

EFFECTS OF AN INTERCOLLEGIATE SPORT SEASON
ON SELECTED PERSONALITY TRAITS
AND MENTAL PREPARATION SKILLS

A Thesis

Presented to the
Department of Physical Education and Sport
State University of New York
College at Brockport
Brockport, NY

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Education
(Physical Education)

by

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May 1997

STATE UNIVERSITY OF NEW YORK
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BROCKPORT, NY

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Title of Thesis: Effects of an intercollegiate sport season on selected personality traits
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College at Brockport, in partial fulfillment of the requirements for the degree Master of Science
in Education (Physical Education).

Date: 6/27/97

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ACKNOWLEDGEMENTS

With the completion of my Master's Thesis, I would like to acknowledge those people who guided me throughout this research project. I would like to thank Dr. Merrill Melnick and Dr. Peter Galvani for serving on my thesis committee. I appreciated their insights, suggestions, and assistance. I also want to thank my parents, Dan and Bonnie Drake, whose love and support in everything I do is everlasting.

I especially want to thank Dr. Dan Smith for all of his guidance as my thesis advisor. His expertise in the area of Sport Psychology and his constant assistance were instrumental in helping me complete my thesis.

ABSTRACT

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STATE UNIVERSITY OF NEW YORK
COLLEGE AT BROCKPORT, 1997
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This study investigated changes in five personality traits and the use of mental preparation skills by college athletes over the course of a sport season. The traits measured included achievement motivation, competitive trait anxiety, concentration, leadership, and trait self-confidence. The mental preparation skills included imagery, stress management, goal-setting, psychic energy management, and attention. A self-evaluation questionnaire was administered to Fall and Winter intercollegiate athletes at the State University of New York, College at Brockport. The participating male athletic teams included soccer, football, basketball, ice hockey, cross-country, and wrestling. The participating female athletic teams included soccer, field hockey, gymnastics, volleyball, basketball, cross-country, and tennis. The purpose of the investigation was to determine if the personality traits and mental preparation skills of athletes change over the course of a sport season. It was found that five of the six personality traits and the mental

preparation skills did not change. Competitive trait anxiety was the only variable that significantly changed from pre- to post-season.

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CHAPTER 1

Introduction

A major focus in sport psychology research over the past 25 years has been the identification of particular characteristics or traits of individuals to explain and predict behavior in sport contexts. The major focus of this investigation, however, was not to predict performance from personality measures, but simply to determine if an athlete's personality changes over time. Differing opinions have emerged as to whether personality traits are relatively stable, or whether they can be modified through sport experiences and interventions. Secondly, the researcher was also interested in whether an athlete's use of mental preparation skills changes over the course of a sport season.

Personal experience as a coach and athlete led the researcher to believe that personality traits and mental preparation skills can change over time. Change can occur, in the absence of direct intervention, as a result of maturation, coaching, and the sport experience. If coaches know which personality traits and mental preparation skills change over the course of a season, they can better target their efforts at facilitating change.

Purpose

The purpose of this investigation was to determine if changes occur in selected personality traits and mental preparation skills over the course of a sport season. The personality traits under study included achievement motivation, competitive trait anxiety, concentration, leadership, and trait self-confidence. The mental preparation skills included imagery, stress management, goal-setting, psychic energy management, and attention.

Hypothesis

Personality traits and mental preparation skills of athletes positively change over the course of a sport season. Specifically, athletes will demonstrate higher achievement motivation, lower competitive trait anxiety, better concentration, better leadership, and higher trait self-confidence. In addition, they will also make more effective use of mental preparation skills (i.e., imagery, stress management, goal-setting, psychic energy management, and attention) over the course of a competitive season.

Delimitations

1. The investigation was delimited to Fall and Winter athletes at an NCAA Division III institution. The athletes were chosen from 13 teams, six men's teams and seven women's teams.
2. Five personality traits (achievement motivation, competitive trait anxiety, concentration, leadership, and trait self-confidence) and five mental preparation skills (imagery, stress management, goal-setting, psychic energy management, and attention) were selected for the investigation; no other individual characteristics were included in the study.

Limitations

1. Although all of the subjects were varsity athletes, the researcher could not specify with any certainty what their specific skill levels were.
2. Four of the six sub-scales (achievement motivation, concentration, leadership, and a composite score for the five mental preparation skills) have no established reliability or validity. Only the competitive trait anxiety and trait self-confidence sub-scales have been previously determined to be reliable and valid.

3. Social desirability factors may have influenced the athletes' responses to the measurement instruments.
4. Several factors other than the competitive sport experience can cause changes in personality traits and mental preparation skills over the course of a competitive season. The research methodology chosen did not allow the researcher to draw any conclusions about causality.

Significance of the Study

Although many researchers have studied the personality traits of athletes, few have investigated *changes* in personality over the course of a competitive season. This may be so because they believe that personality traits are relatively stable over time, and that a competitive season is unlikely to have any effect. However, others believe that personality can and does change over time. If we find that changes do occur, coaches can make appropriate use of the information. If changes do not occur, then coaches can better spend their time elsewhere.

Definitions

1. Achievement motivation: The reason people select different activities, persist in them, and the intensity used to carry them out (Carron, 1984).
2. Competition: The process involved in striving to outdo another, as for supremacy.
3. Concentration: The ability to focus one's efforts on a specific task.
4. Extrinsic motivation: Desire to succeed, which comes from others through positive and negative reinforcements, or from a desire for material possessions (such as money, trophies, etc.)

5. Imagery: An experience similar to a sensory one but arising in the absence of the usual external stimuli (Martens, 1982).
6. Intrinsic motivation: The inner drive to be competent and successful.
7. Leadership: The influencing of individuals and groups toward a common goal (Barrow, 1976).
8. Personality: The relatively stable psychological structure and processes that organize human experience and shape a person's activities and reactions to the environment (Horn, 1992).
9. Personality trait: "Any distinguishable, relatively enduring way in which one individual differs from others" (Guilford, 1959, p. 6).
10. Sport-confidence: An athlete's realistic expectation about achieving success as a result of past experiences.
11. Trait anxiety: The behavioral predisposition to perceive a wide range of nondangerous situations as threatening and to respond to them with varying levels of state anxiety (Spielberger, 1966).
12. Trait self-confidence: "The belief or degree of certainty individuals usually possess about their ability to be successful in sport" (Vealey, 1986, p. 223).

CHAPTER 2

Review of Literature

One goal of sport personology research is to explain the role of personality in sport in a way that is systematic, replicable, and predictive. Vealey (1992) has identified four approaches to the study of personality: psychodynamic, dispositional, phenomological, and learning. Psychodynamic approaches are complex and have little direct impact on sport personality research because of their clinical focus. Dispositional approaches emphasize consistency in behavior over time and across situations. Advocates contend that an individual's personality is essentially a collection of dispositional characteristics. Phenomological approaches focus on an individual's subjective experience and personal view of the world. Learning approaches emphasize that learning accomplished through interactions with the environment best explains human behavior (Vealey, 1992).

Personality traits both guide and initiate behavior (Hergenhahn, 1980). Opinions differ in psychology as to how to define a personality trait. Most researchers refer to personality traits as relatively stable and unchanging. Wiggins (1971) states that personality traits are distinguishable, relatively enduring ways in which people differ from others. They refer to attributes or qualities which have been abstracted from behavior by a process referred to as trait attribution. There are differences of opinion in the field of sport psychology as to whether personality traits change, or are modified through sport experiences. Traits are generally thought of as dispositions to act in certain ways rather than as characteristics which always cause a person to act in a certain way (Lamberth, 1978). Most personality researchers would agree that "traits are relatively stable

personality dispositions” (Guilford, 1959, p. 6), that is, they last over a long time, are displayed in most (if not all) situations, and exercise significant control over an individual’s behavior (Lamberth, 1978).

Griffith (1926) made an early distinction between traits and states by describing personality in terms of persistency and insistency. He stated that personality traits are persistent in that they last over a period of time, but they can also be insistent, that is, they are actively manifested in specific situations.

Some sport researchers and coaches believe that personality traits change over the course of a sport season. If they are right, then coaches need to know which traits change over time and which do not. It seems reasonable to believe that participation in athletics can produce both favorable and unfavorable changes in personality, depending on the circumstances (Booth, 1957).

Shacter (1949) describes personality as “continuing to grow, and to change in many ways, every week and month and year of your life” (p. 5). Kennedy (1971), a swimming coach, believes that you can take a personality trait and, by reinforcing it, bring it to the forefront of other personality traits. Others believe that personality traits can be modified (brought from potentiality to actuality) by sports participation (Kennedy, 1971).

Mental Toughness Profile

Literature dealing with the Mental Toughness Profile (Smith, 1994) will now be reviewed. The profile includes six sub-scales for measuring “mental toughness.” These scales are: achievement motivation, competitive trait anxiety, concentration, leadership, trait self-confidence, and a mental preparation skills composite score.

Competitive Trait Anxiety

Charles Spielberger (1966), a psychologist noted for his extensive work in the area of anxiety and behavior, was the first researcher to clearly delineate between two types of anxiety - state and trait. He observed that state anxiety (A-state) is characterized by subjective, consciously perceived feelings of apprehension and tension, accompanied by activation or arousal of the sympathetic branch of the autonomic nervous system. He further defined trait anxiety (A-trait) as the behavioral pre-disposition to perceive a wide range of nondangerous situations as threatening and to respond to them with varying levels of state anxiety. In other words, he viewed trait anxiety as a relatively stable personality trait, and state anxiety as a temporary condition caused by one's immediate perception of the environment (Bowe & Smith, 1994; Llewellyn & Blucker, 1982; Spielberger, 1966).

State anxiety, like kinetic energy, is a personal reaction which takes place at a given level of intensity. Trait anxiety, like potential energy, refers to a latent disposition for a reaction to occur if it is triggered by appropriate stimuli (Spielberger, 1966).

Trait anxiety measures reflect anxiety-proneness. Individuals differ in their response to varying degrees of stress with varying levels of anxiety. Thus, if an individual has elevated trait-anxiety, s/he is generally more disposed than the average person to respond with state anxiety (Spielberger, 1966). For this investigation, trait anxiety was chosen because its stability allows it to be measured at any time.

Anxiety can also be differentiated along cognitive and somatic dimensions. Cognitive anxiety is caused by negative self-evaluation, i.e., negative expectations about success. In sport, this is usually manifested by poor performance expectations. Somatic

anxiety refers to the physiological and affective elements of the anxiety experience that are directly caused by sympathetic autonomic arousal. Examples are rapid heart rate, shortness of breath, clammy hands, butterflies in the stomach, and tense muscles (Martens, Burton, Vealey, Bump, & Smith, 1990). Cognitive and somatic anxiety are both present in stressful situations because they contain elements related to the arousal of each (Morris, Davis, & Hutchings, 1981).

When people compete, they are confronted with a variety of situational demands. Some athletes view these demands as sources of challenge and excitement. Although these individuals may sometimes experience anxiety or other negative affects while competing, they typically perceive competition as relatively nonstressful and nonthreatening. Others, however, become tense and apprehensive prior to and during competition. The challenge and excitement of competition are accompanied by stress responses. Instead of attending to the task at hand, these individuals focus on their heightened emotional arousal or become preoccupied with worry (Passer, 1984).

Other terms closely related to anxiety are stress, threat, and arousal. Stress occurs when there is a substantial imbalance between perceived demand and perceived response capability of the organism; the failure to meet this demand has important perceived consequences (McGrath, 1970). There are numerous potential sources of stress in athletics. Passer (1984) cites perceived ability, expectancy of success (not only winning and losing, but also the quality of performance), expectancy of negative evaluation (apprehension about performing and being negatively evaluated by others), and expectancy of negative effect (feeling ashamed and upset as a result of poor performance.)

Arousal, which is closely related to cognitive and somatic anxiety, refers to the intensity of behavior and ranges from deep sleep to intense excitement. Thus, arousal deals only with intensity of behavior, whereas cognitive and somatic anxiety deal with intensity and direction of behavior, and are often associated with threatening environmental cues (Martens et al., 1990). Threat is the perception of physical or psychological danger (Bowe & Smith, 1994).

For the purpose of this investigation, the SCAT (Sport Competition Anxiety Test) was chosen to measure trait anxiety. The concurrent validity of SCAT has been demonstrated by correlating competitive A-trait SCAT scores with other trait anxiety personality measures. SCAT's reliability has been established by test-retest procedures. Specifically, the test-retest reliability of SCAT was assessed for four samples of boys and girls, grades 5 to 6 and 8 to 9, from the Champaign-Urbana (IL) public school system. Each sample completed SCAT and then was retested at one of four subsequent time intervals (one hour, one day, one week, and one month). Test-retest reliability ranged from .57 to .93 with a mean of .77 for all samples combined. The correlations were significant at the $p < .01$ level of confidence (Martens, Vealey, & Burton, 1990).

Trait Self-Confidence

Feelings of self-confidence can arise from performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal (Bandura, 1977). Performance accomplishments are especially powerful because they are based upon successful personal experiences. Performing a skill is probably the best way to gain confidence. If athletes are confident about their abilities, they will be less tentative, less hesitant, less cautious, and will perform with greater intensity (Bowe & Smith, 1994).

True self-confidence is an athlete's realistic expectation about achieving success. It is an accumulation of experiences in achievement situations which results in expectations about achieving success in future activities. It is not what an athlete hopes to do, but rather what s/he realistically expects to do.

Because the type of self-confidence being researched is sport-specific, Vealey's (1986) term "sport-confidence" is appropriate; she defined it as the degree of certainty that individuals possess about their ability to be successful in sport. Furthermore, sport-confidence can also be divided into trait and state components.

Trait sport-confidence (SC-trait) is defined as "the belief or degree of certainty individuals *usually* possess about their ability to be successful in sport" (Vealey, 1986, p. 223). In contrast, state sport-confidence (SC-state) is "the belief or degree of certainty individuals possess *at one particular moment* about their ability to be successful in sport" (Vealey, 1986, p. 223). In Vealey's (1986) validation of the Trait Sport-Confidence Inventory (TSCI), she found a significant relationship between competitive trait anxiety (A-trait) and trait sport-confidence (SC-trait), $r = -.28$, $p < .001$. As predicted, competitive trait anxiety was negatively related to trait sport-confidence.

The competitive trait anxiety and trait sport self-confidence sub-scales used in this investigation have established reliability and validity. The other four sub-scales were designed by Smith (1994). Preliminary indications show that these four sub-scales have excellent differentiation ability. Smith and Clack (1996) found support for the validity of all four sub-scales by predicting success in professional hockey. Bove and Smith (1994) found the four sub-scales differentiated skill levels among basketball players. And, Smith

and Snead (1997) found the sub-scales successful in predicting achievement levels among basketball officials. A review and discussion of the four sub-scales follow.

Concentration

Concentration is no more than paying attention, yet sometimes it is very difficult to do. There are many aspects involved in loss of concentration. Sometimes an athlete's concentration is lost because attention is directed to other things such as the crowd, the coach, or perceived outcomes of performance (Suinn, 1986).

Losing concentration can result from stress, negative thoughts, too many distractions, attention drifting, or physical fatigue (Suinn, 1986). A basketball player who misses an easy lay-up, a football player who jumps off-sides because he forgot the snap count, and a baseball player who misses a routine fly ball are a few examples of the negative effects of a lack of concentration.

Nideffer (1976) regards concentration and the ability of individuals to select and control both the width and direction of their attention as a personality trait. That is, just as some individuals are characterized as intelligent, honest or hostile, they can also be characterized as broad or narrow, internal or external attenders. To the extent that these attentional traits are present in individuals, any attempt to improve performance must include recognition of attentional style appropriate to the demands of the competitive situation.

Width of attention ranges from a narrow focus (such as reading a book) to a broad focus (such as driving a car in busy traffic). Generally speaking, most people find it difficult to sustain either a narrow or broad focus over a period of time. Also, full control over attention occurs only by accident or in ideal situations (Nideffer, 1976).

Direction of attention refers to attention directed to either external or internal stimuli. When you have an internally directed focus of attention, you are involved in your own thoughts and feelings. By contrast, when you focus externally, you are attending to events outside your own body and are no longer in contact with your own thoughts and feelings (Nideffer, 1976).

Mental Preparation Skills

The basic skills of Psychological Skills Training (PST) are imagery, stress management, goal-setting, psychic energy management, and attention. All of these skills are interrelated and the development of one helps the development of the others (Martens, 1987).

Famous athletes such as Larry Bird, Reggie Jackson, and Jack Nicklaus have recognized the importance of PST. All three feel that once athletes have developed their physical skills to a high level, and are competing with others at that level, the winner is likely to be the person who is best prepared psychologically (Martens, 1987).

The subject of imagery is currently receiving a great deal of attention in applied sport psychology. Imagery is an experience similar to a sensory experience (seeing, hearing, feeling), but arises in the absence of external stimuli. It is more than just visualizing in your mind's eye, it can also involve all the senses. The auditory and kinesthetic senses are also important to athletes. Kinesthetic sense is the sensation of body position or movement that comes from stimulation of sensory nerve endings in muscles, tendons, and joints (Martens, 1987).

Stress occurs when athletes perceive a performance outcome to be important, and the perceived demands of the performance exceed their capabilities. Too much stress can

be very detrimental to an athlete's performance. However, it can be also be useful and stimulating. Therefore, the goal of stress management is not the elimination of stress, but the limitation of it while maintaining a high level of performance (Greenberg, 1987).

Goal-setting gives an athlete a sense of control and positive direction, as well as an incentive for action. Setting goals can help athletes perform better, reduce anxiety, build self-confidence, and increase concentration (Bowe & Smith, 1994).

Managing psychic energy is the process of gaining control of one's thoughts. Psychic energy is the vigor, vitality, and intensity with which the mind functions. Psychic energy is either positive and associated with such emotions as excitement and happiness, or, negative and associated with such emotions as anxiety and anger.

The last component of PST refers to the attentional skills of athletes. They include the mental processes whereby athletes direct and maintain awareness of stimuli detected by the senses (Martens, 1987).

Achievement Motivation

Motivation refers to selection and persistence in certain activities and the intensity to carry them out. Many coaches, athletes, and sport psychologists agree that achievement motivation is the single most important attribute for successful performance. To motivate athletes, it is first necessary to learn what factors influence their motivation, and then to know how to put this knowledge to use (Carron, 1984).

Researchers consider motivation to be one of the most complex phenomena in sport psychology. On the other hand, of the six personality traits included in this study, motivation may well be the one most susceptible to modification.

The effect of motivation on performance is determined by the nature of the task, the motives of the individual, and the incentive character of the work station (Atkinson, 1974). On a bright, sunny, summer day, one athlete may choose to lay by the poolside while another chooses to play basketball, tennis, etc. Similarly, an athlete who scores twenty points in a basketball game may be satisfied and take the next day off, while another feels that he could have scored thirty points and so he practices the next morning.

A good example of the latter is Larry Bird, considered one of the greatest basketball players of all time. Bird would stay late after practice and show up hours before each game to shoot by himself, while the other players practiced only when they were required to do so. Bird's motivation to achieve was probably the single biggest factor for his success as he was not blessed with extraordinary athletic talent.

The motive to achieve is responsible for selection of and preference for activity, duration of training, and intensity and vigor of performance (Singer, 1980). Singer & Hilmer (1980) suggest that those who have a high need to achieve demonstrate extremely high persistence at tasks, complete tasks at a high rate, demonstrate exceptional quality in performance, are task- rather than person- oriented, take reasonable risks, enjoy stress, like to have knowledge of the results of the activity to judge themselves, and take personal responsibility for their actions.

Psychologists consider motivation to have two dimensions: direction and intensity. Direction is concerned with choosing a goal, while intensity is concerned with how much effort a person puts forth to reach that goal (Martens, 1987).

Within social psychology of sport, motivation has been studied from two major perspectives. First, motivation has been examined as an outcome variable, measured by

effort, choice, and persistent behaviors. Second, motivation has been examined as an individual difference factor. Here, interest is focused on how individuals who vary in levels of motivation differ in self-perception and participation behaviors (Weiss, 1992).

Leadership

Martens (1987) states that leadership is simply knowing how to chart a course and giving others directions of how to get there. A team without a leader is like a ship without a rudder. Leaders instill values, motivate members of the group, communicate, confront members when problems arise, and resolve conflicts.

The traditional view of leaders is that they serve as intermediaries between the general organization they represent and the team they lead. General organization refers to the productivity, performance, and output of the team. The leader's primary responsibility is to insure that the needs and aspirations of all team members are satisfied. Thus, every leader must be sensitive to both task demands and the people involved (Carron, 1984). Some leaders have a style of interacting which places maximum emphasis on task performance while others have a style of interacting which involves a maximum emphasis on interpersonal relations (Carron, 1984).

To summarize, the Mental Toughness Profile includes seven variables (five personality traits, a mental preparation skills composite score, and a mental toughness composite score). The purpose of the instrument is to predict success in athletic competition (Smith and Clack, 1996). This investigation will explore whether these personality traits and mental preparation skills change over the course of a sport season. Although the traditional view is that personality traits are relatively stable and

unchanging, there is reason to believe that both personality traits and mental preparation skills can and do change over the course of a competitive season.

CHAPTER 3

Methods and Procedures

The purpose of this investigation was to determine if five personality traits and five mental preparation skills change over the course of a sport season. The personality traits included achievement motivation, competitive trait anxiety, concentration, leadership, and trait self-confidence. The five mental preparation skills included the effective use of imagery, stress management, goal-setting, psychic energy management, and attention.

Instruments for Data Collection

This investigation utilized a battery of questionnaires. The questionnaire which measured competitive trait anxiety, the Sport Competition Anxiety Test (SCAT), was developed by Martens, Vealey, and Burton (1990); the questionnaire which measured trait self-confidence, the Trait Sport-Confidence Inventory (TSCI), was developed by Vealey (1986); and, the questionnaire which measured achievement motivation, concentration, leadership, and mental preparation skills, the Mental Toughness Questionnaire (MTQ), was developed by Smith (1994). The choice of items for the MTQ was based on in-depth interviews with professional baseball, basketball, hockey, and football players, coaches, and managers. In these interviews, Smith sought to identify individual factors most important for success in professional sports.

Section one of the data collection instrument included ten statements. Subjects indicated their degree of agreement on a Likert scale which ranged from “hardly ever” (1-3) to “sometimes” (4-7) to “always” (8-10). These ten items comprised the Sport Competition Anxiety Test (SCAT) (Martens et al., 1990), an instrument which assesses

the amount of trait anxiety experienced by athletes in competitive situations. SCAT's reliability and validity have been previously established (Martens et al., 1990). For this investigation, the SCAT score for each athlete (a lower score indicates less competitive trait anxiety) was subtracted from 100, thereby making a higher score more desirable and consistent with the other variables.

Section two included twelve statements to measure trait self-confidence. Subjects indicated their degree of agreement on a Likert scale which ranged from "low" (1-3), to "medium" (4-7), to "high" (8-10). The ten items comprised the previously validated Trait Sport-Confidence Inventory (TSCI) (Vealey, 1986). These self-report items refer to how confident players generally feel when competing compared to the most confident performer they know.

Section three consisted of the twenty-three item Mental Toughness Questionnaire (MTQ) (Smith, 1994). Subjects evaluated themselves on three personality traits (achievement motivation, concentration, and leadership) and five mental preparation skills (imagery, stress management, goal-setting, psychic energy management, and attention) thought to be important to sport performance. Subjects indicated their responses on a Likert scale which ranged from one ("strongly disagree") to 10 ("strongly agree").

A mental toughness composite score (MTCS) for each athlete was determined by averaging the individual scores for achievement motivation, competitive trait anxiety, concentration, leadership, trait self-confidence, and a composite score for the five mental preparation skills.

Administration of the Questionnaire

The questionnaire was administered to 13 intercollegiate athletic teams during the 1996-97 academic year at State University of New York, College at Brockport. The entire inventory took approximately 15 minutes to complete, although there was no time limit. The general instructions included statements such as “there are no right or wrong answers” and, “it is important to answer each question based on how you actually feel.” The questionnaire was completed at various locations in order to accommodate the coaches. The sites included a classroom, a weight room, an athletic field, a locker room, a court, and gymnasium bleachers.

Subjects

A total of 205 athletes, 132 males and 73 females, completed the questionnaire between August 1996 and March 1997. The questionnaire was administered on two occasions to each athlete. The first administration was completed during the pre-season (within two weeks after the first practice and well before the first contest) and the second administration during the post-season (within one week after the last contest).

The subjects were Fall and Winter athletes at State University of New York, College at Brockport. The participating male athletes by sport were: soccer (N=14), football (N=75), cross-country (N=11), basketball (N=8), ice hockey (N=17), and wrestling (N=7). The participating female athletes by sport were: soccer (N=18), field hockey (N=15), cross-country (N=11), gymnastics (N=4), volleyball (N=12), basketball (N=8), and tennis (N=5).

Analysis of the Data

Each of the questionnaires was individually scored and a mental toughness composite score (MTCS) calculated for each athlete (Smith, 1994). The composite score was calculated by averaging the five personality trait scores and the mental preparation skills composite score.

Three methods of statistical analysis were used to analyze the data. First, means and standard deviations were calculated for each variable on the pre- and post-tests. This was done for descriptive purposes as well as to discern if average scores changed in the hypothesized direction. The test-retest method was also used to establish reliability. All subjects completed the questionnaire at the beginning and end of their sport season. Next, analysis of variance (ANOVA) was used to determine if there were significant differences between the pre- and post-tests for each of the six variables. Finally, Pearson correlation was used to describe the relationship between the pre- and the post-test scores for each variable.

CHAPTER 4

Results

This investigation studied change in five personality traits and a composite score for five mental preparation skills over the course of an intercollegiate sport season. The five personality traits were as follows: achievement motivation, competitive trait anxiety, concentration, leadership, and trait self-confidence. The mental preparation skills included imagery, stress management, goal-setting, psychic energy management, and attention. A pre-test was administered within two weeks after the first practice and well before the first contest. A post-test was administered within one week after the last contest. Intercollegiate athletes from the State University of New York, College at Brockport participated in the investigation. The participants were members of 13 different teams (seven female and six male) and totaled 205 athletes (132 males and 73 females).

The results of the study will be presented in this chapter. Three methods of statistical analysis were used to analyze the data: (1) means and standard deviations were calculated for each variable on the pre- and the post-tests; (2) analysis of variance (ANOVA) was performed to determine significant differences between the pre- and post-tests for the five personality traits, the mental preparation composite score, and the mental toughness composite score; and (3) Pearson product-moment correlation was computed to describe the relationship between pre- and post-test scores for each of the variables. The level of significance for each ANOVA was set at .05, but for the correlations, the more stringent .01 level was utilized.

1. Means and Standard Deviations.

Means and standard deviations were calculated for each variable on the pre- and post-tests. This was done for descriptive purposes as well as to discern if the post-test scores changed in the hypothesized direction. (See Table 1 and Figure 1.)

TABLE 1

Means and Standard Deviations For the Pre- and Post-tests
For Each of the Six Variables and MTCS

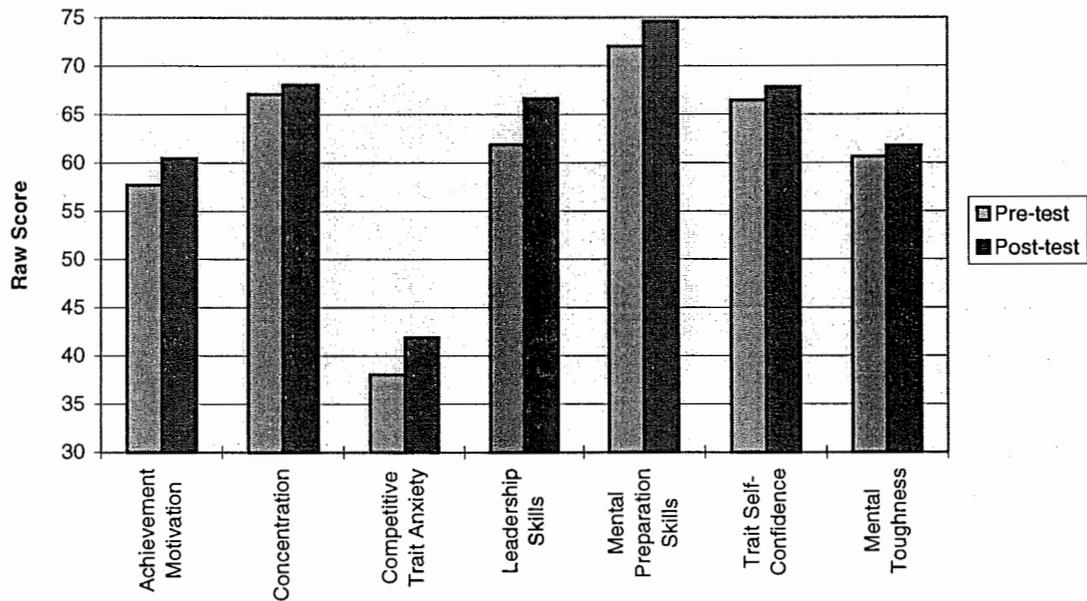
<u>Variable</u>	<u>Pre-test</u> (N = 205)		<u>Post-test</u> (N = 205)	
	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>
Achievement Motivation	57.73	14.06	60.48	25.73
Concentration	67.12	14.52	68.08	13.88
Competitive Trait Anxiety	38.10	15.92	41.94	16.13
Leadership	61.88	13.89	66.64	59.29
Trait Self-Confidence	66.47	13.68	67.85	15.35
Mental Preparation Skills Composite Score	72.04	14.28	74.61	50.46
Mental Toughness Composite Score	60.66	9.32	61.77	9.27

Subjects improved on the post-test score for each of the five personality traits. The largest change occurred for the leadership variable (7.69%); the smallest change was calculated for the concentration variable (1.43%). The mental preparation skills composite score and the mental toughness composite score also increased on the post-test

by 3.57% and 1.83%, respectively. Thus, all of the post-test scores changed in the hypothesized direction.

FIGURE 1

Mean Comparisons on the Pre- and Post-tests for Each of the Six Variables and MTCS



2. Analysis of Variance.

Analysis of variance (ANOVA) was calculated to determine if there were significant differences between the pre- and post-tests for each variable, i.e., the five personality traits, the mental preparation skills composite score, and the mental toughness composite score. (See Table 2.)

TABLE 2

ANOVA for the Pre- and Post-test Scores for the Six Variables and MTCS

<u>Variable</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig. Of F</u>
AM	773.095	1	773.095	1.80	.18
CON	95.620	1	95.620	.47	.49
CTA	1510.656	1	1510.656	5.89	.02*
LEAD	2323.356	1	2323.356	1.25	.26
TSC	196.722	1	196.722	.93	.34
MPSCS	677.388	1	677.388	.49	.48
MTCS	125.680	1	125.680	1.46	.23

* Significant at the .05 level.

KEY: AM = achievement motivation; CTA = competitive trait anxiety; CON = concentration; LEAD = leadership; TSC = trait self-confidence; MPSCS = mental preparation skills composite score; MTCS = mental toughness composite score.

Only one of the five personality traits, competitive trait anxiety, yielded a significant F-ratio; none of the other four traits significantly changed over the course of the season. Neither the mental preparation skills composite score nor the MTCS significantly changed between the pre- and post-tests.

3. Pearson Product-Moment Correlations (r).

The correlation coefficient is a measure of the relationship of one variable to another. A perfect relationship is expressed by a coefficient of 1.00, and no relationship by a coefficient of .00. According to Garrett (1966), “A coefficient of correlation falling between .00 and 1.00 always implies *some* degree of positive association, the degree of correspondence depending upon the size of the coefficient” (p.123). (See Table 3 for the r values.)

TABLE 3

Correlations Between the Pre- and Post-test Scores
For Each of the Six Variables and MTCS

<u>Variable</u>	<u>Correlation</u>
Achievement Motivation	.42*
Concentration	.58*
Competitive Trait Anxiety	.69*
Leadership	.14
Trait Self-Confidence	.65*
Mental Preparation Skills Composite Score	.20*
Mental Toughness Composite Score	.76*

* Correlation is significant at the .01 level (df = 204).

Significant positive correlations were calculated between pre- and post-test scores for four of the five personality traits. Leadership was the only personality trait that yielded a non-significant correlation. The correlations for the mental preparation skills

composite score and the MTCS were statistically significant, thus affirming the reliability of both.

CHAPTER 5

Discussion, Conclusions, Recommendations

Discussion of Results

For each of the five personality traits, the mental preparation skills composite score and the MTCS, the post-test mean scores changed in the hypothesized direction. However, the ANOVA results demonstrated that only one variable, competitive trait anxiety, changed significantly from the pre- to post-test. In addition, the Pearson product-moment correlation analysis yielded significant positive correlations between pre- and post-test scores for all variables except leadership, calling into question the statistical reliability of the leadership scale. Although the correlation coefficient for the mental preparation skills composite score was significant (.20), the relatively low value raised concerns about its reliability as well.

Interestingly, competitive trait anxiety is considered by many researchers to be a very stable personality trait. However, these findings suggest that an athlete's experiences over the course of a season can change his/her competitive trait anxiety for the better. This finding raises questions about the presumed stability of competitive trait anxiety. There are a few reasons to explain the positive change. Firstly, the start of practice at the beginning of a new season (when the pre-test was administered) is a time when athletes may feel anxious and apprehensive; their role on the team has not been fully established. However, by the end of the season (when the post-test was administered), most athletes generally feel more comfortable with their team roles; under these circumstances, they should feel less anxiety, apprehension, and self-doubt.

Secondly, athletes may also feel unsure and anxious about how their teams will perform early in the season; this can also cause anxiety and stress. However, by the end of the season, the team's success/failure is known and the athlete is more likely to accept the team's fortunes.

Correlation is a strong statistic for assessing test-retest reliability. As the Pearson product-moment correlation results showed, significant associations between pre- and post-test scores for six of the seven variables were calculated, thus affirming the reliability of the sub-scales involved. Interestingly, the highest correlation between pre- and post-test scores occurred for the MTCS (.76), strongly supporting its reliability and continued use in future research investigations.

Conclusions

1. This investigation predicted positive change in five personality traits and a mental preparation skills composite score over the course of a sport season. Four of the five personality traits did not change from pre- to post-season, supporting the popular belief that personality traits are relatively stable over time.
2. The only personality trait to positively change was competitive trait anxiety. Although it is considered a very stable trait by many researchers, the findings of this study suggest that it can be favorably influenced over the course of a competitive season.
3. The Mental Toughness Questionnaire was found to be statistically reliable, with the possible exception of the leadership scale.
4. Since only one of the seven ANOVA analyses was statistically significant, the investigation was unable to reject the null hypothesis.

5. Since five of the six variables did not significantly change over the course of the competitive season, it was concluded that only direct intervention on a coach's part is likely to result in positive changes. Practicing a sport and game competition were apparently insufficient to affect change in the personality traits and mental preparation skills under investigation.

Recommendations

The following recommendations are offered to future researchers interested in the personality changes of athletes over the course of a competitive sport season.

1. To better investigate change over the course of a season, it may be appropriate to administer the questionnaire more than twice. For example, an athlete's performance can range from poor one week to exceptional another week. Fluctuations in play can influence an athlete's personality as well as his/her mental preparation skills. By administering the questionnaire more often, these possible changes can be monitored more closely.
2. Because the investigation utilized inferential statistics, important individual differences may have been overlooked. It is recommended that the case study approach be considered in future investigations. This approach would allow greater insight into individual changes over the course of a season.
3. Investigate changes in one or more of the personality variables according to gender, age, individual vs. team sports, coaching style, and team's win/loss record.
4. Investigate changes in personality traits and mental preparation skills at the high school, NCAA Division I, or professional levels.

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