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PERSONALITY CHARACTERISTICS OF ULTRAMARATHONERS: FINISHERS VS. NONFINISHERS

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By

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ABSTRACT

PERSONALITY CHARACTERISTICS OF ULTRAMARATHONERS: FINISHERS VS. NONFINISHERS

by Daniel V. Lindstrom

The study investigated whether personality characteristics differ between finishers and nonfinishers in the 1989 Western States 100 Mile Endurance Run. Background information on both groups was examined to determine their effect on performance.

Subjects included 46 male runners, ages 38 through 46, who had previously participated in 50 and 100 mile competitions. Subjects completed the Edwards Personal Preference Schedule and background questionnaire by mail prior to the race. The Profile of Mood States was administered twice, at the prerace medical examiniation and at the finish or dropout point of the race. A discriminant analysis was used to determine group differences in selected variables. Univariate results showed differences between finishers and nonfinishers on specific personality characteristics. Finishers (n=30) scored significantly higher on postrace vigor. Nonfinishers (n=16) scored significantly higher on traits of exhibition and aggression, and on mood states of depression and anger. Results of the background questionnaire concluded that finishers ran more training runs of 20+ miles.

Acknowledgments

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This thesis is dedicated to Deborah, without her love and support this thesis would not have been possible.

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Chapter 1

Introduction

Running as a sport has grown in popularity in the last few years (Honikman & Honikman, 1988). Of the 17 million runners in the United States, 2 million are racers, and 200,000 are marathoners (Honikman & Honikman, 1988). The growth of this sport has resulted in more research being conducted to examine runner's physiological and psychological characteristics and their relationship to health and performance.

Recent medical evidence suggests a link between health and exercise (Johnsgard, 1989; Sheehan, 1980). In the past 20 years, there has been a significant decrease in the number of deaths due to cardiovascular disease. There are reportedly 27% fewer deaths resulting from heart attacks, 36% fewer from stroke, and 48% fewer from hypertensive disease (Cassidy, 1986). More people are aware of the role of exercise in maintaining good health. As a result, we are now living longer. Children born in 1970 had a life expectancy of 70 years of age. The life expectancy for children born in the 1980's, however has increased 4 1/2 years to 74 1/2 years of age.

Another area of increased research attention is the relationship between mental health and running. The existence of a "runner's high" has been widely accepted by the scientific community. Runner's high produces

psychological benefits which may be brought about by the brain's release of beta endorphins (Glasser, 1976). Sport psychologists have conducted case studies in which subjects have exhibited reduced depression after having been involved in a daily running program (Kostrubala, 1977).

In addition to recreational runners, there are runners who race competitively in 10Ks, marathons, and ultramarathons. Competitive runners' abilities range from novice (beginning) to elite (world class). Some seek extrinsic rewards of trophies and praise. Others search for intrinsic gratification through an improved sense of pride in their accomplishments (Summers, Machin, & Sargent, 1983). Although the 10K is the most popular distance, many runners seek the challenge of running longer distances. The marathon has proven to be a popular distance for runners who want to run their own race without having to deal with overcrowded conditions.

The marathon originated in Marathon, Greece where, according to legend, an Athenian named Pheidippides ran from the battlefield of Marathon to Athens (a distance of approximately 24 miles) to report Greece's victory over the Persians in a battle fought in the year 490 B.C. (Martin & Gynn, 1979). The modern marathon, which is a standard distance of 26 miles, 385 yards, began in the Olympic games of 1924 held in Paris (Martin & Gynn, 1979).

Marathons were once considered the ultimate test of one's running endurance although longer competitive races called ultra distance or ultramarathons existed in the late 1800's (Osler & Dodd, 1979).

The roots of ultramarathoning trace back to the 1800's when participants were called pedestrians. Edward Payson Weston is considered the first pedestrian to walk competitively. In 1861, Weston walked to attend the inauguration of President Lincoln. He traveled 453 miles in 8 days. Since that time, more runners have participated in ultra distance races in search of the upper limits of their endurance capacity. Thus, ultramarathoning has evolved. Modern ultradistances range from 50 kilometers (30.2 miles) to 100 miles, with 50 miles being the most popular distance. Multiday track runs and transcontinental races also exist (Osler & Dodd, 1979).

Statement of the Problem

To date, there have been few research studies on ultra distance runners due to the relatively recent popularity of the sport. This research examined very small numbers of ultramarathon athletes and compiled case studies. Usually these case studies are limited to examining physiological demands, nutritional needs, and training patterns in relationship to selective factors involved with running performance. Little is presently

known about the ultra distance runner's personality characteristics. Researchers have not been able to determine how these runners are able to endure physical and psychological stress. In addition, there is little evidence that would indicate whether differences in personality characteristics exist between runners who drop out of an ultra race and those who are able to finish. The question remains as to whether these ultramarathon runner's personalities differ from the general population and other running groups, like the 10K runner and marathoner.

Therefore, the intent of this study was to examine personality characteristics of ultramarathoners. The identification of these characteristics may aid coaches in selecting athletes who will be successful in ultra endurance events. The identification of weaknesses in their personality characteristics may aid athletes in acquiring the desirable characteristics required of their sport. This study may also advance the knowledge beyond what teachers presently know in developing training programs for ultra endurance sports.

Statement of the Purpose

The purpose of this study was to determine if there are differences in personality characteristics between finishers and nonfinishers of a 100 mile endurance run.

Hypothesis I

There are no significant differences in finisher's pre- postrace mood states.

Hypothesis II

There are no significant differences in nonfinisher's pre- postrace mood states.

Hypothesis III

There are no significant differences between finishers and nonfinishers in prerace mood states.

Hypothesis IV

There are no significant differences between finishers and nonfinishers in postrace mood states.

Hypothesis V

There are no significant personality trait differences between finishers and nonfinishers.

Delimitations

This study was delimited to runners who:

1. participated in the 1989 Western States 100 Mile Endurance Run.
2. were between the ages of 38-46
3. were male
4. had completed a qualifying race based on age and appropriate time and distance requirements in order to participate in the Western States.
5. were experienced ultramarathoners who had completed other distance races at 50 or 100 miles.

This study was further delimited to examining the following specific personality traits and mood states:

1. Personality Traits

   achievement
   order
   exhibition
   autonomy
   intraception
   dominance
   endurance
   aggression

2. Mood States

   anger
   depression
   vigor
   fatigue
   tension
   confusion

Two specific psychological test batteries were used:

1. A Profile of Mood States
2. Edwards Personal Preference Schedule

Limitations

1. There was no control over the selection of participants in the Western States 100 Mile Endurance Run due to the race official's lottery method of selection for race participation.
2. There was no control over subjects who took part in the study.
3. Some of the runners who agreed to take part in the study did not fill out the background questionnaire or complete it properly.
4. Some runners failed to complete the Profile of Moods

States (POMS) at the aid station of the dropout point or at the finish line.

5. Some runners failed to complete the Edwards Personal Preference Schedule (EPPS).
6. Runner's training prior to the race was not monitored.
7. Food and water intake was not controlled during the race.
8. Runner's level of motivation in completing the race was not measured.
9. Pacers were not controlled for their ability to give assistance and/or motivate each runner during the last 38 miles of the race.

Definitions

Association. A strategy used by runners to constantly monitor sensory feedback received from working muscles, and lungs (Morgan, 1978).

Disassociation. A cognitive strategy used by runners to block out pain and discomfort (Morgan, 1978).

Finishers. Runners who were able to complete the race (Tharion, Strowman, & Rauch, 1988).

Nonfinishers. Runners who were stopped for medical reasons or voluntarily withdrew from the race (Tharion, et al., 1988).

Ultramarathon. Any running race which is longer than the official marathon distance of 26 miles, 385 yards (McCutcheon & Yoakum, 1983).

Summary

Ultramarathoner's personality profile has only recently been studied by researchers. Presently, little is known about runners abilities to compete over great distances without physical and psychological damage. The intent of this study was to examine the relationship between runners' personality characteristics and their effects on performance.

Chapter 2

Review of Literature

This chapter includes a review of current research that examines personality characteristics of marathoners, noncompetitive runners, distance runners, and ultramarathoners.

Marathoners

Researchers have long studied athletes, comparing their personality characteristics to those of the general population. Gontang, Clitsome, and Kostrubala (1977) investigated 50 sub-3-hour marathoners to assess possible differences in runners' personalities. The Myers-Briggs Type Indicator (MBTI), form F, measured personality type. In addition, demographic data were collected from each participant. Sub-3-hour marathoners were described as college graduates whose average age was 33, who had completed 11 marathons, had 9 years of running experience, and had averaged 76 miles per week during the year. The results of the MBTI revealed significant differences (ratio of 2:1) in runners' tendency toward introversion as compared to extroversion in the population studied. Similar results were found among runners who take action when faced with a problem (judging types) as compared to runners who are aware, but take no action (perceiving types). Clitsome and Kostrubala (1977), found similar personality traits when testing 100 marathoners.

Celestino, Tapp, and Brumet (1979), compared 74 male marathon finishers and 23 male nonfinishers. Each runner completed the Rotter's internal-external locus of control measure (I-E Scale), a test which measures introversion-extroversion. No significant differences were found between the two groups on I-E scores. Among the finishers, there was a moderate but significant negative correlation of -.38 between the I-E score (internality) and finish time. Conclusions were similar to the findings of Gontang et al. (1977); distance runners tended to be more introverted than the general population. Morgan and Costill (1972), studied marathoners using the Eysenck Personality Inventory (EPI), which measures extroversion-introversion (E) and neuroticism-stability (N), as well as a Lie (L) score. The Morgan and Costill results differed in that they revealed marathoners to be within normal limits on extroversion-introversion. Differences in the results could have been due to the use of different measurement scales and to a variance in statistical analysis of the normal limits used in each study.

Wilson, Morley, and Bird (1980), examined mood states of 30 males, 20-45 years of age, who were divided into three equal groups of marathoners, joggers, and nonexercisers. Each completed the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971). POMS is a 65 question, 5-point adjective rating scale which measures

six mood states: tension, depression, anger, vigor, fatigue, and confusion. Marathoners had significantly less depression, anger, confusion, and more vigor than nonexercisers and joggers.

Personality traits of marathoners, as compared to joggers, have also been examined by researchers. Valliant, Bennie, and Valiant (1981) studied 68 marathoners and 38 joggers. Subject's personality traits were obtained from the responses on the Sixteen Personality Factor Questionnaire (16-PF; Cattell, 1971). Marathoners were found to be more reserved, intelligent, tender-minded, imaginative, and self-sufficient. Joggers were more happy-go-lucky, apprehensive, and controlled. Marathoners also tended to be more reserved when compared to joggers and to the normal population as a whole.

In addition, researchers have examined the strategies used by runners for coping with stress during competition. Freischlag (1981), examined 55 randomly selected athletes from the 1980 Skylon International Marathon. Half of the marathoners were found to either slow their pace or run through the pain, while the others relied on cognitive processes to displace pain by concentrating on other concerns. Freischlag's conclusions were not in agreement with Morgan's 1978 study. Freischlag did not identify differences in mental strategies between elite and nonelite runners.

Middle Distance/Marathoners

Researchers have also studied cognitive strategies used by middle distance runners and marathon runners. Morgan and Pollock (1979), used 8 college middle distance runners and 19 world class athletes, who were divided into subgroups of 11 middle distance, and 8 marathon runners. The study investigated possible differences in psychological characteristics between the two groups. This study further explored whether the elite runners used different types of coping strategies than nonelite runners. Data revealed that nonelite distance runners employed a cognitive strategy designed to disassociate painful input, whereas the elite runners attempted to process this information (body signals) by using association strategies. Elite runners who used association coping strategies tended to avoid serious injuries by listening to how their bodies were performing.

Nieman and George (1987) studied 231 male distance runners to determine if personality traits of faster runners were different from those of slower runners. Runners were divided into eight groups based on Gardner and Purdy's (1970) computerized running performance tables. Subjects were administered the 16-PF questionnaire to determine possible differences between groups and to compare them to the general population. As a group, runners were significantly different from 16-PF

norms on 9 of 16 measures. Runners were found to be more reserved, intelligent, dominant, socially reserved, suspicious, shrewd, experimental, self-sufficient, and unconventional than the 30 year old men in the 16-PF norms. Faster runners in comparison to slower runners were more submissive, happy-go-lucky, socially reserved, and sensitive. In comparing the eight groups of runners, the faster runners were more conscientious. The top three groups (athletes), were more emotionally stable than other runners. Faster runners tended more toward introversion than the group of runners as a whole. Runners tended to be more reserved (detached and or self-involved), intelligent (abstract thinking), and self-sufficient (resourceful) as compared to the general population. Studies on success in distance running were associated with several personality factors.

Noncompetitive Runners

Research has also been conducted on psychological characteristics of noncompetitive runners (joggers). Francis and Carter (1982) tested 44 male joggers, 25 to 35 years of age, selected from a population of faculty members and students from the University of Alabama. A brief medical history was obtained and joggers were divided into four groups based on miles jogged per week. Trait levels of anxiety were assessed using the State-Trait Anxiety Inventory (Spielberger, Gorsuch, &

Luschene, 1970) and the Multiple Affect Adjective Check List (MAACL; Zuckerman & Lubin, 1979). Psychological parameters of anxiety, hostility, and depression were found to be significantly lower for the joggers than the sedentary controls. There were no significant differences on psychological variables when joggers were compared to one another.

Ultramarathoners

McCutcheon and Yoakum (1983) examined the personalities of 50 ultramarathoners who were randomly selected to determine if there were any within group differences. Subjects included 8 runners who had run races no longer than 10 miles along with a group of 8 nonrunners. All were matched for age and sex. Ultramarathoners had an average of 6.96 years of running experience as compared to an average of 4.68 years for the control group. Ultramarathoners also ran 40 more miles per week and had faster 10 mile times. The study did not find significant personality differences among ultramarathoners, runners and nonrunners. Related research was also conducted by the U.S. Army.

Tharion, Strowman and Rauch, (1988) investigated psychological characteristics of 56 male ultramarathoners who participated in the 1986 Massanutten Mountain Massacre 50 Miler and the 1986 Old Dominion 100 Miler. Ultramarathoners were administered the POMS. A postrace

POMS was also administered within one hour after a runner finished the race, voluntarily withdrew, or was removed for medical reasons. Runners were divided into groups of 17 finishers and 17 nonfinishers in the 50 mile run and of 11 finishers and 11 nonfinishers in the 100 mile run to determine differences in mood states. Ultramarathoners in general, exhibited less tension, depression, fatigue, and confusion and more vigor when compared to nonrunners. With the exception of fatigue, there were no significant mood differences between finishers and nonfinishers. A higher level of fatigue was reported by finishers after the race. This was attributed to the fact that finishers ran further and for longer periods of time than nonfinishers. The results determined that ultramarathoners' mood profiles are similar to runners in general. Results here could be misleading due to the small sample size and to the variance in administering the postrace POMS. The POMS mood profile for the sample of ultramarathoners used in this study showed the iceberg configuration that was previously reported on marathon populations (Morgan & Pollock, 1977). High level athletes tend to score below the mean on negative psychological constructs contained in the POMS, and above the mean for one positive construct (vigor). Folkins and Bell (1981), in a similar study, examined 42 males and 4 females from the Western States Run to see if any differences existed

between race finishers and nonfinishers on personality variables. The average age of the subjects was 33. The average educational level was 16 years with the majority occupying white collar professional positions. Participants had 6 to 10 years running experience and ran 40 miles or more per week. The following three measures were administered: An abbreviated Minnesota Multiphasic Personality Inventory (MMPI; Kincannon, 1968), the MAACL, and the Adjective Check List (ACL; Gough & Heilbrun, 1965). The MMPI was used to develop personality profiles and to assess degrees of psychopathology. The MAACL, which is a self administered test comprised of 132 adjectives, was scored on three affective dimensions, anxiety, depression, and hostility. The ACL is a list of 300 adjectives commonly used to describe personal attributes. It is scored on 24 standardized scales, including 15 which are based on Murray's need theory of personality. Runners who finished the 100 mile run, tended to have more deviant scale scores on the MMPI as compared to nonfinishers. Finishers scored significantly higher on the schizophrenic, hypochondriac, hysterical, and psychopathic deviate scales. On the ACL, one adjective (adaptable) differentiated finishers from nonfinishers. Finishers checked adaptable more frequently (89%) than did nonfinishers (38%). Finishers' anxiety scores on the MAACL were lower than nonfinishers. Results

showed that ultramarathoners consistently selected several positive descriptive adjectives, and that they did not differ from the general population on motivational needs, moods, and clinical pathology.

Ultramarathoners tend to be older, 35 years old, middle class individuals with college educations. They train 6 to 7 days a week and run 50 to 60 miles a week. Ultramarathoning is still in its infancy, and as a result, this unique group of athletes has not been studied in sufficient detail to identify personality characteristics common to the group. The identification of select group differences between race finishers and nonfinishers has not yet been established.

Research was reviewed on the incidence of injury in noncompetitive runners, 10K, marathon, and ultramarathon runners. The possible differences between injured and noninjured runner's personality traits was explored.

Running Injuries

Valliant (1980) studied 42 male and 24 noncompetitive runners at Saint Mary's University. Runners were placed into two groups, injured (32 males and 16 females), and noninjured (10 males and 8 females). Data concerning the personality traits was collected from responses on 16-PF. There were no significant differences between groups though there were differences between the sexes on E (humble versus assertive) and on M (practical versus

imaginative). Injured females tended to be more practical and assertive when compared to injured males. In a later study by Valliant (1981), 41 male subjects were divided into two groups of 26 injured and 15 noninjured runners who participated in a 5, 8, or 10 mile road race. Injured and noninjured runners differed on psychological, physical, and training measures. Injured runners were found to be less tough-minded, less forthright, heavier, taller, and they ran more miles per week than noninjured runners. Similar research done by Bates and Olstering (1979) found no anatomical factors correlated with injuries.

Research on elite marathon runners done by Holmich, Darre, Jahnsen, and Jensen (1988) found that elite runners train between 56 and 93 miles per week. Runners sustained injuries at a rate of 43% that kept them from training. The most common reasons for not completing a race were exhaustion and injuries to lower extremities. Of the runners who did not drink water/or other fluids during a marathon, 61% dropped out. In a related study by Sandill, Pascoe, and Noakes (1988), 32 of the runners who collapsed in the Comrades Ultramarathon were used as subjects. Reasons for collapse were inadequate training, dehydration, and hypoglycemia.

Personality Characteristics of Athletes

In the area of trait psychology, one focus of research has been conducted to identify differences in personality traits between athletes and nonathletes. To examine possible differences in personality traits, researchers have used the Edwards Personal Preference Schedule (EPPS; Edwards, 1956) which measures the strength of basic manifest needs. Although previous studies have not used the EPPS on runners, studies using the EPPS questionnaire have been found to identify athletes of differing abilities (Johnsgard, 1977). Fletcher and Dowell (1971) examined the possible differences in personality traits between athletes and nonathletes. The EPPS was administered to 950 males in their first year of college. Subjects were classified into groups who had participated in high school athletics and those who had not. The former athletes were found to be more dominant, aggressive, and had a higher need for order than nonathletes. Hunt's (1969) study attained similar results. Stoner and Bandy (1977) studied the personality traits of female athletes involved in individual sports (n=30) and team sports (n=30) and compared them to those of female nonathletes (n=30). The EPPS was administered to all three groups. Athletes and nonathletes were found to differ on 4 of the 15 EPPS scales. Nonathletes were observed to have a higher need for intraception, change,

and heterosexuality than subjects in team sports. Participants in team sports had a higher need for deference. Nonathletes were found to have a higher need for intraception and change than individual sport females.

Researchers have also examined athletes personality traits common to each sport. Johnsgard, Ogilvie, and Merritt (1975) studied the psychological traits among 43 parachutists, 30 racing drivers, and 50 football players. Groups were administered both A and B forms of the Institute for Personality and Ability Testing Sixteen Personality Factor Questionnaire (IPAT 16-PF), MMPI), and the EPPS. The three groups shared very high needs for achievement, dominance, exhibition, change, and heterosexual expression. They shared common low needs for deference and order on the EPPS. The participants involved in the individual sports of parachuting and car racing shared common traits for independence and autonomy. They shared a need to verbalize their aggressions, were more assertive and self-sufficient. Football players showed a greater need for interpersonal relationships. Race car drivers exhibited unique psychological traits which were specific to their sport. They were more motivated, intelligent, and tough-minded, more emotionally stable, and showed greater needs related to endurance than parachutists and football players.

Personality Characteristics of Top Performers

Research has been conducted on athletes to examine differences in psychological traits between top performers and those with lesser ability (Ogilvie, 1968). A study conducted by Johnsgard (1977) tested 350 male novice race drivers who made up the 1966-69 race driver school classes in the San Francisco Region of the Sports Car Club of America (SCCA). The IPAT 16-PF, and the EPPS were administered to race drivers to assess differences in personality traits. A group of 30 men who finished every race were compared to a group of 30 men who did not finished (DNF) two or more races. Data on DNFs showed that consistent finishers were less aggressive, more conscientious as against expedient, less exhibitionistic, and had greater needs for order and endurance than drivers who had two or more DNFs. Successful amateur race car drivers who had two seasons of racing with consistently high finish times were less dominant, aggressive, and assertive, more orderly, deferential, and more inclined to take responsibility for themselves.

Summary

In the previous studies, psychological characteristics of selected running groups were examined. Marathoners and distance runners tended to be more reserved compared to noncompetitive runners and the normal population as a whole (Gontang et al., 1977). Noncompetitive runners were

significantly lower on anxiety, hostility, and depression variables than the normal population (Francis & Carter, 1982).

Tharion et al. (1988) failed to find differences in mood between race finishers and nonfinishers except for fatigue scores using the POMS. If they had used a larger sample size than n=34, results could have been affected. Furthermore, Tharion's study did not use consistent protocol for administering the postrace POMS which could have led to different results.

Folkins and Bell (1981) used the shortened version of the MMPI to access psychological characteristics of runners. Validity and reliability problems in such studies have been questioned when compared to full version of the MMPI (Folkins & Bell, 1981). Presently, the EPPS questionnaire has not been used on runners, although studies using the EPPS have been found to identify differences in personality traits between athletes and nonathletes (Fletcher & Dowell, 1971) and athletes of differing abilities (Johnsgard, 1977).

Chapter 3

Procedures

The purpose of this study was to examine the psychological profiles of ultramarathoners to determine if there were differences between runners who finished and runners who failed to complete the 1989 Western States 100 Mile Endurance Run. After requesting and receiving approval from race organizers (Appendix B & C) to conduct research, the Profile of Mood States, Edwards Personal Preference Schedule (Appendix E) and a background questionnaire (Appendix A) were administered to ultramarathoners who participated in the race.

Selection and Description of Subjects

Male runners who ranged in age from 38-46, were asked to take part in this study (Appendix D). Race eligibility was based on age related qualifying time and distance. To qualify, each runner must have had one of the following minimum times. For those 39 years old or younger, 50 miles in under 9 hours, 100 kilometers in under 12 hours or 100 miles in under 24 hours; for those 40 to 49 year olds, 50 miles in under 9 1/2 hours, 100 kilometers in under 12 1/2 hours or 100 miles in under 24 hours. Qualifying runs must have been completed within thirteen months preceding the race. The top ten finishers in each division from 1988's race were automatically granted entrance into the race.

Description of Race

The Western States 100 Mile Endurance Run starts at Squaw Valley, California. The course ascends a total of 18,090 feet and descends a total of 22,970 feet before its finish at Auburn, California. Participants were notified 6 months prior to the race that they had been selected in the lottery, which allows them minimum training time to prepare for the race. Runners characteristically train for this race by running at altitudes above 5,000 feet, in high heat and humidity, and by completing a weekly 5-6 hour run over variable terrain. To remain in the race runners were required to reach each course checkpoint by the specified cut-off time. Runners were held at any of the five major medical checkpoints if any of their vital signs (heart rate, body weight, and blood pressure) failed to meet standards predetermined at the prerace medical examination. Runners were required to reach the finish line at Placer High School in under 30 hours. Pacers were not allowed until runners reached the 69 mile mark at Foresthill. Pacers were allowed to follow along with their specified runner for the last 31 miles of the race to give assistance/and or emotional support (Klein, 1987).

Administering the Tests

Prerace

The Profile of Mood States (POMS) required 5 to 10 minutes to complete and was administered at the Squaw

Valley medical facility between 8:00 a.m. and 12:00 p.m. the day before the race. The POMS was selected for its ability to assess the psychological characteristics of runners that differentiate them from the normal population. The Edwards Personal Preference Schedule (EPPS), which takes 45 minutes to complete, was filled out and returned by mail. The EPPS was selected for its ability to identify top performers from those with lesser ability.

Postrace

During the prerace medical examination, runners were notified that a second POMS would be administered to each runner 1/2 hour after they have either dropped out or finished the race. In the event of a dropout, the runner was requested to take the test at the closest aid station. If they completed the race, they filled out the POMS at the Placer High School track, the site of the finish. If for any reason, runners did not fill out or complete the background, POMS, or EPPS questionnaires, their data were not included in this study. Trained volunteers were briefed the day prior to the race as to their responsibilities in administering the postrace POMS. Volunteers, who had previous support crew experience in the Western States, were stationed at the following locations: Robinson's Flat, Last Chance, Devils Thumb, Deep Canyon II, Michigan Bluff, Foresthill, River

Crossing, Auburn Lake Trails, Highway 49, and Placer High School. Tester's materials included 20 POMS booklets, answer sheets, and 40 pencils. Testers were further instructed to accompany race volunteers to each aid station as requested by race organizers.

Background Questionnaire

A background questionnaire was administered to examine the characteristics of the participants in the Western States. Questionnaires were mailed out with a self-addressed envelope 30 days prior to race start. Questionnaires were sent to 155 male participants ranging in age from 38-46. Thirty-two percent of the sample responded (n=50) to the questionnaire.

Selection and Description of the Questionnaires

The Profile of Mood States (POMS)

The POMS (McNair, et al., 1971) is a 65 question, 5-point adjective rating scale designed to measure six mood states: tension, depression, anger, fatigue, vigor, and confusion (see Appendix F for description of each mood state).

Reliability and Validity of the POMS. In two samples of 350 and 650 psychiatric patients (Buros, 1978) the POMS had a reliability estimates for internal consistency and item homogeneity of .84 to .95 (using K-R 20 values). Test-retest correlations range from .65 for vigor to .74 for depression (Buros, 1978). The validity of the test is

based on factorial validity: a replication of the same factors in six factor analysis of large samples of psychiatric outpatients and students. Studies employing the POMS have shown significant decreases in depression, anger, and confusion in swimmers (Berger & Owen, 1983), joggers (Lichtman & Poser, 1983), and runners (Zetner, 1982) as a function of their activity.

The Edwards Personal Preference Schedule (EPPS)

The EPPS (Edwards, 1956) is a 225-item forced choice test which measures the relative strength of 15 manifest needs: achievement, deference, order, exhibition, autonomy, affiliation, intraception, succorance, dominance, abasement, nuturance, change, endurance, heterosexuality, and aggression (see Appendix G for description of each trait).

Reliability and Validity of the EPPS. Internal consistency and item homogeneity were estimated for reliability of the EPPS using split-half reliability coefficients. The average subject responded consistently to about 80% of the EPPS duplicated items (Goldberg, 1978). The average homogeneity value of .70 was found for consistency scores for the complete 225 item EPPS test. A test-retest reliability value of .80 was determined after one week (Edwards, 1956).

Measures of response consistency were used to determine convergent validity. Measures were derived from

different item pools on the EPPS, CPI, and MMPI. Corresponding correlations among measures from the 225-item pools ranged from .30 to .45. Consistency measures obtained from the completed inventories had an average correlation of .50.

Analysis of Data

To distinguish between the two mutually exclusive groups, finishers and nonfinishers were compared on personality traits and mood states measures by use of discriminant function analysis. This analysis determines the best linear combination of predictor variables that serve as the basis for classifying cases into one of two groups (finishers versus nonfinishers). Discriminant analysis was determined by the stepwise method which finds the independent variable with the highest value on the selection criterion to begin the analysis. The initial variable is grouped with another and the discriminating power of the combination is calculated. This process continues until all pairs of variables have been analyzed. Step two determines the pair of variables with the best criterion value. This pair is grouped with a third variable and analyzed until all triad combinations have been calculated. Step three proceeds with a criterion group of three and the process continues adding one variable at a time to the criterion group until all possible combinations have been computed. At the

possible combinations have been computed. At the beginning of each step, the previous group of variables is retested to determine if they satisfy the new selection standard. In the event that a previously selected variable loses its discriminant powers, it is discarded from the selection group; however, this variable may be included at a later step if it requalifies into the criterion selection group (Chisholm, 1985).

Finally, univariate Fs and significance values were computed for eight selected EPPS traits and for six POMS mood states included in the discriminant function analysis to determine directional differences between groups. The univariate F reports the ratio between two within-group variances, while the multivariate F tests the differences among group centroids. As the Wilks' Lambda increases, the F ratio decreases. In addition, a canonical correlation was computed to determine how the discriminant functions were weighted to achieve the optimal linear equation. All statistics were performed through the SPSS/PC+ system (Noreesis, 1988) at the San Jose State University Statistics Laboratory using the Statistical Package for Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

Chapter 4

Results and Discussion

The purpose of this study was to examine differences in psychological characteristics between finishers and nonfinishers who competed in the 1989 Western States 100 Mile Endurance Run. Personality characteristics were determined for both finishers and nonfinishers based on eight traits selected a priori from the EPPS, and six mood states from the POMS. Group means and standard deviations were computed for each variable. Traits were analyzed by the Wilks' method of discriminant analysis. Appendixes H and I contain the results of the analysis of variance results.

Initially, questionnaires were sent to 155 male runners. Fifty responded to the questionnaire. Four subjects data were discarded due to failure of completing the POMS pretest, reducing the number of subjects to 46. Of the remaining 46 subjects, 30 runners finished and 16 failed to finish the race. The percentage of finishers (60%) and nonfinishers (32%) in the study was similar to runners in the overall race. A background demographic profile of the subjects as a whole showed that they trained an average of 62 miles per week the last 6 months preceding the race, and had run in previous 50 and 100 mile races. Runners used a combination of race strategies either constantly monitoring body signals (association) or

blocking out the pain (disassociation) when running ultramarathon competitions. Runners also tended to continue their training patterns unless they had serious anatomical injuries.

Background Questionnaire Analysis

As revealed in their background questionnaires, experienced male ultrarunners have been runners for an average of 14 years and have averaged 6 years of running ultradistance races. Runners who participated in this study were between the ages of 38-46 years of age. Of the runners tested, 72% had previously run the Western States. Runners reported a 63% dropout rate during previous Western States. When comparing finishers to nonfinishers in experience and training patterns, there were no significant differences between the two groups except for the number of 20+ mile training runs in the last 6 months (Appendix J). Finishers averaged 20 long training runs as compared to 10 long training runs for nonfinishers, $F(1, 44) = 17.38$, $p<.05$.

Data Analysis

Table 1 summarizes the steps with which each variable was entered or discarded from the criterion selection group in order to form the final optimal linear combination of variables.

To achieve the optimal linear combination, a standard canonical discriminant function coefficient was determined

Table 1

Selected Variables Forming the Optimal Linear Combination, Steps When Variables Satisfied Criterion Standards, and Significant Values

Action			
Entered	Removed	Steps Entered	Sig.
Depression (posttest)		1	.001
Vigor (posttest)		2	.001
Confusion (pretest)		3	.001
Tension (pretest)		4	.001
Fatigue (posttest)		5	.001
Endurance		6	.001
Anger (pretest)		7	.001
Exhibition		8	.001
Intraception		9	.001
Aggression		10	.001
	Tension (pretest)	11	
Tension (posttest)		12	.001
Vigor (pretest)		13	.001
Achievement		14	.001

for each of the selected variables. This coefficient allows each variable the best chance at satisfying the criterion standards. The coefficients assigned to each significant variable are found in Table 2.

Significant differences were found between finisher's and nonfinisher's anger, depression, and vigor posttest scores. Finishers scored higher on vigor while nonfinishers were higher on anger and depression. No significant differences were found on confusion, fatigue, and tension, while EPPS results showed significantly higher nonfinisher scores for aggression and exhibition when compared to finishers. No statistical differences were found for achievement, order, autonomy, intraception, dominance, and endurance. The background questionnaire results showed that finishers run significantly more 20+ mile training runs than nonfinishers.

EPPS Analysis

The eight EPPS trait measures selected were aggression, achievement, order, exhibition, autonomy, intraception, dominance, and endurance. No significant differences were found between finishers and nonfinishers on endurance, dominance, intraception, autonomy, achievement, and order trait measures. On two of the selected traits, aggression and exhibition, there were significant differences between the two groups.

Table 2

Standardized Canonical Discriminant Function Coefficients

Variable	Coefficient
Achievement	.20608
Exhibition	1.06939
Intraception	1.14170
Endurance	-.47194
Aggression	.74078
Tension (posttest)	-.42795
Depression (posttest)	1.57126
Anger (pretest)	-.47973
Vigor (pretest)	-.22304
Vigor (posttest)	-1.14027
Fatigue (posttest)	-.58215
Confusion (pretest)	-.76382

Finishers' mean scores were significantly higher than nonfinishers on aggression, $F(1, 44) = 6.25$, $p<.05$. Runners who failed to finish the 1989 Western States reported more aggression than did finishers. Computed means showed nonfinishers at 53.50, compared to finishers at 30.23. Significant differences were found between finishers and nonfinishers on exhibition. Nonfinishers had higher mean scores on exhibition (74.94) than did finishers (61.83), $F(1, 44) = 4.06$, $p<.05$.

Based on the results of the EPPS (see Figure 1), certain personality factors may determine whether runners can complete the Western States. According to the EPPS description of personality traits, exhibition is described as the need to be the center of attention and anger characterizes the trait of aggression. These traits were found to be prevalent in nonfinishers. There is a possible relationship between the aggressiveness and exhibitionism of nonfinishers. Nonfinishers may have pent up anger expressed through their starting out too quickly. In addition, when they start out fast they make themselves the center of attention. Therefore, high scores on aggression and exhibition may be contributing to their failure to complete the race. It is well documented that runners who start out fast in this race seldom finish (Klein, 1989). In fact, runners may have a selected personality advantage in finishing this race if

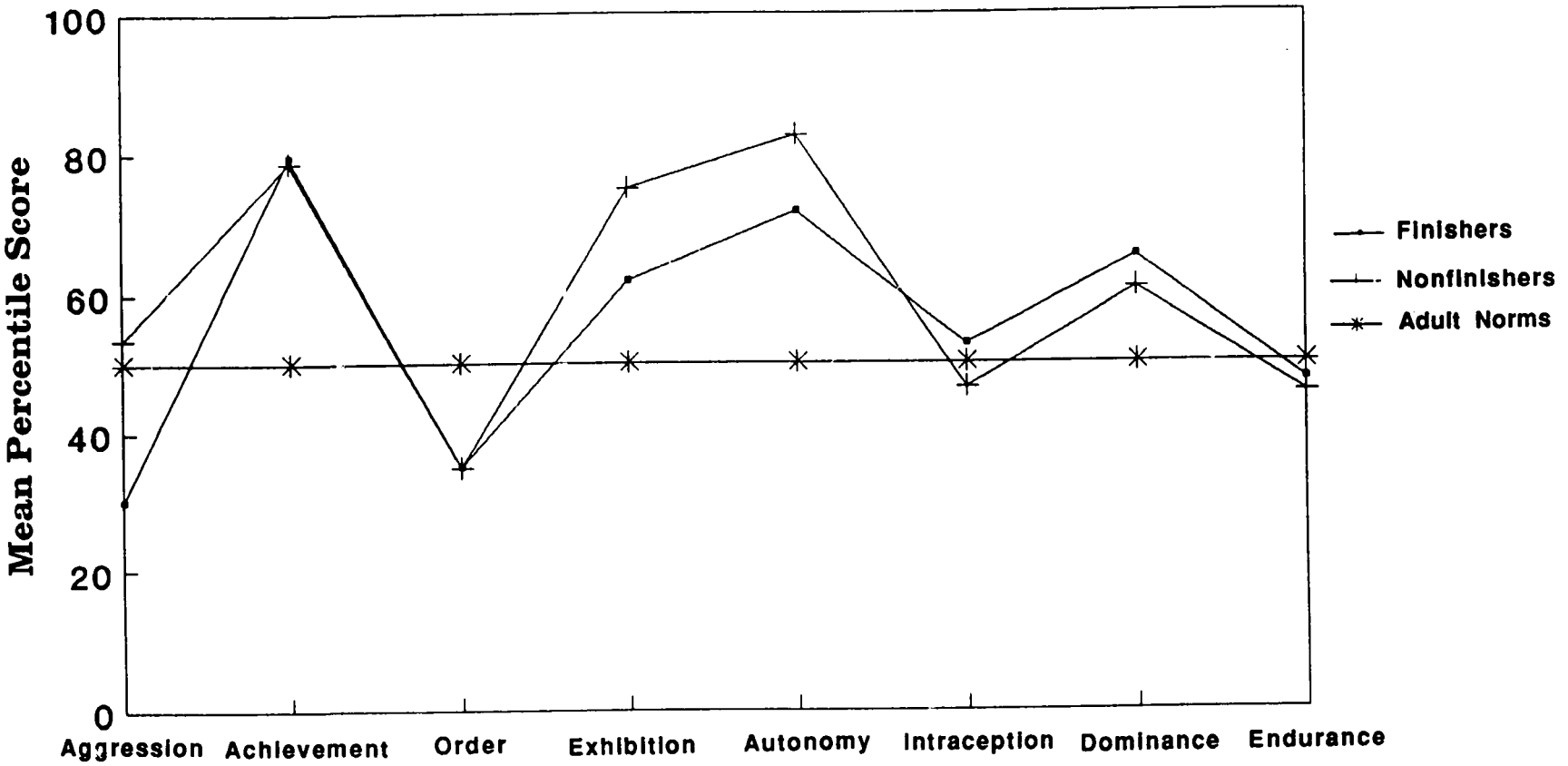

Figure 1. EPPS personality profile: finishers vs. nonfinishers.

they tend to be more passive and introverted than aggressive and exhibitionistic.

POMS Analysis

Pretest Results for Finishers versus Nonfinishers

Results of finishers versus nonfinishers on the pretest POMS showed no significant differences on fatigue, tension, depression, anger, vigor, and confusion, showing that both groups were similar in mood before the start of the race (see Figure 2).

Pre- Posttest Results for Nonfinishers

As a group, nonfinishers were composed of runners who completed postrace POMS within the established time of 30 minutes after race completion (n=9), and those who completed the postrace POMS after the 30 minute time limit had expired (n=7). Analysis of these two subgroups however, revealed no significant differences in mood (p>.05). As a result, both groups were combined into a single nonfinisher group. Nonfinishers' (posttest) anger means increased from 46.81 pretest to 52.50 posttest, while tension means decreased from a pretest mean of 53.87 to a posttest value of 47.40. Significant differences were found between pre- and posttest mean scores for depression, confusion, fatigue, and vigor. Nonfinishers exhibited more depression after they withdrew from the race, $F(1, 44) = 15.55$, $p<.05$. Mean scores were 43.69 pretest, as compared to 57.81 posttest. When comparing

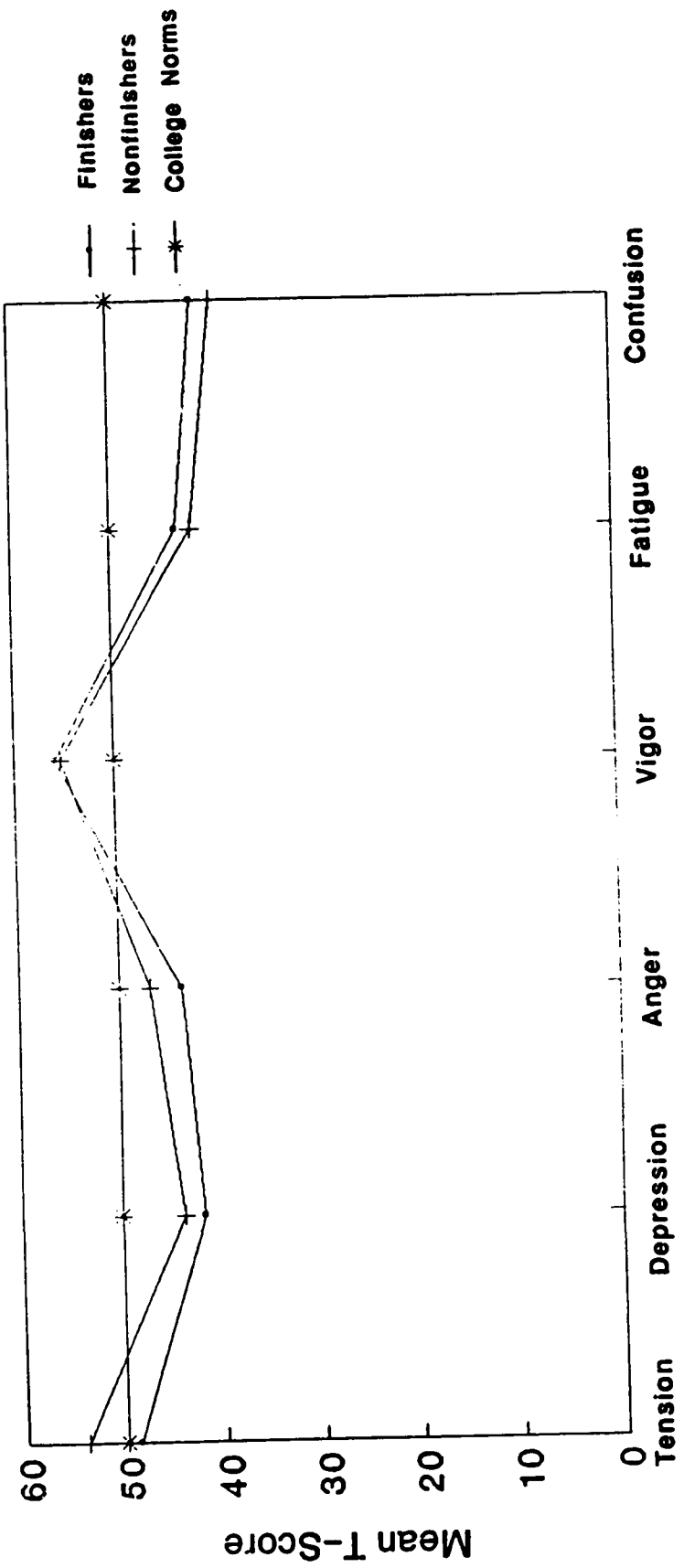

Figure 2. Pretest comparison of mood states: finishers vs. nonfinishers.

nonfinisher prerace mean scores 39.63, with postrace scores, 50.12, nonfinishers displayed significantly more postrace confusion, $F(1, 44) = 13.94$, $p<.05$. Nonfinishers tended to have significantly higher fatigue scores after withdrawal from the race (64.38) than they did prior to the start of the race (41.94), $F(1, 44) = 41.28$, $p<.05$, (see Figure 3). Nonfinishers also exhibited significantly less vigor postrace (35.06) than they did before the race (55.44), $F(1, 44) = 49.89$, $p<.05$.

Pre- Posttest Finishers' Results

Finisher's pre- posttest POMS scores showed no significant differences on confusion, depression, anger, and tension. Significant differences were found between pre- posttest scores for vigor and fatigue (see Figure 4). Vigor scores decreased posttest from 55.87 to 46.07, $F(1, 44) = 16.00$, $p<.05$, and fatigue values increased from 43.43 to 64.77, $F(1, 44) = 100.42$, $p<.05$.

Posttest Results for Finishers versus Nonfinishers

No significant differences in tension, confusion, and fatigue were found between finishers and nonfinishers' POMS scores ($p>.05$), while significant differences were found for pre-post mean scores in depression, anger and vigor (see Figure 5). Nonfinishers (57.8) exhibited more depression than finishers (44.20), $F(1, 44) = 25.25$, $p<.05$, and nonfinishers (52.50) also exhibited more anger than finishers (42.73), $F(1, 44) = 8.04$, $p<.05$.

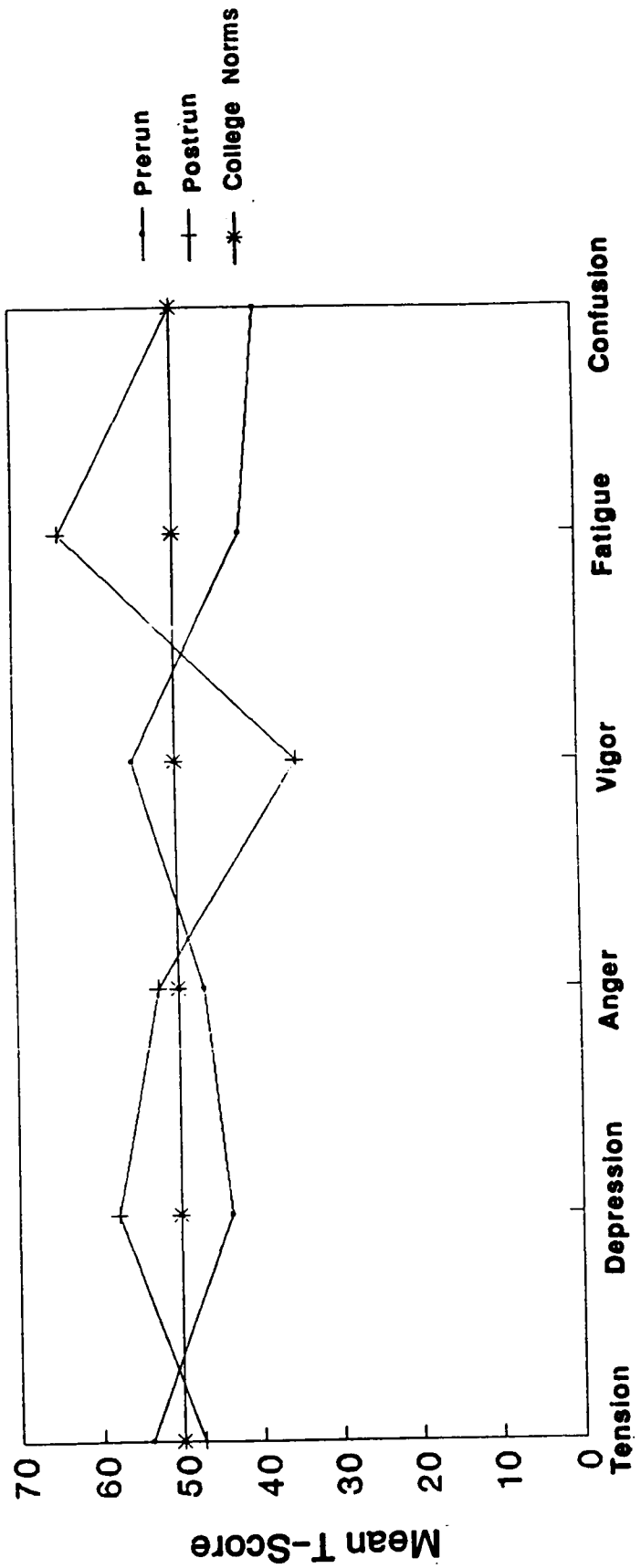

Figure 3. Pre- posttest comparison of mood states: nonfinishers.

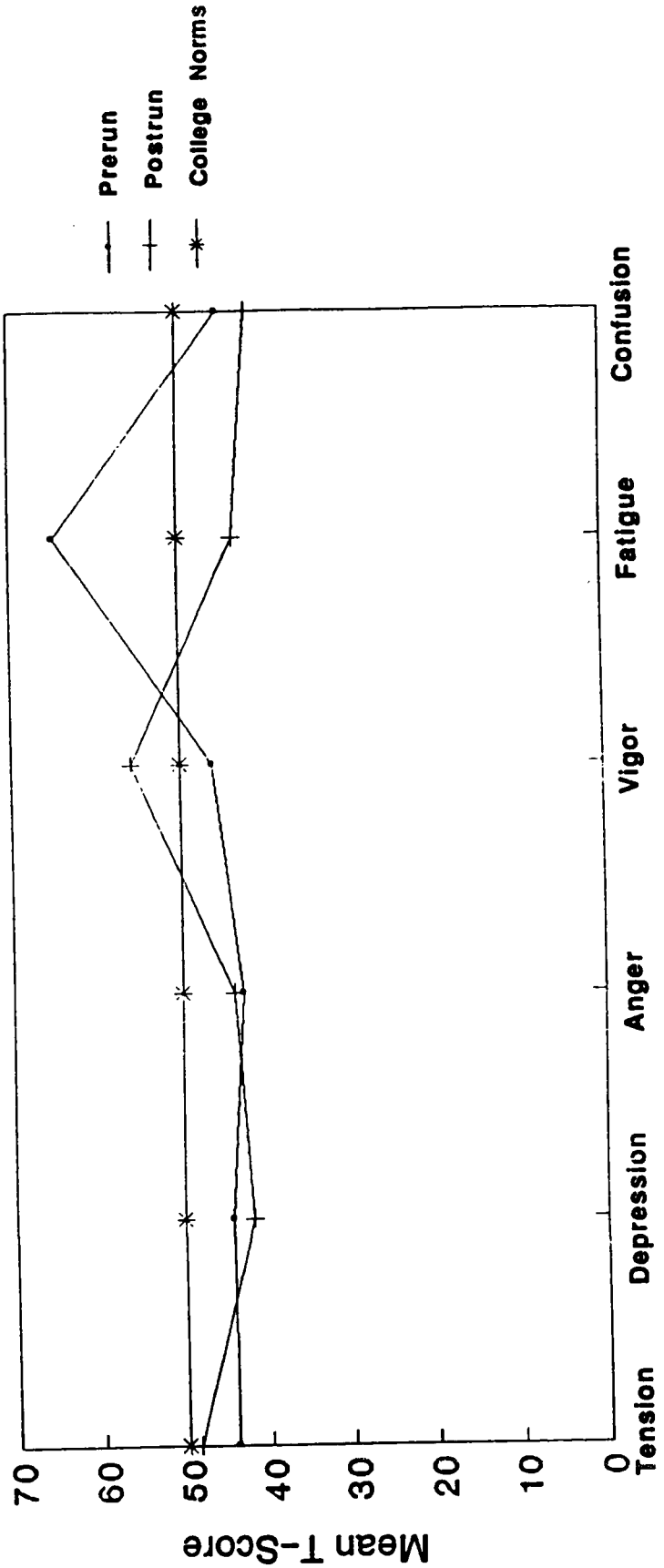

Figure 4. Pre- posttest comparison of mood states: finishers.

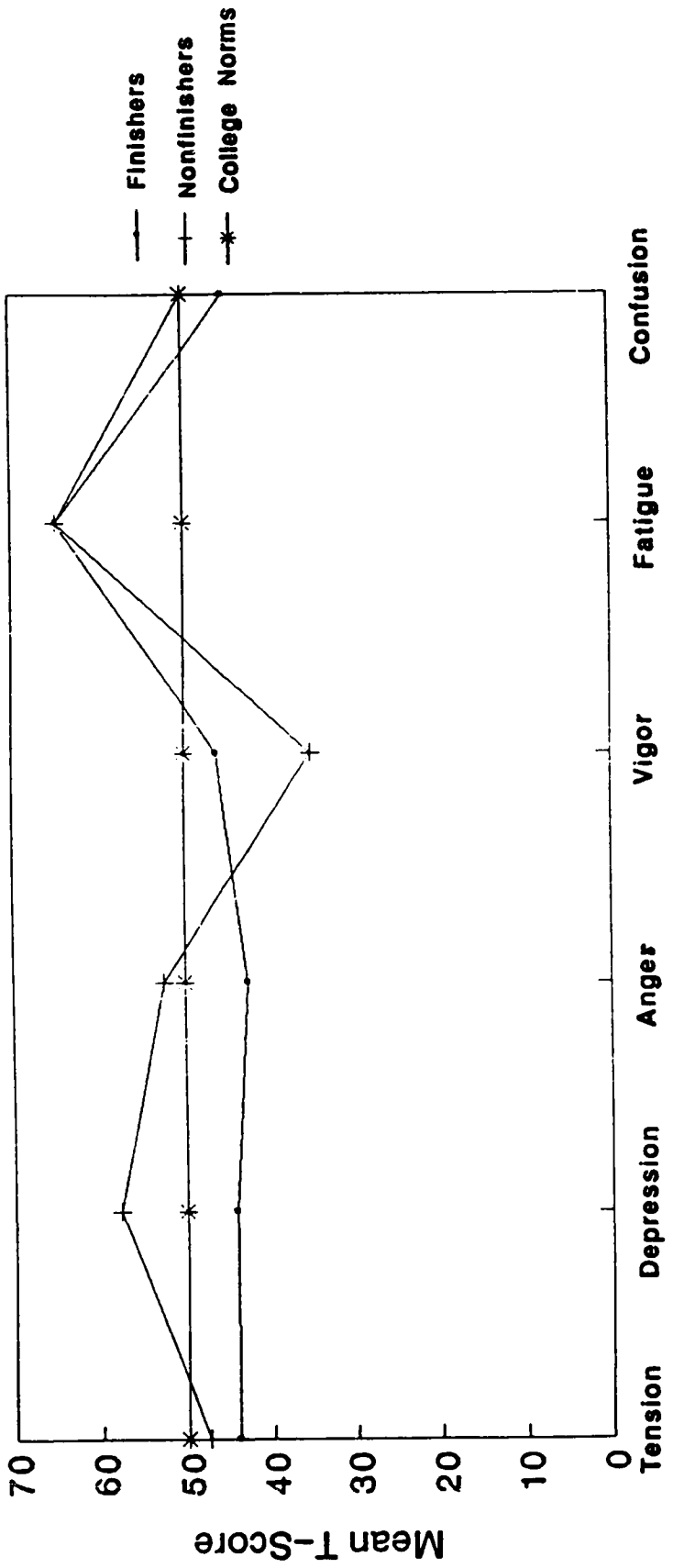

Figure 5. Posttest comparison of mood states: finishers vs. nonfinishers.

In addition, finishers (46.07) displayed more vigor than nonfinishers after the race (35.06), $F(1, 44) = 13.30$, $p < .05$.

Findings from the Discriminant Analysis

1. The model shown, correctly categorized 100 percent of the cases in finisher and nonfinisher groups.

2. The groups could be differentiated based on the following variables:

a. Significant selected variables of finishers showed posttest mean scores were significantly higher on the mood state of vigor when compared to nonfinishers.

b. Nonfinishers mean scores were significantly higher on the traits of exhibition, aggression, and on postrace mood states of depression and anger when compared to nonfinishers (see Table 3).

Table 3

Significant Selected Variables of Nonfinishers Compared to Finishers

Variable	Nonfinisher M	Finisher M	Sig.
Exhibition	74.94	61.83	.050
Aggression	53.50	30.23	.016
Depression (posttest)	57.81	44.20	.001
Anger (posttest)	52.50	42.73	.007

Summary

Before the race start, competitors exhibited a similar mood profile with runners in general, (Tharion et al., 1988) except they had a tendency toward higher tension scores. Race competitors showed nonsignificant trends toward less depression, anger, fatigue, confusion, and more vigor when compared to nonrunners. Nonfinishers tended to be more tense than a normal population of nonrunners. This is in contrast to Tharion's 1988 study that found nonfinishers to be lower in tension as compared to nonrunners. The different results in this study may be attributed to the unique group of participants. Runners become extremely focused prior to the race. It is not uncommon for runners to be unable to sleep the night prior to the start of the race.

While previous studies have shown group differences on fatigue, posttest scores for finishers versus nonfinishers on fatigue were not statistically significant. Different findings in this study may be due to race management philosophy. Runners are encouraged to continue even if they have to wait a while before they are able to go on. As a result, when runners withdraw from this race, they typically exhibit low energy levels similar to those found in finishers.

Discussion

This study found significant mood changes in depression, anger, and vigor in nonfinishers when compared to finishers. Runners in this study train ardulously for this race by running 62 miles per week for at least 6 months. It is reasonable to assume that most runners have high aspirations for completing the race. As a result, nonfinishers might be expected to have elevated depression and anger scores when compared to finishers if they fail to finish this race. Nonfinishers exhibited a significant reduction in vigor after the race compared to finishers. This may be due to the interaction of nonfinishers not feeling good about failing to finish and their own existing energy levels.

Results of the EPPS showed nonfinishers to be significantly different when compared to finishers on two personality traits; exhibition and aggression. Nonfinishers appear to take more risks, pushing too hard at the first part of the race, and possibly showing off (Klein, personal communication, 1989). Starting off too fast in this race is cited by past competitors as one of the main reasons for the high dropout rate (50%) in the Western States. Some runners have a tendency to start out too fast and not listen to body signals (Klein, personal communication, 1989). When there is a possible physical problem, these runners sometimes ignore what is happening

to them until it's too late. Results in this study were similar to the results of Johnsgard's (1977), who found that amateur race car drivers who failed to finish two or more races exhibited more aggression and exhibition than consistent drivers. Results of Chisholm's 1985 study also found differences in personality characteristics between successful and less successful gymnasts. A discriminant analysis reported successful gymnasts significantly higher on traits of drive, conscientiousness, and exhibition compared to less successful gymnasts. Less successful gymnasts scored significantly higher than successful gymnasts in levels of leadership, emotional control, and guilt proneness. The different results found on exhibition could be the result of differences in sex and age of the subjects in each study.

Chapter 5

Summary, Conclusions, and Recommendations

Summary

The purpose of this investigation was to determine differences in psychological characteristics between finishers and nonfinishers who competed in the Western States 100 Mile Endurance Run. Subjects included were 46 experienced male runners who were between 38-46 years of age, and had previously run other 50 and 100 mile ultramarathon races. These subjects were divided into two groups, finishers and nonfinishers. Two psychological inventories, the Edwards Personnel Preference Schedule, Profile of Mood States, and a background questionnaire were administered to all competitors who agreed to participate. The data obtained from this study were analyzed by a discriminant function analysis which evaluated eight traits of the EPPS and the six mood states of the POMS. This analysis was performed to determine whether the groups could be differentiated based on the complete set of characteristics.

Conclusions

Based on the analysis of data the following conclusions appear justified:

1. The Edwards Personnel Preference Schedule was able to discriminate between finishers and nonfinishers based on the following variables: exhibition and aggression.

2. In the Profile of Mood States questionnaire the variables that discriminated between the two groups were depression, anger, and vigor.

3. Finishers scored significantly higher than nonfinishers on the mood state of vigor.

4. Nonfinishers scored significantly higher than finishers on traits of exhibition, aggression, and on posttest mood states of depression and anger.

5. Competitors as a group, tended to score high in traits of achievement, exhibition, autonomy, and dominance but low on order.

6. Competitors also tended to score high in moods of fatigue but low on vigor.

7. Personality characteristics are developed and formulated by both hereditary and environmental factors (Minton & Schneider, 1980). If runners can receive positive feedback at a early age, advantageous characteristics could be developed along with skill acquisition. A selective advantage appears to exist in runner's acquiring specific characteristics which may determine their success in ultra endurance sports. Furthermore, psychological testing for desired traits could be a useful instrument in development of psychological profiles of athletes in various sports.

8. The information from this study should not be used for determining outcomes, but as a method to promote potential

ultradistance athlete's abilities through appropriate psychological development and physical training.

Recommendations for Future Study

The findings of this study appear to support previous research that found that athletes can be separated into successful and less successful groups and that this is determined by their personality characteristics (Johnsgard, 1977; Tutko, Lyon, & Ogilvie, 1974; Chisholm, 1985). Available research on ultramarathon athletes has primarily used small samples. Larger data samples in future research is needed to support current theory.

Additional analysis of ultra endurance athletes personality characteristics is necessary. The ultramarathoner's complete personality profile has not been established due to the different criterion established within each study. Hopefully, future trait research will consider developing methods to increase the number of questionnaire respondents. Personality characteristics of athletes not included in studies may be more important than those who were self-selected. Further study should analyze the EPPS scales not focused on in this study. Administering other questionnaires such as Cattell's 16-PF, MMPI, and the California Psychological Inventory should also be explored to determine the possible existence of other psychological characteristics common to successful ultra endurance athletes.

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Appendixes

Appendix A

Background Questionnaire

Name _____ Sex _____

Address _____ Age _____

_____

_____

Telephone work (___)_____ _____

home (___)_____

Best running times in the following distances: (1988-89)

10K _____ Marathon _____ 50 Miles _____

100 Miles_____

1. How many years have you been running? _____

2. How many years have you been running ultramarathons?_____

3. How did you first get involved in running? _____

_____ _____

_____

4. On the average how many miles do you run each week during the last 6 months? _____

5. How many long training runs of 20 miles or longer did you run <u>each week</u> in preparation for this race during the last 6 months? _____

6. Do you run when you are hurt? _____

7. Do you run when you are tired? _____

8. Have you suffered from any injuries during training that prevented you from running?_____ If so, list the injury and how long it took to recover? _____

_____

9. How many training runs did you have in
a) high heat?_____ b) extreme cold? _____
c) altitude and heat _____ in the last 6 months?

10. How many training runs did you have at altitudes above 5,000 feet? _____ in the last 6 months?

Questions for Previous Runners of the Western States

11. What was the main reason for your success when the last time you completed the last Western States?

_____

_____

12. List previous years you have run the Western States and give finishing time or aid station and mile mark of dropout point.

year	finishing time	dropout point
_____	_____	_____
_____	_____	_____
_____	_____	_____

13. What caused you to drop out of your last Western States? _____

14. If you have failed to complete the race in previous years, can you recount how you felt emotionally when you had to withdraw from the race?

_____

15. If you have never dropped out of the race, what of your previous Western States Experiences might have caused you to fail in your attempt to finish the race? _____

_____

16. How many miles did you train on the Western States trail in the last 6 months? _____

17. What types of injuries did you have during your previous Western States experience? _____
_____

18. To what level did your perception of pain increase during your previous attempt at the Western States?

(circle letter)

a) little or no discomfort
b) moderate discomfort
c) mild discomfort
d) severe discomfort

19. What do you do when you have a physical problem during the race? _____
_____

20. If you experienced pain, do you run through it or do you try and remedy the situation?_____(yes or no)

21. In the last Western States what mile mark and/or aid station did you reach during daylight hours of the race?
_____
_____

22. In previous Western States experience how many miles were you averaging per hour while running at night? _____

23. What was your predominant strategy used for coping with pain and discomfort? a) Association-constantly monitoring body signals. b) Disassociation-distract your mind from pain and other distress signals coming from your body. (explain)
_____
_____
_____

Appendix B

Request to Conduct Study

January 25, 1989

Board of Directors
Western States Endurance Run
11139 Mace River Court
Rancho Cordova, CA 95670

Board of Directors:

I would like permission to conduct a study on the personality characteristics of ultramarathoners who participate in the 1989 Western States 100 Mile Endurance Run. Runner's psychological profiles will be examined to determine if differences exist between race finishers and nonfinishers.

Ultramarathoning is a sport I have participated in since 1982. I have run in the Western States Endurance Run in 1983, 1984, and 1987. I completed the race in 1984 and 1987 in under 30 hours. But it was my first attempt in the Western States in 1983 that is my most memorable experience. I withdrew from the race at the 86 mile mark, Auburn Lakes Trails. I realized that psychological strength must be equal to or stronger than physiological strength for successful completion of the Western States. As a result of this and other such running experiences, I became interested in the psychological aspects of distance running and therefore decided to undertake this study to fulfill my thesis requirement and thereby complete my Master's Degree at San Jose State University.

Competitors will be asked to fill out a background questionnaire along with a paper and pencil test known as the Profile of Mood States (POMS). The POMS is a 65-item adjective rating scale which takes only a few minutes to fill out. It is designed to assess the following six mood states: tension, depression, anger, vigor, fatigue and confusion. The POMS will be administered twice, before the race at the prerace medical examination and again within one hour after the finish of the race or at the aid station of the drop out point. The Edwards Personal Preference Schedule will also be administered either my mail, at the Nugget 50 mile run, or at the prerace medical examination. The EPPS, which takes 1 hour to fill out, is a 225 question forced choice test which measures the relative strength of 15 manifest needs.

These trained testers will be at the following aid stations: Debbie Show (Robinson Flat), Steve Lindstrom (Last Chance), Greg Cantrell (Devil's Thumb), Kim Smith (Michigan Bluff), Pam Reid (Forresthill), Charlie Johnson (California Aid Station #3), Marchael Shea (River Crossing), JoAnn Lindstrom (Auburn Lake Trails), Janice Johnson (Highway 49), and Dan Lindstrom (Placer High School). These testers will be instructed to accompany aid station personnel to their prospective check point. **They will give assistance at all aid stations where they are assigned.**

A study of this kind will be of value to the Western States organization and to the ultramarathoners who want to participate in this ultimate endurance race. In addition, it is hoped that this study will further the knowledge of what we now know about the psychological domain of endurance athletes.

I greatly appreciate your consideration in this matter.

Professionally yours,

Daniel V. Lindstrom

Daniel V. Lindstrom

Appendix C

Approval to Conduct Study

May 3, 1989

Mr. Dan Lindstrom
17005 Roberts Road # 3
Los Gatos, California 95032

Dear Dan:

The board of directors has granted you permission to conduct your research project at this year's Western States 100 Mile Endurance Run. If we can be of any assistance to you, don't hesitate to call.

yours truly,

Norman Klein
Race Director

Appendix D
Participation Letter

May 31, 1989

Daniel V. Lindstrom
17005 Roberts Road #3
Los Gatos, CA 95032

Dear Western States Runner:

I request your participation as a subject in my study on personality characteristics of runners who compete in the 1989 Western States 100 Mile Endurance Run. Runner's personality profiles will be examined to determine if differences exist between race finishers and nonfinishers.

I first became interested in the psychological aspects of distance running as a result of my participation in the 1983 Western States. I withdrew from the race that year at the 86 mile mark, Auburn Lake Trails. I realized then, as you may have, that psychological strength must be equal to or stronger than physiological strength for successful completion of the Western States. I finished the race in 1984 and 1987 in under 30 hours but I still asked myself that question, "Why, even though I was in better shape in 1983, was I not able to finish the race then?" As a result of this and other such running experiences, I became interested in the psychological aspects of distance running and therefore decided to undertake this study.

Participation in this study will require you to fill out 3 questionnaires, the Edwards Personal Preference Schedule, the Profile of Mood States, and a background questinnaire. The Edwards Personal Preference Schedule and background questinnaire will be completed by mail. The Profile of Mood States, which takes only a few minutes to fill out, will be completed at the prerace medical examination. A second Profile of Mood States will be completed at the finish line. In the event that you withdraw from the race, you will be asked to complete the questionnaire at the closest aid station.

Enclosed, you will find a consent form, the Edwards Personal Preference Schedule with answer sheet, and a background questionnaire. If you decide to participate in this study, complete and return all test materials in the enclosed stamped addressed envelope. I will be at the prerace medical examination to personally hand to you the results of your Edwards Personal Preference Schedule.

The results of this study will benefit you in that it will identify your personality profile along with valuable information concerning your mood states.

I would greatly appreciate your participation in my study. Good luck in this year's race. I hope to see you at the prerace medical examination.

Sincerely,

Daniel V. Lindstrom (Signed)
Researcher/Graduate Student

Appendix E

Test Descriptions

Profile of Mood States

Reproduction of the test, exact directions, and answer sheets are prohibited by copyright. The test may be obtained from:

Educational and Industrial Testing Service
P.O. Box 7234
San Diego, California

Edwards Personal Preference Schedule

Reproduction of the test, exact directions, and answer sheets are prohibited by copyright. The test may be obtained from:

The Psychological Corporation
New York, New York

Appendix F

Descriptions of the POMS Factors

Profile of Mood States (McNair, Lorr, & Droppleman, 1971)

Tension-Anxiety (Factor T). Factor T is defined by adjective scales descriptive of heightened musculoskeletal tension. The defining scales include reports of somatic tension which may not be overtly observable (tense, on edge), as well as observable psycho-motor manifestations (shaky, restless).

Depression-Dejection (Factor D). Factor D appears to represent a mood of depression accompanied by a sense of personal inadequacy. Indicating feelings of personal worthlessness (unworthy), futility regarding the struggle to adjust (hopeless, desperate), a sense of emotional isolation from others (blue, lonely, helpless, miserable), sadness (unhappy) and guilt (sorry for things done).

Anger-Hostility (Factor A). Factor A appears to represent a mood of anger and antipathy towards others. Angry, furious, ready to fight. They describe feelings of intense, overt anger. Grouchy and annoyed describe milder feelings of hostility. Resentful, spiteful, deceived, and bitter refer to more sullen and suspicious components of hostility. Peeved, bad-tempered and rebellious were added.

Vigor-Activity (Factor V). Factor V is defined by adjectives suggesting a mood of vigorousness, ebullience,

and high energy. Friendliness is highly correlated with Vigor.

Fatigue-Inertia (Factor F). Factor F represents a mood of weariness, inertia and low energy level.

Confusion-Bewilderment (Factor C). Factor C represents a mood of confused, forgetful, bewildered, and unable to concentrate.

Appendix G

Description of the EPPS Personality Traits

Edwards Personal Preference Schedule (Edwards, 1953)

Achievement (ach). To do one's best, to be successful, to accomplish tasks requiring skill and effort, to be a recognized authority, to accomplish something of great significance, to do a difficult job well, to solve difficult problems and puzzles, to be able to do things better than others, to write a great novel or play.

Deference (def). To get suggestions from others, to find out what others think, to follow instructions and do what is expected, to praise others, to tell others that they have done a good job, to accept the leadership of others, to read about great men, to conform to custom and avoid the unconventional, to let others make decisions.

Order (ord). To have written work neat and organized, to make plans before starting on a difficult task, to have things organized, to keep things neat and orderly, to make advance plans when taking a trip, to organize details of work, to keep letters and files according to some systems, to have meals organized and have a definite time for eating, to have things arranged so that they run smoothly without change.

Exhibition (exh). To say witty and clever things, to tell amusing jokes and stories, to talk about personal

adventures and experiences, to have others notice and comment upon one's appearance, to say things just to see what effect it will have on others, to talk about personal achievements, to be the center of attention, to use words that others do not know the meaning of, to ask questions others cannot answer.

Autonomy (aut). To be able to come and go as desired, to say what one thinks about things, to be independent of others in making decisions, to feel free to do what one wants, to do things that are unconventional, to avoid situations where one is expected to conform, to do things with regard to what others may think, to criticize those in positions of authority, to avoid responsibilities and obligations.

Affiliation (aff). To be loyal to friends, to participate in friendly groups, to do things for friends, to form new friendships, to make as many friends as possible, to share things with friends, to do things with friends rather than alone, to form strong attachments, to write letters to friends.

Intraception (int). To analyze one's motives and feelings, to observe others, to understand how others feel about problems, to put one's self in another's place, to judge people by why they do things rather than by what they do, to analyze the behavior of others, to analyze the motives of others, to predict how others will act.

Succorance (suc). To have others provide help when in trouble, to see encouragement from others, to have others be kindly, to have others be sympathetic and understanding about personal problems, to receive a great deal of affection from others, to have others do favors cheerfully, to be helped by others when depressed, to have others feel sorry when one is sick, to have a fuss made over one when hurt.

Dominance (dom). To argue for one's point of view, to be a leader in groups to which one belongs, to be regarded by others as a leader, to be elected or appointed chairman of committees, to make group decisions, to settle arguments and disputes between, to persuade and influence others to do what one wants, to supervise and direct the actions of others, to tell others how to do their jobs.

Abasement (aba). To feel guilty when one does something wrong, to accept blame when things to not go right, to feel that personal pain and misery suffered does more good than harm, to feel the need for punishment for wrong doing, to feel better when giving in and avoiding a fight than when having one's own way, to feel the need for confession of errors, to feel depressed by inability to handle situations, to feel timid in the presence of superiors, to feel inferior to others in most respects.

Nurturance (nur). To help friends when they are in trouble, to assist others less fortunate, to treat others

with kindness and sympathy, to forgive others, to do small favors for others, to be generous with others, to sympathize with others who are hurt or sick, to show a great deal of affection toward others, to have others confide in one about personal problems.

Change (chg). To do new and different things, to travel, to meet new people, to experience novelty and change in daily routine, to experiment and try new things, to eat in new and different places, to try new and different jobs, to move about the country and live in different places.

Endurance (end). To keep at a job until it is finished, to complete any job undertaken, to work hard at a task, to keep at a puzzle or problem until it is solved, to work at a single job before taking on others, to stay up late working in order to get a job done, to put in long hours of work without distraction, to stick at a problem even though it may seem as if no progress is being made, to avoid being interrupted while at work.

Heterosexuality (het). To go out with members of the opposite sex, to engage in social activities with the opposite sex, to be in love with someone of the opposite sex, to kiss those of the opposite sex, to be regarded as physically attractive by those of the opposite sex, to participate in discussions about sex, to read books and plays involving sex, to listen to or to tell jokes

involving sex, to become sexually excited.

Aggression (agg). To attack contrary points of view, to tell others what one thinks about them, to criticize others publicly, to make fun of others, to tell others off when disagreeing with them, to get revenge for insults, to become angry, to blame others when things go wrong.

Appendix H

Analysis of Variance Results of the Profile of Mood States Questionnaire

Table 4

Finisher (1) and Nonfinisher (2) Pretest Group Means Standard Deviations, Univariate Fs, and Significance Values for Six Mood States.

Mood State	Group Mean	Standard Deviation	F	Sig.
Fatigue				
1	43.43	8.47	.31	.59
2	41.94	9.13		
Tension				
1	48.57	10.05	2.97	.09
2	53.88	9.75		
Depression				
1	41.70	4.48	1.10	.39
2	8.42	1.10		
Anger				
1	43.70	7.63	1.24	.33
2	46.81	11.28		
Vigor				
1	55.87	7.86	.03	.87
2	55.44	9.12		
Confusion				
1	41.63	8.91	.57	.44
2	39.63	7.87		

Table 5

Finisher Pretest (1) and Posttest (2) Group Means, Standard Deviations, Univariate Fs, and Significance Values for Six Mood States.

Mood State	Group Mean	Standard Deviation	F	Sig.
Fatigue				
1	43.43	8.47	100.42	.01*
2	64.77	8.01		
Tension				
1	48.57	10.05	3.09	.08
2	43.97	10.22		
Depression				
1	41.70	4.48	2.80	.10
2	44.20	6.85		
Anger				
1	43.70	7.63	.23	.63
2	42.73	7.82		
Vigor				
1	55.87	7.86	16.00	.01*
2	46.07	10.88		
Confusion				
1	41.63	8.91	1.94	.17
2	45.10	10.10		

*$p < .01$.

Table 6

Nonfinisher Pretest (1) and Posttest (2) Group Means, Standard Deviations, Univariate Fs, and Significance Values for Six Mood States.

Mood State	Group Mean	Standard Deviation	F	Sig.
Fatigue				
1	41.94	9.13	41.28	.01*
2	64.38	10.57		
Tension				
1	53.88	9.76	3.46	.07
2	47.37	10.01		
Depression				
1	43.69	8.42	15.55	.01*
2	57.81	11.59		
Anger				
1	46.81	11.28	1.39	.25
2	52.50	15.64		
Vigor				
1	55.44	9.12	48.89	.01*
2	35.06	7.07		
Confusion				
1	39.63	7.87	13.94	.01*
2	50.12	8.03		

*$p < .01$.

Table 7

Finisher (1) and Nonfinisher (2) Posttest Group Means, Standard Deviations, Univariate Fs, and Significance Values for Six Mood States.

Mood State	Group Mean	Standard Deviation	F	Sig.
Fatigue				
1	64.77	8.01	.02	.90
2	64.38	10.57		
Tension				
1	43.97	10.22	1.18	.28
2	43.37	10.01		
Depression				
1	44.47	6.85	25.21	.01*
2	57.81	11.59		
Anger				
1	42.73	7.82	8.04	.03*
2	52.50	15.64		
Vigor				
1	46.07	10.88	3.30	.01*
2	35.06	7.07		
Confusion				
1	45.07	10.12	2.98	.07
2	50.12	8.03		

*$p < .03$.

Appendix I

Analysis of Variance Results of the Edwards Personnel Preference Schedule Questionnaire

Table 8

Finisher (1) and Nonfinisher (2) Group Means, Standard Deviations, Univariate Fs, and Significance Values for Eight EPPS Traits.

Trait	Group Mean	Standard Deviation	F	Sig.
Aggression				
1	30.23	29.64	6.25	.02*
2	53.50	30.87		
Achievement				
1	79.50	18.09	.02	.89
2	78.69	19.59		
Order				
1	35.10	23.06	.00	.97
2	34.81	28.90		
Exhibition				
1	61.83	20.65	4.06	.05*
2	74.94	21.67		
Autonomy				
1	71.73	24.85	2.05	.13
2	82.06	20.00		

*p<.05.

table continues

Trait	Group Mean	Standard Deviation	F	Sig.
Intraception				
1	52.67	29.99	.43	.53
2	46.37	33.33		
Dominance				
1	65.27	28.42	.26	.62
2	60.69	30.57		
Endurance				
1	47.47	27.24	.05	.82
2	45.56	26.87		

Appendix J

Analysis of Variance Results of the Background Questionnaire

Table 9

Finisher (1) and Nonfinisher (2) Group Means, Standard Deviations, F Scores, and Significance Values for Runners Background Questionnaire.

Factor	Group Mean	Standard Deviation	F	Sig.
Running Experience				
1	12.83	4.34	2.06	.26
2	15.62	9.00		
Ultra Experience				
1	6.00	3.00	.00	1.00
2	6.00	2.85		
100 Mile Time				
1	24.24	4.34	.03	.87
2	23.66	5.22		
Miles/Week				
1	59.70	12.31	1.17	.29
2	65.63	12.26		
20+ Mile Runs				
1	20.10	6.74	17.38	.01*
2	9.25	10.93		
Race Experience				
1	1.60	1.69	.03	.88
2	1.68	1.88		
Race Withdrawal				
1	.63	.76	.00	.97
2	.62	.80		

$p < .01$.