males, and a higher percentage of the females in the study were swimmers); (b) have lower levels of confidence in their physiological superiority than males; (c) rank primary role models differently than males; (d) participate, both as youths and adults, less for the sake of escape than males; (e) perceive themselves as experiencing less pain during competition than males; (f) perceive themselves as able to limit their perception of pain more than males; (g) enjoy the pain involved with pushing "the wall" of their physical limits less than males; (h) be more unsure than males about their capability to endure more than the average person; (i) have higher anxiety, and (j) place more emphasis on the team, than males.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The purpose of this study was to determine if there were: (a) certain factors that endurance athletes perceive as affecting agents, and/or (b) specific psychological or socialpsychological characteristics of subelite endurance athletes. The study also examined gender differences in the ways subelite athletes adapted to the endurance-related sport task.

Twenty-five male and female subelite endurance athletes were utilized as subjects. Seventeen varsity letter winners from NCAA Division I nationally ranked swimming and track teams comprised the collegiate athletes in the study. Additionally, 4 category II cyclists and 4 nationally competitive triathletes contributed information. The study group of 14 males and 11 females was analyzed by gender to determine whether similarities and differences existed between genders for the psychological, socialpsychological, and experiential factors.

Psychological, socialpsychological and experiential information was collected during the spring of 1992. The Athlete Perceptions questionnaire, AP, designed for the study surveyed athletes concerning background information which may have been related to their becoming subelite athletic participants in competitive endurance sports. The questions were demographic, physiological, socialpsychological, and psychological in nature.

The Psychological Skills Inventory for Sport, PSIS (Mahoney, et al., 1987), and the Commitment to Running Scale, CS (Carmack & Martens, 1979), were selected on the basis of previous reported research which confirmed their role in the sport environment. The PSIS produced ratings on the six factors, anxiety, concentration, confidence, mental

preparation, motivation, and team emphasis within athletes. The CS was customized to measure athlete commitment to and enjoyment of their particular sport.

The previously reported research indicated conflicting results regarding whether psychological skill comes through practice or is an inborn part of the genetic makeup (Wickelgren 1988; Martin et al., 1984; Drake, 1990; Weinburg, 1985). An attempt was made to account for some of the variables which were previously uncontrolled but which consistently characterized subelite endurance athletes in the study. These characteristics were measured according to individual athlete perception. In the present research, athletes implicitly attributed psychological skill to both personal experience and genetics.

Gender differences were measured and evaluated by comparisons of percentages of responses for the AP factors. On the PSIS, significant differences were revealed through one-way ANOVA's for anxiety and team emphasis. No significant differences were revealed on the other PSIS factors. No gender differences were found in the evaluation of the CS scale.

There were several gender differences in expectations. Females: (a) excelled at their sport earlier than males, (b) had lower levels of confidence in their physiological superiority than males, (c) were more unsure than males about their capability to endure more than the average person, and (d) had higher anxiety and placed higher significance on team emphasis than males. Uncharacteristically, but positively, females: (a) ranked primary role models differently than males (b) participated less for the sake of escape than males, (c) perceived themselves to experience less pain during competition than other athletes, (d) perceived themselves as able to limit their perception of pain more than males, (e) enjoyed the pain involved with pushing "the wall" of their physical limits less than males.

An interesting gender comparison came in relation to perception of pain. Males perceived themselves to have higher ability to endure pain than the average individual

(females did not perceive such), and to enjoy the pain associated with their sport more than females. On the other hand, females perceived themselves: (a) to have higher ability to limit perception of pain associated with their endurance sport than males perceived themselves to have, and (b) to have less problem with the pain becoming too great to think about than males perceived themselves to have.

The possibility exists that demographic, physiological, sociological, and psychological factors combine to encourage the development of traits that may contribute to great endurance ability in sport. The hypotheses were that a demographic situation characterized by hardship, a sociological setting that placed high demands as expected norms, and a psychological make-up which was identified by an associative approach to pain would contribute to increased endurance ability. Since athlete levels were not compared in this study, these hypotheses would mean that a high percentage of the subelite population should be identified by the above-mentioned characteristics. (The more accomplished the endurance athlete population, the more these characteristics would be expected to identify the group).

If American endurance runners are to have an impact on world-level endurance competitions, then enough people have to be socialized - demographically, culturally, and psychologically - to capably deal with pain. This study indicated that subelite athletes believed that they were able to demonstrate high endurance skills due to both physiological and psychological elements.

Conclusions

The results of the data suggested the following conclusions:

1. There were gender differences in: (a) number of sports in which athletes participated, (b) role model distributions, (c) pain perception, and (d) participation motivation.

2. Subelite endurance athletes predominantly seemed to perceive themselves as: (a) enjoying the pain involved with their endurance sport, (b) able to limit that pain, (c) more willing than most to forego the pain, (d) more capable of competing when the pain seems less than usual.

3. Although only one measure tested for mood, subelite endurance athletes perceived themselves to be characterized as usually in good moods.

4. Most athletes perceived hardship as contributing to their performance capabilities, and most named motivation as a reason for participation, but only a low percentage of the athletes indicated that they had actually undergone hardship in their past. The ones who had undergone hardship, in comparison to the rest: (a) were less socially supported in their athletic participation, (b) enjoyed their sport less, and, (c) were more likely to have desired to have chosen another sport.

5. Psychologically, subelite endurance athletes were characterized by approaching performance: (a) both psychologically and physiologically confident, (b) with a high degree of control over anxiety, (c) with a priority on concentration skill, and, (d) for the sake of fulfilling their own needs.

6. Cognitive associative techniques of coping with pain seem to characterize a large percentage of subelite endurance athletes and may contribute to the endurance athletes' ability to endure.

7. No demographic factors were found to consistently characterize the subelite endurance athlete.

8. Subelite endurance athletes chose to participate in their sport almost invariably because they enjoyed their sport in one way or another. Most athletes: (a) competed for love of their sport, (b) enjoyed the pain associated with their sport, (c) were committed in addition to competing for the sake of enjoyment.

Implications for Future Research

The results of this study have demonstrated that psychological and experiential factors may affect the actual physiological ability of the subelite endurance athlete. Subelite endurance athletes seemed to be generally characterized as: (a) associative, (b) confident, (c) supported in their participation, and (d) enjoying all aspects of their sport. The following recommendations are recommended for future research.

1. Research needs to be conducted with a larger sample of endurance athletes from several more endurance sports for the sake of the generalizability of the results.
2. Research needs to be conducted with a comparative analysis of different levels of endurance athletes.
3. Future research should focus on the potential for practical application of the results to younger age groups who could benefit from knowledge of what factors constitute psychological superiority.

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APPENDICES

APPENDIX A

Athlete Perceptions

Section I:

Directions: Circle the number corresponding to your answer for each of the statements as it pertains to your feelings about yourself as an athlete in your sport. If there is a question asked, please answer it in the space provided. Please answer every question.

- (1) strongly agree,
- (2) agree,
- (3) don't know,
- (4) disagree,
- (5) strongly disagree.

- | | |
|-----------|--|
| 1 2 3 4 5 | 1. Your athletic ability in distance events can be attributed to genetics. |
| 1 2 3 4 5 | 2. Your social background encouraged your involvement in athletics. |
| 1 2 3 4 5 | 3. Your family has financially supported your involvement in athletics to the best of their abilities. |
| 1 2 3 4 5 | 4. As a youth, the sport in which you are now involved would have been your first choice of sports at which you could excel later in life. |
| 1 2 3 4 5 | 5. You are mentally tougher than the average individual because you had to endure a hard background. |
| 1 2 3 4 5 | 6. At a young age, you participated in sports, at least partially, to escape from other areas of your life. |
| 1 2 3 4 5 | 7. You currently see your sport, at least partially, as an escape. |
| 1 2 3 4 5 | 8. Your motivation to participate in sports comes from within yourself. |
| 1 2 3 4 5 | 9. You have been driven to excel in your sport by people around you. |
| 1 2 3 4 5 | 10. You wish you had not been driven to excel by anyone. |
| 1 2 3 4 5 | 11. You have a <u>psychological</u> ability to endure pain in athletic competition which is superior to the average individual's ability to do so. |
| 1 2 3 4 5 | 12. You have a <u>physiological</u> ability to endure pain in athletic competition which is superior to the average individual's ability to do so. |
| 1 2 3 4 5 | 13. You have adjusted to enduring pain in athletic competition. |
| 1 2 3 4 5 | 14. You endure more pain during athletic competition than the average individual <u>is able</u> to endure. |
| 1 2 3 4 5 | 15. You experience more pain during athletic competition than the average individual <u>is willing</u> to endure. |

- (1) strongly agree,
- (2) agree
- (3) don't know,
- (4) disagree,
- (5) strongly disagree.

- | | |
|-----------|---|
| 1 2 3 4 5 | 16. You feel good about yourself around other runners when you have a good race. |
| 1 2 3 4 5 | 17. You enjoy the pain involved with pushing "the wall" of your physical limits. |
| 1 2 3 4 5 | 18. You fear pain involved with endurance sports. |
| 1 2 3 4 5 | 19. You often feel tired of participating in your sport. |
| 1 2 3 4 5 | 20. Your reasons for participating in athletics are intrinsic, rather than extrinsic;
i.e. you perform only to satisfy yourself. |
| 1 2 3 4 5 | 21. You participate in athletics primarily for the purpose of recognition. |
| 1 2 3 4 5 | 22. You are usually in a good mood. |
| 1 2 3 4 5 | 23. During competition, you can limit your perception of pain. |
| 1 2 3 4 5 | 24. You usually think about anything but the race in which you are involved. |
| 1 2 3 4 5 | 25. You are addicted to your endurance sport. |
| 1 2 3 4 5 | 26. You have always had an intense love for your endurance sport. |
| 1 2 3 4 5 | 27. You are an elite athlete. |
| 1 2 3 4 5 | 28. You compete for the sake of health. |
| 1 2 3 4 5 | 29. You will continue to stay in shape after college. |
| 1 2 3 4 5 | 30. You are a highly motivated athlete. |
| 1 2 3 4 5 | 31. You are a highly committed athlete. |
| 1 2 3 4 5 | 32. During competition the pain is <u>often</u> too great to think about. |
| 1 2 3 4 5 | 33. When racing, you <u>often</u> cannot ignore the physical pain. |

Section II: Answer each of the following questions in the space provided.

- 34. What is your age in years? ____ .
- 35. What is your gender (circle one)? M F.
- 36. What is your endurance sport? ____ . Speciality events? _____.
- 37. At what age did you begin to be interested in your endurance sport? ____ .
- 38. At approximately what age did you begin to compete in your endurance sport? ____ .

39. At approximately what age did you begin to excel in your sport? ____.
40. Who played the most critical role in your development as an athlete?
41. Did, or do, you have a primary role model? (Yes/No)
If so, who, and when did they influence you the most?
42. To what do you attribute your success at enduring pain associated with your endurance sport?
43. Why do you choose to continue competing in your endurance sport?
44. Describe your current commitment level to your sport.
45. Circle the letter corresponding with the financial status of the family in which you were raised.
- (a) wealthy
(b) middle class
(c) lower class
46. In your best performances, describe how you felt while competing in relation to how you usually feel when competing.

47. Please list your three top performances in your two best events:

	Event _____		Event _____
1.		1.	
2.		2.	
3.		3.	

48. List other competitive sports in which you have been involved:

<u>Sport</u>	<u># of years</u>	<u>achievement level</u>	<u>age of participation</u>
1.			
2.			
3.			
4.			

APPENDIX B

Psychological Skills Inventory for Sport

Form R-5 c 1987 Michael J. Mahoney

Name: _____ Date: _____

Sport: _____ Birth Date: _____ Gender: M F

The statements below deal with various aspects of athletic performance and competition. Please rate each statement according to how well it describes your own personal experience. Fill in the circle corresponding to how well you agree with it. Please be sure to rate each statement.

	<u>strongly</u> <u>disagree</u>		<u>neutral</u>		<u>strongly</u> <u>agree</u>
1. I am very motivated to do well in my sport.	0	1	2	3	4
2. I often have trouble concentrating during my performance.	0	1	2	3	4
3. I often dream about competition.	0	1	2	3	4
4. I am self-confident about my athletic skills.	0	1	2	3	4
5. I get very frustrated when a teammate is performing poorly.	0	1	2	3	4
6. I am more tense <i>before</i> I perform than I am <i>during</i> the performance.	0	1	2	3	4
7. I try not to think about my performance during the 24 hours prior to it.	0	1	2	3	4
8. I experience frequent "hot streaks" in which my performance is unusually good.	0	1	2	3	4
9. I sometimes lack the motivation to train.	0	1	2	3	4
10. I get along very well with other members of a team.	0	1	2	3	4
11. I am seldom so tense that it interferes with my performance.	0	1	2	3	4
12. Winning is very important to me.	0	1	2	3	4

	<u>strongly disagree</u>		<u>neutral</u>		<u>strongly agree</u>
13. I often "rehearse" my performance in my head just before I perform.	0	1	2	3	4
14. In most competitions, I go in confident that I will do well.	0	1	2	3	4
15. I tend to perform better when I feel more tense rather than less tense.	0	1	2	3	4
16. When I am actually performing, I am almost totally unaware of the audience.	0	1	2	3	4
17. When I am performing poorly, I tend to lose my concentration.	0	1	2	3	4
18. It doesn't take much to shake my confidence.	0	1	2	3	4
19. I concentrate more on my own performance than on the performance of the team.	0	1	2	3	4
20. I am often panic-stricken during the last few minutes before I begin my performance.	0	1	2	3	4
21. When I make a mistake, I have trouble forgetting it and concentrating on my ongoing performance.	0	1	2	3	4
22. I would like to be more motivated.	0	1	2	3	4
23. A minor injury or a bad practice can really shake my self-confidence.	0	1	2	3	4
24. I set goals for myself and I usually achieve them.	0	1	2	3	4
25. I sometimes feel intense anxiety while I am actually performing.	0	1	2	3	4
26. During my performance, my attention seems to flip back and forth between what I am doing and other things.	0	1	2	3	4
27. I enjoy working with teammates.	0	1	2	3	4
28. I have frequent doubts about my athletic ability.	0	1	2	3	4

	<u>strongly disagree</u>		<u>neutral</u>		<u>strongly agree</u>
29. I spend a lot of energy trying to stay calm before a meet.	0	1	2	3	4
30. When I begin to perform poorly, my confidence drops very quickly.	0	1	2	3	4
31. I think team spirit is very important.	0	1	2	3	4
32. I often worry about making mistakes in an important race.	0	1	2	3	4
33. When I mentally practice my performance, I "see" myself performing -- just like I was watching a video tape.	0	1	2	3	4
34. I can usually remain confident even through one of my poorer performances.	0	1	2	3	4
35. When I am preparing to perform, I try to imagine what it will <i>feel</i> like in my muscles.	0	1	2	3	4
36. My self-confidence jumps all over the place.	0	1	2	3	4
37. When my team loses, I feel badly -- no matter how I did as an individual.	0	1	2	3	4
38. When I make an error in my performance, I become very anxious.	0	1	2	3	4
39. Right now, the most important thing in my life is to do well in my sport.	0	1	2	3	4
40. I am good at controlling my tension level.	0	1	2	3	4
41. My anxiety level drops as soon as I begin my performance.	0	1	2	3	4
42. My sport is my whole life.	0	1	2	3	4
43. I have always worked well with my coaches.	0	1	2	3	4
44. I have faith in myself.	0	1	2	3	4
45. When it comes down to the last hours before a meet, I often wish I were better prepared.	0	1	2	3	4

APPENDIX C

Feelings About Running

The following statements may or may not describe your feelings about endurance running. Read each statement and then circle the appropriate number to indicate how well the statement describes *your feelings most of the time*. There are no right or wrong answers. Do not spend too much time on any one item, but give the answers which seem to describe how you *generally feel* about running.

	strongly disagree	disagree	uncertain	agree	strongly agree
1. I look forward to running.	1	2	3	4	5
2. I wish there were a more enjoyable way to stay fit.	1	2	3	4	5
3. Running is drudgery.	1	2	3	4	5
4. I do not enjoy running.	1	2	3	4	5
5. Running is vitally important to me.	1	2	3	4	5
6. Life is so much richer as a result of running.	1	2	3	4	5
7. Running is pleasant.	1	2	3	4	5
8. I dread the thought of running.	1	2	3	4	5
9. I would arrange or change my schedule to meet the need to run.	1	2	3	4	5
10. I have to force myself to run.	1	2	3	4	5
11. To miss a day's running is sheer relief.	1	2	3	4	5
12. Running is the high point of my day.	1	2	3	4	5

Feelings About Swimming

The following statements may or may not describe your feelings about endurance swimming. Read each statement and then circle the appropriate number to indicate how well the statement describes *your feelings most of the time*. There are no right or wrong answers. Do not spend too much time on any one item, but give the answers which seem to describe how you *generally feel* about swimming.

	strongly disagree	disagree	uncertain	agree	strongly agree
1. I look forward to swimming.	1	2	3	4	5
2. I wish there were a more enjoyable way to stay fit.	1	2	3	4	5
3. Swimming is drudgery.	1	2	3	4	5
4. I do not enjoy swimming.	1	2	3	4	5
5. Swimming is vitally important to me.	1	2	3	4	5
6. Life is so much richer as a result of swimming.	1	2	3	4	5
7. Swimming is pleasant.	1	2	3	4	5
8. I dread the thought of swimming.	1	2	3	4	5
9. I would arrange or change my schedule to meet the need to swim.	1	2	3	4	5
10. I have to force myself to swim.	1	2	3	4	5
11. To miss a day's swimming is sheer relief.	1	2	3	4	5
12. Swimming is the high point of my day.	1	2	3	4	5

Feelings About Triathlons

The following statements may or may not describe your feelings about triathlon training. Read each statement and then circle the appropriate number to indicate how well the statement describes *your feelings most of the time*. There are no right or wrong answers. Do not spend too much time on any one item, but give the answers which seem to describe how you *generally feel* about triathlon training and racing.

	strongly disagree	disagree	uncertain	agree	strongly agree
1. I look forward to swimming, cycling, and running.	1	2	3	4	5
2. I wish there were a more enjoyable way to stay fit.	1	2	3	4	5
3. Swimming, cycling, and running are drudgery.	1	2	3	4	5
4. I do not enjoy swimming, cycling, and running.	1	2	3	4	5
5. Triathlons are vitally important to me.	1	2	3	4	5
6. Life is so much richer as a result of swimming, cycling, and running.	1	2	3	4	5
7. Triathlons are pleasant.	1	2	3	4	5
8. I dread the thought of swimming, cycling, or running.	1	2	3	4	5
9. I would arrange or change my schedule to meet the need to swim, cycle, or run.	1	2	3	4	5
10. I have to force myself to swim, cycle, and run.	1	2	3	4	5
11. To miss a day's training is sheer relief.	1	2	3	4	5
12. Swimming, cycling, and running are the high points of my day.	1	2	3	4	5

Feelings About Cycling

The following statements may or may not describe your feelings about triathlon training. Read each statement and then circle the appropriate number to indicate how well the statement describes *your feelings most of the time*. There are no right or wrong answers. Do not spend too much time on any one item, but give the answers which seem to describe how you *generally feel* about triathlon training and racing.

	strongly disagree	disagree	uncertain	agree	strongly agree
1. I look forward to cycling.	1	2	3	4	5
2. I wish there were a more enjoyable way to stay fit.	1	2	3	4	5
3. Cycling is drudgery.	1	2	3	4	5
4. I do not enjoy cycling.	1	2	3	4	5
5. Cycling is vitally important to me.	1	2	3	4	5
6. Life is so much richer as a result of cycling.	1	2	3	4	5
7. Cycling is pleasant.	1	2	3	4	5
8. I dread the thought of cycling.	1	2	3	4	5
9. I would arrange or change my schedule to meet the need to cycle.	1	2	3	4	5
10. I have to force myself to cycle.	1	2	3	4	5
11. To miss a day's training is sheer relief.	1	2	3	4	5
12. Cycling is the high point of my day.	1	2	3	4	5

APPENDIX D

Over the past school year I have been studying to complete a Master's degree with a concentration in sport psychology. As a part of my requirements I am writing a thesis. The purpose of my study is to determine if there are specific psychological and/or socialpsychological characteristics of endurance athletes including motives for participation, psychological methods of preparation for competition, demographic factors, competitive experience factors, and coping strategies for overcoming pain. I would need your assistance in identifying the (distance and middle distance runners; or distance and middle distance swimmers; cyclists; or triathletes who, within the past year, have finished in the top 5% of an Olympic distance race certified by the Triathlon Federation, where the race had at least 200 participants).

The athletes will be contacted following your approval. They will receive a verbal explanation of the purpose of the study, and a packet of materials (attached) which explains the nature of informed consent and the three questionnaires which would take them approximately 20 minutes to complete. The athletes will be informed that the completion of the questionnaires serves as informed consent, that they may choose to participate or not to participate and/or withdraw from the study at any time, and that their choice to participate will not have any effect on their team or club participation.

Confidentiality of your team/organization and of each athlete will be maintained as no names will ever be attached to the questionnaires. Only numbers will be used to keep the three questionnaires coordinated for each athlete, and only group data will be used in evaluating and reporting any of the results.

If you agree to allow your athletes to be contacted, you are free to withdraw your consent at any time, and you and/or the athletes may ask any questions of us at any time. My name and that of my advisor, our addresses, and telephone numbers are included.

If you agree to the conditions explained above, please sign one copy of this letter and keep the other for your files in case you need to contact one of us. Thank you for your consideration and assistance in the conduct of this research.

Sincerely,

Seth Parrish
Master's Candidate

Patricia A. Beitel, Ed.D.
Faculty Advisor

Department of Human Performance and Sport Studies
1914 Andy Holt Ave., Office #350 or #338
The University of Tennessee
Knoxville, TN 37996-2700
Phone (615) 974-5111

I understand the conditions explained above, and I agree that my athletes may be contacted.
Signature_____

Position_____ Date_____

APPENDIX E

Psychological Characteristics of Subelite Athletes

The purpose of this study is to determine if there are specific psychological and/or socialpsychological characteristics of endurance athletes including motives for participation, psychological methods for preparation for competition, demographic factors, competitive experience factors, pain perception, and coping strategies used for overcoming pain. Results of this study will be used as the thesis requirement for Seth Parrish.

Your coach/president has been contacted and given permission for your assistance.

Attached are three questionnaires that will take approximately 20 minutes to complete. Most of the questions are multiple choice, but a few necessitate a brief written response. You should write directly on the paper as indicated for each question. You may ask questions any time about the study or about the nature of the questions on the survey.

Your choice to participate or not to participate in the study will have no effect on your participation in your event(s) or on your team standing. Your participation in the study is voluntary, and you may withdraw from the study at any time.

There is no risk as your identity will remain confidential. No names will ever be associated with your answers, and only group results will be used in evaluating and reporting the results. The numbers on your questionnaire are merely to keep all of each person's answers together in case these pages should come apart.

Since all of the information is your report about your perceptions, no signature is necessary for your consent. Your completion of the forms serves as your informed consent and indicates your awareness of the purpose of the study and what is expected of you.

You should keep this page in case you have questions and need to contact either of us. The results of analysis of your questionnaires will be made available to you at any time. The benefit of the study should come in the ability to more readily identify psychological and social psychological characteristics of subelite athletes like yourself. Thank you very much for your assistance with this project.

Seth Parrish
Master's Candidate

Patricia A. Beitel, Ed.D.
Associate Professor

Department of Human Performance and Sport Studies
1914 Andy Holt Ave.
The University of Tennessee
Knoxville, TN 37996-2700

VITA

Seth Benton Parrish was born in Alexandria, Virginia, on December 14, 1968. While attending Evangelical Christian School, Seth was active in student government and participated in state finals competitions in both varsity track and football. Upon his 1987 high school graduation, Seth attended Samford University then Memphis State University in pursuit of a B.A. in English and a minor in coaching. He ran varsity track for each school. He actively participated in membership of several honor societies and was initiated to Who's Who Among American College Students. In May of 1991 Seth graduated magna cum laude from Memphis State. In August of 1991 Seth accepted a graduate associate teaching position at the University of Tennessee, Knoxville where he will pursue the Master's of Science degree with a major concentration in Sport Psychology. He will receive his degree in August of 1992.