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A Comparison of Personality Traits of Female Athletes with a High Incidence of Injury to Those with a Low Incidence of Injury

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~~A Comparison of Personality Traits of Female Athletes
with a High Incidence of Injury to Those with a Low~~
(TITLE)
Incidence of Injury

BY

J'nise A. Ramsey

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE in Physical Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
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1995

YEAR

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ABSTRACT

The purpose of this study was to determine if there is a significant difference in the personality traits of collegiate female athletes with a high incidence of injury when compared to female athletes with a low incidence of injury. Fourteen female intercollegiate athletes completed a personal information questionnaire and Cattell's Sixteen Personality Factor Questionnaire during a one hour session of testing.

The mean raw scores of the two groups were analyzed to determine if they differed statistically. The mean raw scores were then converted to mean sten scores under the recommendations of Cattell. A visual depiction of the mean sten scores was also completed to identify any possible trends.

The results of this study indicate that there is a significant difference between those athletes with a high and low incidence of injury on the primary personality factor B. Factor B indicates an individuals reasoning abilities. The findings of this study indicate that athletes with a high incidence of injury are more concrete thinkers, while those athletes with a low incidence of injury tend to be more abstract thinkers. However, this finding may not be as profound because the mean sten scores of both groups fall within the average range of the population. A visual inspection of the data also seems to indicate with more subjects there may have been a significant difference in the

personality traits of warmth, dominance, and independence.

It was also found that there seems to be a relationship between the number of high school injuries and collegiate injuries. After review of the personal information questionnaires, it was found that all but one individual that was classified as having a high incidence of injury in college would also have been classified similarly in high school.

The findings of this study indicate that the use of a personality inventory may be helpful to some degree in determining the incidence of injury in collegiate female athletes. This may help coaches, and athletic trainers to better help such athletes whether it be in prevention or rehabilitation. This study also seems to indicate that more studies should be done in this area. However, future studies should address a wider variety of issues associated with injury such as exposures, and type of equipment available to the athletes.

DEDICATION

This paper is dedicated to the memory of my mother, Judith A. Ramsey. I cannot possibly express the thanks and appreciation that I owe to her. She always told me to follow my dreams as far as they would take me. I would also like to dedicate this paper to my grandmother, Sally M. Paschal. She made my dreams of having a college education a reality. Finally, I would like to extend thanks and great appreciation to Nancy and Howard Paschal for their guidance after my mother's death.

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CHAPTER 1

INTRODUCTION

It was reported by Anderson and Williams (1988) that between three and five million injuries occur in recreation and sport settings each year. The number of sports related injuries is on the rise, carrying with them considerable emotional, social, and economic cost (Nideffer, 1989). Therefore, it is important for coaches, athletic trainers, and others involved in sports to look into ways to possibly prevent injuries.

There is considerable research on differences in personality traits of athletes versus non-athletes and the relationship of stress to injury (Taerk, 1977). However, one area which needs to be considered is the personality characteristics of athletes in relation to their past injury history. Research in this area has not been widely studied. Much of the focus in this area has been on football injuries. However, Taerk (1977) believes that sports which have limited body contact and more control over the environment are the best for this type of research.

In general, research involving female athletes has been neglected. In a study conducted by Myers (1991), she contended that since women are becoming increasingly involved in athletics it is important that more research be done

concerning women. O'Connor and Webb (1976) also stated that studies using female athletes have been neglected in comparison to the number of studies conducted using male athletes. It is not only important that women should be studied, but they should also benefit from such research.

Two questions concerning personality in relation to injury have been raised:

"Is there a specific personality type which has a higher incidence of injury, and what percentage of injuries are directly correlated with some psychological factor (Nideffer, 1989)?"

This study will attempt to answer the first question by focusing on the personality of female athletes with a higher incidence of injury who participate in the team sports of volleyball, basketball, and softball. While environmental factors may play some role in the incidence of injuries, only softball is environmentally uncontrolled. However, this sport is generally not played in extreme cold or rain.

Purpose of the Study

The purpose of this study is to identify and compare the personality traits of female athletes, involved in the sports of volleyball, basketball, and softball in relation to their incidence of injury.

Importance of the Study

As the rate and severity of injuries begins to rise it is important that coaches and athletic trainers consider the interaction of the personality in these injuries. While there is some research on male injury prone athletes, primarily football players, there are few studies that pertain to the personality traits of the injured female athlete. The significance of this study is to focus on the personality types of the injured athlete, particularly female athletes. It is hopeful that this investigation will help coaches and athletic trainers to learn about ways to identify female athletes with the potential for a high rate of injury.

Understanding the personality type of an athlete can be a powerful tool for the coach and trainer. Knowing ones personality type could also help the athletes to learn how to interact with other members of the team and its care providers. Also by knowing the personality type of an injured athlete, an athletic trainer could tailor a rehabilitation program specifically to that athlete's emotional needs, particularly since many injuries are prolonged when the injured athlete has difficulty in dealing psychologically with the injury (Arnheim, 1985).

The coach also may benefit from knowing the personality traits of his or her players. These benefits could range from having a more cohesive team to finding ways to possibly prevent

injuries in practice sessions. This could be accomplished by identifying that athlete who is overly aggressive and tends to be injured more often. The coach would then know how to teach the aggressive athlete new ways to channel their aggression.

Together, an athletic trainer and coach could identify those who seem to have a higher incidence of injury and take actions accordingly. The use of personality traits will just add to the arsenal of tools that can be used for injury prevention. Since there is very little research about female athletes with a high incidence of injury, it is hopeful that this study will further the knowledge of the personality traits of such an athlete.

Hypotheses

Null: There will be no differences in the personality traits of female athletes with a high incidence of injury compared to those with a low incidence of injury participating in volleyball, basketball, and softball as measured by Cattell's Sixteen Personality Factor Questionnaire.

Alternate: There will be a difference in the personality traits of injury prone female athletes with a high incidence of injury when compared to those with a low incidence of injury participating in volleyball, basketball, and softball as measured by

Cattell's Sixteen Personality Factor Questionnaire.

Limitations

The major limitation of this study is in the classification of high and low incidence of injury. For this study the athletic trainers at Manchester College were asked to identify those athletes who fell under these classifications. Other limitations may include the small number of subjects, the time needed to complete the questionnaire, and the difficulty in securing subjects.

Delimitations

1. The subjects were all selected from Manchester College a NCAA division III school.
2. The subjects ranged in age from 18-24.
3. The athletes were participating in volleyball, basketball, or softball.
4. The subjects used for this study were not randomly selected.
5. Outside factors such as academic achievement, socio-economic status, social pressure, situational pressure, and participation in other sports were not considered.

Assumptions

1. Cattell's Sixteen Personality Factor Questionnaire is a valid and reliable instrument when used with athletes.
2. All of the subjects were truthful.
3. The injuries did not exist prior to their collegiate participation.
4. The classifications of high incidence and low incidence of injury were not misinterpreted by the athletic trainer.

Definitions

Athlete: Any person who participates in an interscholastic intercollegiate, or professional athletic program.

Personality: The combined distinctive individual qualities a person possesses which will permit a prediction of how he or she will respond in a given situation (Cattell, and Eber, 1957).

Trait: A basic unit in describing personality, that is a relatively permanent feature of behavior that distinguishes one individual from another (Cratty, 1981).

Injury: A condition that requires treatment by an athletic trainer or other medical care provider, other than an illness, that results in diminished performance or loss of playing time.

High Incidence of Injury: Two or more injuries that require treatment in one athletic season.

Low Incidence of Injury: One or no injuries that require treatment during one athletic season.

The following are the definitions of the sixteen personality factors as identified by Cattell's Sixteen Personality Factor Questionnaire (IPAT Staff, 1986):

Factor A: outgoing vs. reserved (affectothymia - sizothymia)

Factor B: abstract vs. concrete (scholastic ability)

Factor C: emotionally stable vs. reactive (ego strength)

Factor E: assertive vs. cooperative (dominance -
submissiveness)

Factor F: animated vs. restrained (surgency - desurgency)

Factor G: rule conscious vs. expedient (superego - strength)

Factor H: venturesome vs. shy (parmia - threctia)

Factor I: sensitive vs. utilitarian (premsia - harria)

Factor L: suspicious vs. trusting (protension - alaxia)

Factor M: imaginative vs. practical (autia - praxernia)

Factor N: discreet vs. forthright (shrewdness - alertness)

Factor O: apprehensive vs. self assured (guilt proneness -
untroubled adequacy)

Factor Q1: experimenting vs. traditional (radicalism -
conservatism)

Factor Q2: self-reliant vs. group oriented (self sufficiency -
group adherence)

Factor Q3: perfectionist vs. flexible (high self concept

control - low integration)

Factor Q4: tense vs. relaxed (high ergic tension - low ergic tension)

Factor EX: extraverted vs. introverted

Factor AX: high anxiety vs. low anxiety

Factor TM: tough minded vs. receptive

Factor IN: independent vs. accommodating

Factor SC: self controlled vs. unrestrained

A more detailed discription of the sixteen personality factors is available in appendix A.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Current research on injury prone athletes is very limited, and mostly deals with male athletes involved in football. Much of this research was conducted in the late 1960's and early 1970's. Most of the recent literature has focused on psychosocial factors associated with football injuries.

The importance of studying the female athlete is on the rise. The changes in athletics that occurred with the advent of Title IX, have meant an increase in the number of women participating in athletics. This in turn means that more females are becoming injured which cannot be ignored. However, there has been very little research done in the area of female athletes with a higher incidence of injury. The focus of research into athletics and women in the past has been on the effect of such activities on reproduction and child bearing.

The review of related literature in this chapter has been organized in the following five categories: 1) Personality traits of the athlete with a high incidence of injury, 2) Psychosocial factors associated with the incidence of injury, 3) Team vs. individual sports, 4) Psychology of the injured athlete, and 5) Physiological and psychological differences in female athletes.

Personality Traits of the Athlete with a High
Incidence of Injury

The first part of this review of literature will focus on the personality traits of those athletes that seem to be continually injured. Athletic trainers and coaches are well aware that some athletes seem to be injured more than others. In the studies reviewed, the researchers tried to determine if the athletes with a high incidence of injury have different personality types than those athletes with a low incidence of injury.

The interaction of personality and injury has not been widely documented in recent years. However, Gordon (1949) wrote that probably more causes of accidents lie within people themselves. Dunbar (1955) further substantiated this by stating that only 10 to 20% of all accidents are really accidents; the remainder can be linked to the personality of the individual.

Some of the earliest studies in this area dealt with accident proneness, not necessarily injury proneness, in children. Marcus, Wilson, Kraft, Southerland, and Schulhoffer (1960) found that children involved in accidents have a higher tendency toward weaker reality bound integration and expressed more emotional insecurity and unhappiness. Another study found that children with repeated injuries have an extraverted personality and are often described as "determined", "daring",

and "fearless" by their parents (Husband, 1975). Manheimer and Mellinger (1966) also found results similar to those found by Husband (cited in Suchman, 1970).

Most of the sports related research in the 1960's focused on football and touch football players. Kraus (1967), and Govern and Koppenhover (1965) were unable to demonstrate any relationship between personality and injury. However, research in the 1970's began to see a possible relationship between injury and personality.

Research in the 1970's was somewhat intermittent. Brown (1971) used the California Psychological Inventory and found no significant relationship between injury and personality traits in high school football players. Young and Cohen (1979) also found similar results using the Tennessee Self Concept Scale in female collegiate basketball players. However, the study conducted by Young and Cohen (1979) only had 14 subjects which may have hampered their findings.

Other researchers during this time did, however, find a correlation between injury and personality. Jackson, Jarret, Bailey, Kausek, Swanson, and Powell (1978) found a significant relationship between injury and personality using Cattell's Sixteen Personality Factor Questionnaire (16PF). In their study they found that high school football players with a higher incidence of injury tend to be tender minded and sensitive, which means that they scored high on Factor I (See Appendix A). Another study which used Cattell's 16PF found

similar results, in that collegiate runners with a higher incidence of injury tended to be tender minded (Valliant, 1980). Jackson, et al. (1978) found a significant relationship between a high incidence of injury and Factor A or shyness. Lavarda (1975) and Lysens, Steverlynck, Vanden Auweele, Lefevre, Renson, Claessens, and Ostyn (1984) also found a relationship between incidence of injury and impulsivity, aggression, and guilt.

While the number of studies which found a significant relationship seem to outweigh those that found no significant relationship there have been very few recent studies investigating athletes with a higher incidence of injury. This is very concerning because the world of sports is continually changing and so are the athletes involved. Research in this area needs to be further advanced so that we can learn which athletes are more prone to injury in today's society.

Kelley (1990) wrote that while much of the research on the incidence of accidents has conflicted at times, there are some general things that characterize accident prone individuals. Overall, accident prone individuals are said to possess a number of traits: aggressiveness, anger, attention getting, easily offended, bereavement, boredom, competitiveness with inability to lose, excitement, feelings of inferiority or superiority, conflicts with authority, frustration, guilt, and an unconscious need for punishment (Yost, 1967).

Psychosocial Factors Associated with
the Incidence of Injury

This next segment addresses the area of life stress in relationship to injuries. Although this is not a factor that will be measured in this study, it's influence cannot be ignored when discussing injuries.

The research has found a high correlation between life stress and injury. According to Ryde (1965) thirty percent of athletic injuries are affected primarily by psychosocial factors and cautions that unless these factors are addressed by medical personnel the injury could be prolonged.

In another study, Hanson, McCullagh, and Tonyman (1992) found a positive correlation with life stress and injury but, it only appears to hold true in contact sports. Bramwell, Masuda, and Wagner (1975) also found a correlation between life changes and injury. In their study they adapted the Social Readjustment Rating Scale to athletes and changed the name to Social and Athletic Readjustment Rating Scale. It was constructed to study the correlation between occurrence of injury and significant life events suffered by football players. Bramwell, et al. (1975) came to the conclusion that there is a significant relationship between injuries and life stress.

While these are only a few studies involved in this area of psychosocial factors of injury they are enough to point out

its important effect. This is not a primary focus of this study, but Taerk (1977) indicated this is an important factor to consider if a complete analysis of the factors that affect injuries is to be considered.

Athletes of Team Sports versus Athletes of Individual Sports

Most researchers have found a distinct difference between team and individual sport athletes, but a major problem arises in classifying those athletes who participate in both types of sports.

Moore (1970) found a significant relationship between team sport participation and an incidence of emotional stability, extroversion, and insecurity (Myers, 1991). Vanek and Cratty (1970) also found similar results. In their study they found that there is a relationship between above average intelligence, self-discipline, and strategical thinking and those who participate in team sports. Cratty (1981) also stated that the team athlete tends to be extroverted, more aggressive, and more willing to take risks.

Research on individual sport athletes is not as wide spread. In a study conducted by Ballinghoff (1973), a relationship was found between those participating in individual sports and anxiety (Myers, 1991). Other studies have found a correlation between introversion, and lower

intelligence (Moore, 1970, and Vanek and Cratty, 1970).

There does seem to be a major factor that increases the incidence of injury that is not directly related to the psychological factors. This is the amount of body contact that occurs in the two types of sports. In an article written by Taerk (1977) he states that team sports generally have more body contact and in turn may predispose the athlete to injuries. It is very important that any research into this area be aware that the type of sport or sports involved could directly affect the outcome.

Psychology of the Injured Athlete

Those working with athletes are aware that in order to fully rehabilitate an athlete from injury they must also consider the mental aspects involved (Arnheim, 1985). While psychology of an injury is not a direct part of this study, it is important because when this is not addressed with initial injuries the possibility of another injury is increased (Nideffer, 1989, and Kelley, 1990). It is important to realize that athletes all perceive pain at different levels. Some pain can be categorized as positive or that generally encountered during physical activity. Another type of pain is negative and is associated with the discomfort of an injury (Kelley, 1990). Some athletes have difficulty in discerning the difference between these two types of pain, which in turn hinders their

athletic ability (Shephard, 1978).

The psychology of an injury is very important to consider when classifying the athlete with a high incidence of injury because some athletes may not be truly injured, but are exhibiting psychosomatic injuries. This is a type of injury, but this injury requires treatment by an individual involved in psychology (Kelley, 1990). Pain has to do with the individual perception, which must be reduced so that the athletes fear of reinjury is diminished.

The issue of the rehabilitation of injuries is one that must be considered daily, but for the purpose of this study this type of psychology is not considered. If this study were to control all variables, the past injury record and methods of rehabilitation would have to be considered.

Physiological and Psychological Differences of Female Athletes

The major focus of this study is on the female athlete, but to fully understand the implications associated with this research the differences between males and females must be considered.

The major differences between men and women tend to be physiological. Women tend to have a higher percentage of body fat, increased Q angles, wider hips, and a higher incidence of orthopedic deviations (Arnheim, 1985). Women in general have a

Q angle greater than 10 degrees, which predisposes them to such injuries as patello-femoral pain (MaGee, 1987). The Q angle is the angle that exists between the ASIS, middle of the patella and the tibial tuberosity (MaGee, 1987).

Another factor that must be considered is the affect of exercise on the reproductive cycle. There are many studies in the area of the amenorrheic athlete, but few conclusions have been made other than the increased number of stress fractures associated with these athletes (Arnheim, 1985).

The psychological differences between male and female athletes are not as widely documented. However, the similarities seem to exist in the literature. One such similarity is that both male and female athletes tend to be more extroverted than non-athletes (Myers, 1991). However, other research has found a major difference between males and females in the area of intelligence, aggressiveness, and the interpretation of stress (Pestonjee, Singh, Singh, and Singh, 1981, Bergandi, 1985, and Taerk 1977). Cratty (1981) went further into explaining these differences by stating that many times male athletes are under less societal control, and have higher aspirations to professional sports careers. Women however, tend to realize that their possibilities of post collegiate sports careers are limited.

Summary

This review of literature has pointed out several factors that must be considered when conducting research into the area of the incidence of injury. While some of these factors will not be controlled in this study it is important to acknowledge the research. Taerk (1977) states that a study which controls for environment, contact, exposures, life stress, and physiology is needed, but due to a lack of funding and time constraints, these guidelines will not be followed. The literature that was reviewed indicates that there are several concepts to be concerned with in injured athletes. However, much of the research mentioned in this chapter may not be transferrable to the female athlete. Personality traits, female athletes, and team sports will be the major areas considered in this study.

CHAPTER 3

METHODS

This study was designed to identify and compare the personality traits of female athletes with a high incidence of injury to those with a low incidence of injury based on the results of Cattell's Sixteen Personality Factor Questionnaire. This chapter provides information about the subjects, the questionnaire, testing procedures, and the types of statistical analysis that were used.

Subjects

Subjects were recruited at Manchester College, an NCAA Division III, Christian liberal arts school located in Indiana with an enrollment of approximately 1000 students.

Fourteen female subjects agreed to participate in this study. These subjects received and signed a consent form (Appendix B). Each subject then received a guidelines sheet (Appendix C) and completed a personal information questionnaire (Appendix D). This questionnaire included such things as age, academic major, sport or sports played, and the number of injuries that they have sustained in each sport season.

The subjects were not randomly picked, but went through a screening process, in which they were identified by a certified

athletic trainer at Manchester College. The athletic trainer tried to identify an equal number of subject who he felt were classified into each category of having either a high incidence of injury or a low incidence of injury. The subjects were not informed about the purpose of the study, due to the possibility of biased responses occurring in the completion of the personality questionnaire. Subjects were only identifiable by their social security numbers. After completing the personal information questionnaire the subjects were divided into groups based on the number of injuries they sustained in one athletic season.

Seven of the subjects were classified as having a high incidence of injury. These subjects participated in one or more of the following sports: volleyball, basketball, softball, or track and field.

The other seven subjects were those classified as having a low incidence of injury. They also participated in one or more of the above mentioned sports of volleyball, basketball, softball, or track and field.

The ages of the subjects ranged from 18-24, with the mean age being 19.85. Seven of them were freshman, three were sophomores, two were juniors, and two were seniors. The majority of the participants were involved in softball (10). (Data for the individual subjects can be found in Appendix E.)

Personality Test

Cattell's Sixteen Personality Factor Questionnaire was chosen as the data gathering tool for this research project. This tool has been widely used in the measurement of personality traits of athletes (Bergandi, 1985). This is a test that is objectively scorable devised by basic psychology research that completely covers personality in a brief period of time (IPAT staff, 1993). The Sixteen Personality Factor test was devised by Raymond B. Cattell at the University of Illinois in Urbana-Champaign.

The following are the various facets of Cattell's theory of personality:

1. A substantial proportion of motivation is unconscious...
2. Attitude learning occurs through classical and instrumental conditioning...
3. Classes of attitudes and beliefs are socially instilled through learning...
4. Certain basic drives are inherited and provide the original basis for behavior...
5. Learning induces a conscience or self-sentiment which integrates behaviors into socially acceptable classes of behavior...
6. Conflicts occur between different dynamic structures which cause moral decisions...

7. Most clinical maladaptive behaviors arise from imbalance arising from conflicts...

(Ryckman, 1989).

This test is a type of inventory that is in written form. It consists of 185 questions and provides 10 to 15 items for each of the 16 personality traits (IPAT staff, 1986). These traits are relatively permanent features and can be thought of as general behavior. This test is also used in determining five global factors. Many researchers contend that this test is a good measure of personality (Bergandi, 1985). It was used in several studies conducted by Jackson, Jarret, Bailey, Kausek, Swanson, and Powell(1978), and Valliant (1980) This test uses a factor analytic approach to testing personality. It appears to be statistically valuable and it proports to measure various personality factors. The internally derived validity for all factors ranges from .84 to .96. The reliability of the factors range from .70 to 1.00 (Cattell and Eber, 1957).

Table 1 gives an indication of the sixteen personality traits and five global factors which are included in Cattell's 16 Personality Factor Questionnaire.

This test is very easy to administer and the questions can be easily understood by the subjects. Further justification for this test is that a thorough knowledge of psychology is not needed to understand the results.

TABLE 1

Personality Traits and Global Factors
Covered by Cattell's 16 PF

Factor	Low sten score Description (1-3)	High sten score Description (8-10)
A	Reserved, impersonal, Distant	Warm, outgoing, attentive to others
B	Concrete	Abstract
C	Reactive, emotionally changable	Emotionally stable, adaptive, mature
E	Deferential, cooperative, avoids conflict	Dominant, assertive, forceful
F	Restrained, serious, careful	Spontaneous, lively animated
G	Expedient, nonconforming	Dutiful, rule-conscious
H	Shy, threat-sensitive, timid	Venturesome, socially bold, thick-skinned
I	Utilitarian, objective, unsentimental	Sensitive, aesthetic, sentimental
L	Trusting, accepting, unsuspecting	Suspicious, wary, skeptical, vigilant
M	Practical, grounded, solution-oriented	Imaginative, abstracted, idea-oriented
N	Forthright, genuine, artless	Private, discreet, non-disclosing
O	Self-assured, complacent, unworried	Apprehensive, worried, self-doubting
Q1	Attached to familiar, traditional	Experimenting, open to change
Q2	Group-oriented, affiliative	Self-reliant, solitary, individualistic
Q3	Tolerate disorder, unexacting, flexible	Perfectionistic, self disciplined, organized

TABLE 1 (continued)

Factor	Low sten score Description	High sten score Description
Q4	Relaxed, placid, patient	Tense, high energy, impatient, driven
EX	Introverted, socially inhibited	Extraverted, socially participating
AX	Low anxiety, unperturbed	High anxiety, perturbable
TM	Receptive, open-minded, intuitive	Tough-minded, resolute, unempathetic
IN	Accommodating, agreeable, selfless	Independent, persuasive, willful
SC	Unrestrained, follow usage	Self-controlled, inhibits urges

A more indepth description of these personality traits can be found in Appendix A (Russell, and Karol, 1994).

Testing Procedures

The questionnaire was administered to the softball athletes during their season, and during the post-season of volleyball, and basketball. It was administered to the subjects during times which were convenient for them and took between 30 and 60 minutes to complete.

They were instructed to sign the consent form and answer the questions on the personal information questionnaire. They were then instructed to remain quiet and answer all questions without spending a long time in contemplation. Each of the questions was answered by marking the corresponding letter on the answer sheet that was provided. The subjects were then instructed to return all materials to the tester and they were

free to leave. They were also told to use response B as little as possible. Response B is a question mark and tends to show indecisiveness, and may in turn directly affect the results of each individual personality survey.

Statistical Procedure

The test booklet used was the fifth edition of Cattell's 16PF. The answers were hand scorable using the respective scoring key. The numerical value was then assigned for each individuals personality factors. (Raw scores for the individual subjects can be found in Appendices F and G)

The scores that were assigned to each individual score were then converted to sten scores. A sten score is derived from the term standard ten, which are distributed over ten equal interval standard score points from one through ten (IPAT Staff, 1986). This is done under the assumption that there is a normal distribution. These scores then were looked at by graphical dipiction and through descriptive statistics.

Statistical Tools

SPSS, statistical package for the social sciences, was used for the determination of the descriptive statistics. This provided mean raw scores, standard deviations, and discriminate analysis. Wilk's Lambda and F Ratio were used in the discriminate analysis. A .05 level of significance was used to determine if these two groups differed statistically.

CHAPTER 4

ANALYSIS OF THE DATA

This study was designed to compare the personality traits of collegiate female athletes in relation to their incidence of injury. Fourteen collegiate female athletes completed Cattell's sixteen personality factor questionnaire for this study. The following is a presentation of the findings, and a discussion of the data.

Presentation of the Findings

The findings have been divided into two sections. In the first section the mean sten scores were compared to the standard population sten scores as determined by Cattell. The ages used for standardizing this test were 15-92 years of age. There were two subgroups within this study. Those two subgroups were those athletes with a low incidence of injury and those with a high incidence of injury. Sten scores are numbered from one through ten, with the population average fixed at a sten of 5.5.

The sten scores were then placed on a profile graph where they could be compared visually. According to Cattell mean sten scores of 5 or 6 are average; 4 and 7 are slightly deviate; 2, 3, 8, and 9 are strongly deviate; and sten scores

of 1 and 10 are extreme.

The second section includes a comparison of the two groups in relation to each personality trait. A discriminant analysis will be presented to show the difference between the two subgroups.

Analysis of the Mean Sten Scores for the Athletes with a Low Incidence of Injury

As shown in Table 2. and Figure 1., athletes with a low incidence of injury scored within the average range on 11 of the 16 primary personality factors and on 2 of the 5 global factors. They were average to the population norms on the traits of Warmth (Factor A), Reasoning (Factor B), Emotional Stability (Factor C), Dominance (Factor E), Rule-Consciousness (Factor G), Social Boldness (Factor H), Vigilance (Factor L), Abstractedness (Factor M), Privatness (Factor N), Apprehension (Factor O), Tension (Factor Q4), Anxiety (Factor AX), and Independence (Factor IN). They scored slightly higher than the norm on the traits of Liveliness (Factor F), Extraversion (Factor EX), and Tough-Mindedness (Factor TM). These traits would characterize these athletes as spontaneous, extraverted, and tough-minded. Athletes with a low incidence of injury scored lower than the norm on the traits of Sensitivity (Factor I), Openness to Change (Factor Q1), Self-Reliance (Factor Q2), Perfectionism (Factor Q3), and Self-Control (Factor SC).

TABLE 2

Mean Raw Score, Mean Sten Score, and Standard Deviations
of Athletes with a Low Incidence of Injury

Primary Factor	Mean Raw Score	Mean Sten Score	Standard Deviation
A	15.4	5	3.60
B	10.9	6	1.86
C	11.4	5	4.93
E	11.3	5	5.15
F	16.3	7	3.95
G	12.4	5	3.82
H	11.0	6	7.83
I	9.70	3	0.95
L	10.4	5	3.51
M	9.43	6	3.74
N	11.1	5	2.85
O	12.7	6	4.27
Q1	13.3	4	6.70
Q2	4.71	4	3.30
Q3	8.43	4	4.76
Q4	13.1	6	4.22
Global Factor	Mean Raw Score	Mean Sten Score	Standard Deviation
EX	6.60	7	1.66
AX	6.04	6	1.37
TM	7.24	7	1.86
IN	4.83	5	2.48
SC	3.99	4	1.51

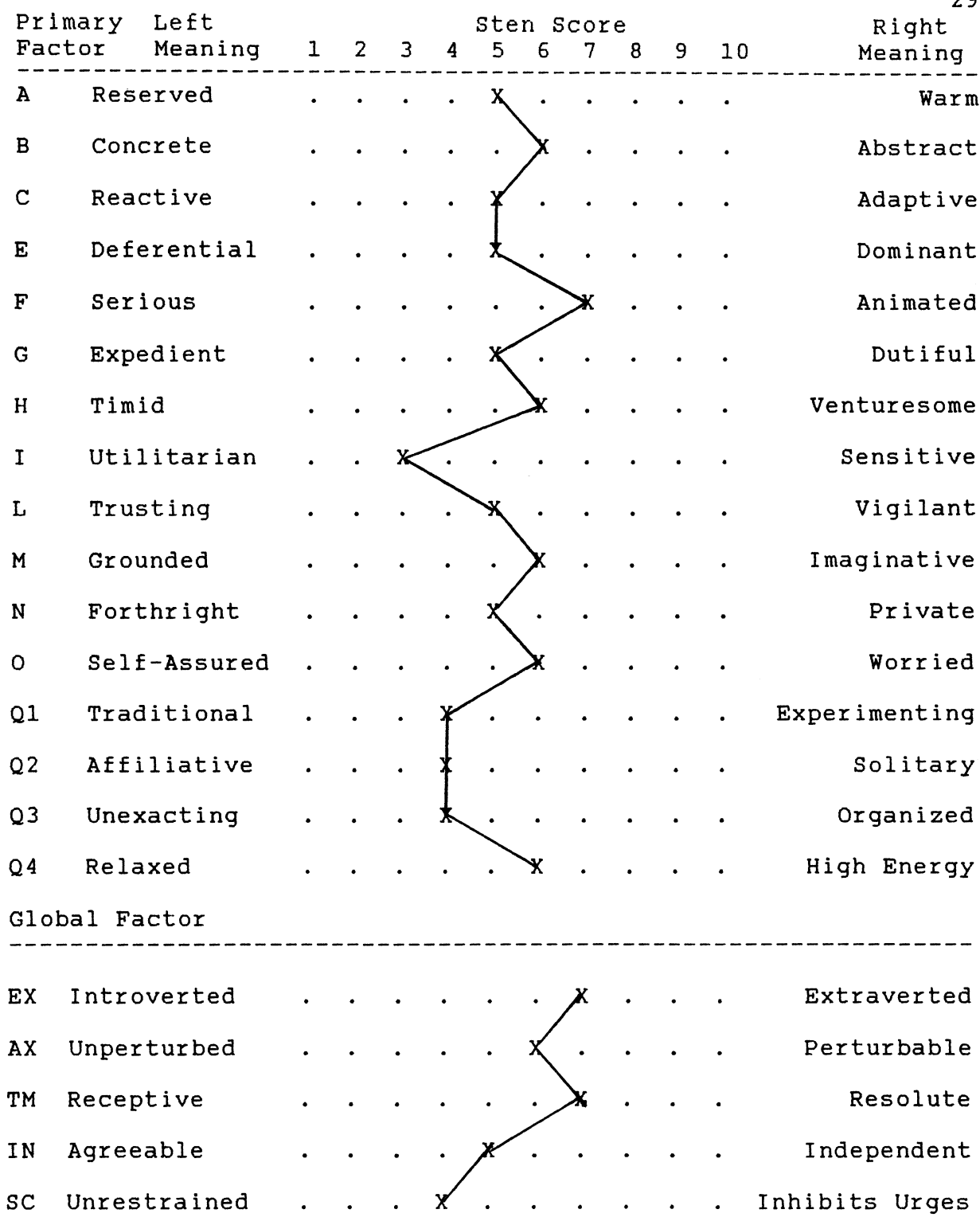


Figure 1. Profile of the Mean Sten Scores of the Athletes with a Low Incidence of Injury on the Sixteen Personality Factor Test

Analysis of the Mean Sten Scores for the Athletes
with a High Incidence of Injury

Table 3. and Figure 2. show the mean sten scores of the athletes with a higher incidence of injury. This group showed a slight deviation from the norm in the factors of Warmth (Factor A), Liveliness (Factor F), Extraversion (Factor EX), and Independence (Factor IN). However, they also had sten scores which indicate they may be less rule-conscious, sensitive, and self-controlled. These results indicate that athletes with a high incidence of injury are characterized as warm, spontaneous, expedient, utilitarian, extraverted, independent, and unrestrained.

Discriminant Analysis of Personality Traits of Athletes
Based on the Incidence of Injury

Table 4 represents the results of the discriminant analysis on the sixteen personality factors of female athletes with high and low incidence of injury. The results indicated that there is a significant difference in the primary personality factor of Reasoning (Factor B) between female athletes with a high and low incidence of injury. This indicates that athletes with a high incidence of injury are more concrete thinkers than those athletes with a low incidence of injury.

TABLE 3

Mean Raw Score, Mean Sten Score, and Standard Deviations
of Athletes with a High Incidence of Injury

Primary Factor	Mean Raw Score	Mean Sten Score	Standard Deviation
A	18.3	7	4.54
B	8.43	5	1.99
C	12.3	5	5.59
E	15.3	6	4.46
F	17.4	7	5.32
G	9.86	4	4.56
H	13.1	6	7.01
I	8.86	3	3.93
L	10.9	5	2.54
M	8.86	6	3.39
N	9.57	5	5.06
O	11.7	5	6.65
Q1	16.4	5	5.88
Q2	5.86	5	5.60
Q3	9.71	5	5.50
Q4	13.1	6	5.70
Global Factors	Mean Raw Score	Mean Sten Score	Standard Deviation
EX	6.99	7	2.43
AX	5.71	6	7.03
TM	6.34	6	2.05
IN	6.50	7	2.20
SC	4.07	4	1.78

Primary Factor	Left Meaning	1	2	3	4	5	6	7	8	9	10	Right Meaning
A	Reserved	.	.	.	.	.	.	X	.	.	.	Warm
B	Concrete	.	.	.	.	X	.	.	.	.	.	Abstract
C	Reactive	.	.	.	.	X	.	.	.	.	.	Adaptive
E	Deferential	.	.	.	.	.	X	.	.	.	.	Dominant
F	Serious	.	.	.	.	.	.	X	.	.	.	Animated
G	Expedient	.	.	.	X	.	.	.	.	.	.	Dutiful
H	Timid	.	.	.	.	.	.	X	.	.	.	Venturesome
I	Utilitarian	.	.	X	.	.	.	.	.	.	.	Sensitive
L	Trusting	.	.	.	.	X	.	.	.	.	.	Vigilant
M	Grounded	.	.	.	.	.	.	X	.	.	.	Imaginative
N	Forthright	.	.	.	.	X	.	.	.	.	.	Private
O	Self-Assured	.	.	.	.	X	.	.	.	.	.	Worried
Q1	Traditional	.	.	.	.	X	.	.	.	.	.	Experimenting
Q2	Affiliative	.	.	.	.	X	.	.	.	.	.	Solitary
Q3	Unexacting	.	.	.	.	X	.	.	.	.	.	Organized
Q4	Relaxed	.	.	.	.	.	.	X	.	.	.	High Energy
Global Factor												
EX	Introverted	.	.	.	.	.	.	X	.	.	.	Extraverted
AX	Unperturbed	.	.	.	.	.	X	.	.	.	.	Perturbable
TM	Receptive	.	.	.	.	.	X	.	.	.	.	Resolute
IN	Agreeable	.	.	.	.	.	.	.	X	.	.	Independent
SC	Unrestrained	.	.	.	X	.	.	.	.	.	.	Inhibits Urges

Figure 2. Profile of the Mean Sten Scores of the Athletes with a High Incidence of Injury on the Sixteen Personality Factor Test

TABLE 4

Discriminate Analysis of Mean Scores

Primary Factor	Wilks' Lambda	F Ratio	Significance
A	0.88	1.71	0.22
B	0.68	5.56	0.04 *
C	0.99	0.93E-01	0.77
E	0.83	2.41	0.15
F	0.98	0.21	0.66
G	0.90	1.31	0.28
H	0.98	0.29	0.60
I	0.98	0.31	0.59
L	0.99	0.69E-01	0.80
M	0.99	0.90E-01	0.77
N	0.96	0.51	0.49
O	0.99	0.11	0.74
Q1	0.93	0.87	0.37
Q2	0.98	0.29	0.60
Q3	0.98	0.22	0.65
Q4	1.00	-0.23E-14	1.00

*Indicates a level of significance.

Global Factor	Wilks' Lambda	F Ratio	Significance
EX	0.99	0.01	0.73
AX	0.99	0.13	0.73
TM	0.94	0.74	0.41
IN	0.87	1.78	0.21
SC	1.00	0.94E-02	0.92

Comparasion of Results of Athletes with a High Incidence
of Injury and Athletes with a Low Incidence
of Injury

Figure 3 is a graphical depiction of the sten scores of both athletes with a high incidence of injury and those with a low incidence of injury. This graph seems to indicate that these two groups are more similar than dissimilar. These two groups tend to be similar in half of the sixteen primary personality factors and in two of the five global factors. Both groups also scored at a sten score of three on Factor I or sensitivity. This may indicate that female athletes as a group are utilitarian and less considerate of other people's feelings than non-athletes.

Discussion of the Results

Several studies were reviewed which found a relationship between personality and the incidence of injury. These studies found a relationship between injury and the personality factors of warmth and sensitivity. However, the results of this study contradict the findings of those studies. This may be due to the low number of subjects used and/or the fact that many of the studies reviewed used male football players as the subjects. Females do tend to differ from males in several areas which were outlined in the review of related literature.

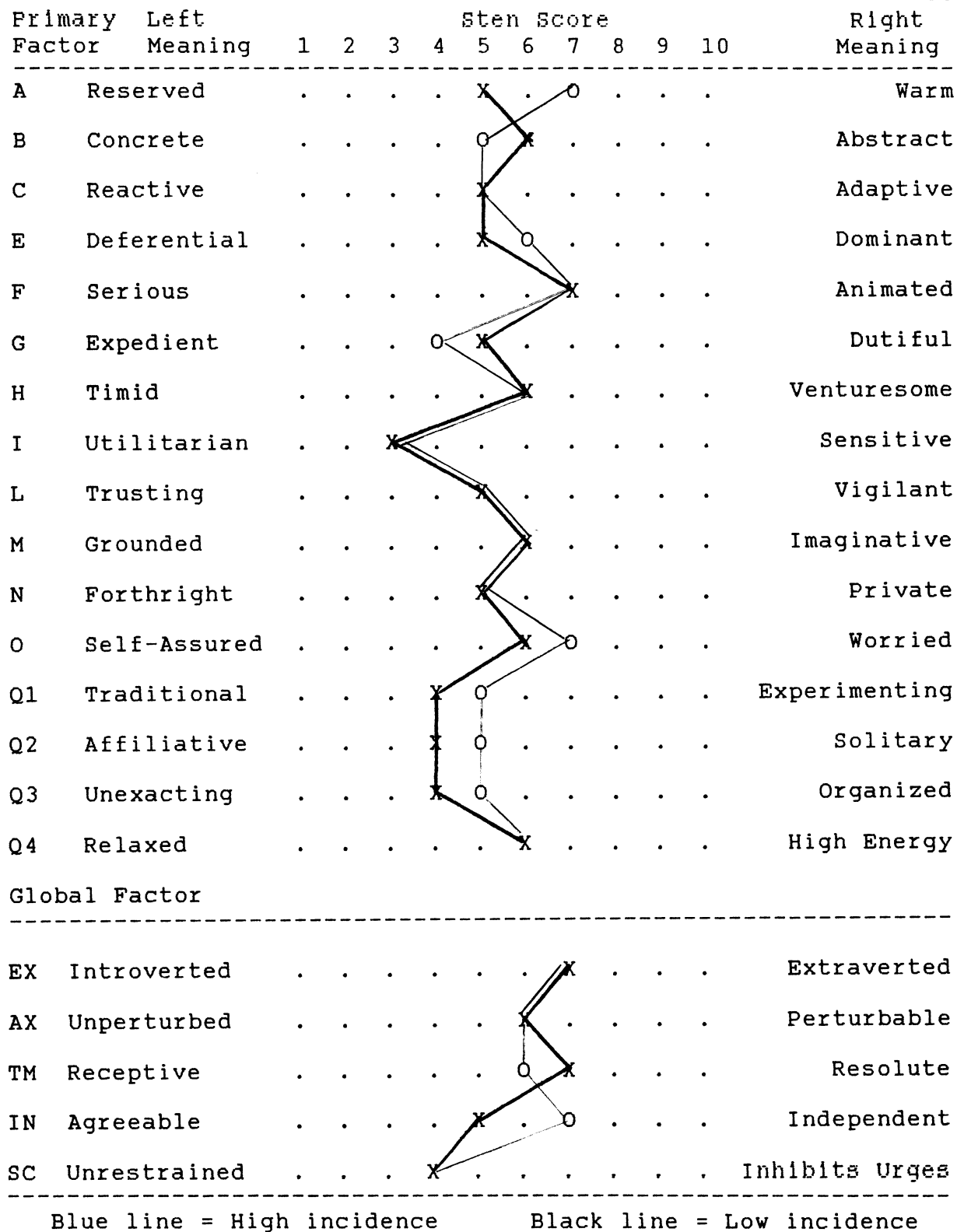


Figure 3. Profile of the Comparasions of the Mean Sten Scores of the Athletes with a High and Low Incidence of Injury on the Sixteen Personality Factor Test

This study found that there is a significant difference between athletes with a low and high incidence of injury on the personality factor of reasoning (Factor B). Factor B deals with an athletes ability to think about situations and make the correct decision. An athlete who has a low reasoning ability may not be able to choice the safest course of action. A significant difference in this factor indicates that athletes with a high incidence of injury tend to be concrete thinkers.

The results of this study seem to indicate that there may be evidence to support the use of psychological testing in the world of sports and recreation. Several professional teams now employ psychologists or psychiatrist to help their athletes identify personality conflicts or other psychological deviance. This study has shown that the use of psychological testing at all levels may help athletes. The help of licensed professionals would only help to decrease the incidence of injury within sports.

While this study found a relationship between injury and the personality trait of reasoning, it is important to note that the findings of this study may be limited due to the small number of subjects. As was stated in chapter three, Taerk (1977) gives several guidelines that would enhance a psychological test. However, the findings of this study did find a relationship between personality and injury. Taerk's (1977) strict guidelines may have increased the number of possible correlations, but this study achieved the objective of

looking into the relationship between incidence of injury and personality.

This study seems to indicate that there is only one personality trait that has a significant relationship to the incidence of injury, but a visual inspection of the mean raw scores of the two groups indicates that there may be a significant relationship in other personality traits. In a study with more subjects one may find that there is a relationship between injury and the factors of warmth (Factor A), dominance (Factor E), and independence (Factor IN).

It is also interesting to note that a relationship may exist between the number of high school injuries and collegiate injuries. While this was not determined in this study, a visual observation of the answers given on the personal information questionnaire indicates that all but one athlete who has a high incidence of injury in college also had a high incidence of injury in high school. This finding may indicate that this type of testing would be beneficial even at the high school level of sports competition.

The findings of this study have several applications to athletes, coaches, and athletic trainers. Athletes could benefit from this study by becoming more aware of yet another factor that may predispose them to injury. This by itself will help athletes to reassess their personality and possibly ask for help. Coaches and trainers would also benefit from this study into the interaction of personality and injury. First of all,

with the athletes having knowledge of the possible interaction of personality, an athletic trainer or coach may want to implement the use of personality testing prior to and after each athletic season. This testing would be done in the hope of identifying the athlete that may be more prone to injury. If an athlete does not object to help from a professional psychologist they may undergo treatment to help them attempt to alter their personality. While personality is relatively permanent a psychologist may be able to help them identify actions that would decrease their risk of injury. Another way that this study may help athletic trainers is in the rehabilitation of athletes. If an athlete had completed a personality inventory at the beginning of the season, the athletic trainer would be able to determine the athlete's type of personality. By knowing the personality the athletic trainer can tailor a rehabilitation program to each individual athlete.

CHAPTER 5

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This study was designed to determine if there is a difference in personality traits of female athletes with a high incidence of injury when compared to those athletes with a low incidence of injury.

The fourteen female athletes involved in the sports of softball, volleyball, and basketball volunteered to be in this study. They all completed Cattell's Sixteen Personality Factor Questionnaire.

The questionnaires were all hand scored using the respective scoring keys. The results were then compared statistically, following the recommendations of Cattell. Cattell recommends that raw mean scores be used for statistical analysis. The results were totaled and end values for the sixteen primary factors and five global factors were assigned.

The SPSS, statistical package for social sciences, was used to determine the mean raw scores, standard deviation, and discriminant analysis. A .05 level of significance was used.

Upon completion of the statistical analysis the mean raw scores were converted to mean sten scores in relation to the norm tables that were provided.

Conclusions

The following conclusions have been made on the acceptance of the alternate hypothesis:

1. Athletes with a low incidence of injury are more abstract thinkers, while athletes with a higher incidence of injury are more concrete thinkers. However, both groups fall within the average range for factor B (reasoning).
2. A visual inspection of the results also indicates that factors A (warmth), E (dominance), and IN (independence) may show a relationship between injury and personality with more subjects.

Recommendations

Based on the findings of this study the following recommendations have been made:

1. A similar study should be made that focuses on sports that are non-contact, and environmentally controlled.
2. A similar investigation should be initiated that takes into consideration daily exposures over an entire year.
3. Further studies should utilize a wider variety of schools, and NCAA divisions.
4. Future studies should use a larger number of subjects.

5. Future studies should closely adhere to the guidelines laid out by Taerk (1977).
6. Other tests should be utilized along with Cattell's sixteen personality factor questionnaire in order to get more information, as indicated by Kelley (1990).

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APPENDICES

APPENDIX A

Description of Cattell's
Sixteen Personality Factors

Reserved

The person who scores low (sten 1 to 3) on factor A tend to be more cautious in involvement and attachments. They tend to like working alone, often on mechanical, intellectual, or artistic pursuits. Often quite uncomfortable in situations that call for extensive interaction or emotional closeness. May indicate a person that would rather work in a laboratory than show people how to use it and they are uncomfortable talking about or showing feelings of affection.

Factor A
vs.

Warm

The person who scores high (sten 8 to 10) on factor A tends to have more interest in people and to prefer occupations dealing with people. They tend to be comfortable in situations that call for closeness with other people. This behavior tends to be more socially desirable and correlates positively with the IM scale. They may say that they enjoy people who show emotions openly, prefer to work in a busy office and their friends describe them as warm and comforting.

Abstract

The person scoring low on factor B tends to be more likely to chose a higher number of incorrect answers. However, this may not accurately reflect people's reasoning ability.

Factor B
vs.

Concrete

The person who scores high on factor B tends to solve more of the reasoning problems correctly. High scores tend to reflect higher reasoning ability because people are unlikely to obtain high scores by chance.

Reactive

The person who scores low on factor C tends to feel a certain lack of control over life. They tend to react to life, say that they have more ups and downs in mood than most people, that their emotional needs are not satisfied, and they feel as

Factor C
vs.

Emotionally Stable

The person who scores high on factor C tends to take life in stride and to manage events and emotions in a balanced, adaptive way. They tend to make adaptive or proactive choices in managing their lives, say that they

though they cannot cope when small things keep going wrong.

rarely meet problems with which they cannot cope, usually go to bed at night satisfied, and recover from upsets quickly. May also be denying problems in order to present themselves favorably.

Factor E
vs.

Deferential

The person who scores low tends to avoid conflict by acquiescing to the wishes of others. They are self effacing, and willing to set aside their wishes and feelings. Low scorers say that they tend to be more cooperative than assertive, and that when people do something that bothers them, they usually let it go.

Dominance

The person who scores high tends to be forceful, vocal in expressing their wishes and opinions even when not invited to do so, and pushy about obtaining what they want. They feel free to criticize others and try to control others' behavior, feel comfortable giving people directions, and point out if they regard another person's reasoning as wrong.

Factor F
vs.

Serious

The person who scores low on this trait tends to take life more seriously. They are quieter, more cautious, less playful, tend to inhibit their spontaneity, and regarded as mature, but not fun or entertaining. Often they prefer working on a quiet hobby, do not enjoy racy or slapshot humor, and believe more in being properly serious than in living the saying "Laugh and be merry".

Lively

The person who scores high on this trait tends to be enthusiastic, spontaneous, and attention seeking. The attention seeking and liveliness of high scorers can assume proportions inappropriate for certain situations. They tend to like being in the middle of excitement and activity, dress in an eye-catching, stylish way, and enjoy spending time talking with friends about social events.

Factor G
vs.

Expedient

The person who scores low on factor G tends to eschew rules and regulations, doing so either because they

Rule Conscious

The person who scores high on factor G tends to perceive themselves as strict followers of rules,

have a poorly developed sense of right or wrong or because they ascribe to rules that are not solely based on conventional mores. Behaviors seem to have elements of need for autonomy, need for flexibility, and difficulty in conforming to strict rules and regulations.

Factor H
vs.

Shy

The person who scores low on this trait tends to be socially timid, cautious, and shy; they find speaking in front of a group to be a difficult experience. The possibility of a subjective experience of discomfort may relate to a low score as well as to some lack of self esteem and discomfort in new settings.

principles, and manners. Rule conscious people emphasize the importance of conformance to regulations, depicting themselves as rule bound, conscientious, and persevering.

Socially Bold

The person who scores high on this trait consider themselves to be bold and adventurous in social groups, and show little fear of social situations. A large element of need for new social exhibition is evident at the high pole, with a flavor of dominance more prevalent than in other extraversion related factors.

Factor I
vs.

Utilitarian

Low scorers evidence less sentimentality, attending more to how things operate or work. They tend to be concerned with utility and objectivity, and may exclude people's feelings for consideration.

Sensitive

High scorers tend to base judgements on personal tastes and aesthetic values. They rely on empathy and sensitivity in their considerations. Usually they tend to be more refined in their interests and tastes, more sentimental, may be so focused on the subjective aspects of situations that they overlook more functional aspects.

Factor L
vs.

Trusting

The person who scores low on factor L tends to expect fair treatment, loyalty, and good intentions from

Vigilant

The person who scores high on factor L expect to be misunderstood, or taken advantage of, and they

others. Trust tends to be related to a sense of well being and satisfactory relationships, as supported in correlations with other measures. However, extremely low scorers may be taken advantage of because they do not give enough thought to others motivations.

Factor M
vs.

Grounded

The person who scores low on this trait is focused on their senses, observable data, and the outer realities of their environment in forming perceptions. Although they may think in a practical manner, they may not be able to generate possible solutions to problems.

experience themselves as separate from other people. They may be unable to relax their vigilance when it might be advantageous to do so. The mistrust may have an aspect of animosity.

Abstracted

The person who scores high on this trait is more oriented to internal mental processes and ideas rather than to practicalities. They are occupied with thinking, imagination, and fantasy, and they often get lost in thought. Extremely high scorers seem less in control of their attention or of situations, and sometimes report that they have mishaps or accidents because they are preoccupied.

Factor N
vs.

Forthright

The person who scores low on factor N tends to talk about themselves needily; they are genuine, self revealing, and forthright. An extremely low score may be forthright in situations, where doing so may not be to their advantage.

Private

The person who scores high on factor N tends to be non-disclosing, and personally guarded. They may maintain their privacy at the expense of developing close relationships, which may reflect disinterest in or fear of closeness.

Factor O
vs.

Self Assured

The person who scores low on factor O tends to be more self assured, neither prone to apprehensiveness, nor troubled about their sense of adequacy. They present

Apprehensive

The person who scores high on factor O tends to worry about things and to feel apprehensive and insecure. Worrying can have positive results, in

themselves as confident and self satisfied.

that a person can anticipate dangers in a situation and can see how actions might have consequences.

Factor Q1
vs.

Traditional

The person who scores low on this trait tends to prefer traditional ways of looking at things. They do not question the way things are done, and prefer life to be predictable and familiar, even if life is not ideal. Often they say that they feel secure and confident when they do work that is familiar and routine, they do not really like people who are "different" or unusual, and think more trouble arises from questioning and changing satisfactory methods than from rejecting promising new approaches.

Open to Change

The person who scores high on this trait tends to think of ways to improve things and enjoy experimenting. They tend to say that they like thinking of new and better ways of doing things in contrast to following well tried ways, they find people interesting if they express different viewpoints, and they are bored by work that is familiar and routine.

Factor Q2
vs.

Group Oriented

The person who scores low on factor Q2 prefer to be around people and do things with others. They may not be optimally effective in situations where help is unavailable or where others are providing poor direction or advice.

Self Reliant

The person who scores high on factor Q2 enjoy time alone and prefer to make decisions for themselves. They may have difficulty in working alongside others, and they also may find it hard to ask for help when necessary.

Factor Q3
vs.

Tolerates Disorder

The person who scores low on this trait leave more things to chance and tend to be more comfortable in a disorganized setting. They may not be able to muster a clear motivation for behaving in planful or organized ways, especially if these behaviors

Perfectionistic

The person who scores high on this trait tends to be organized, to keep things in their proper places, and to plan ahead. They are likely to be most comfortable in highly organized and predictable situations and may find it

are unimportant to them. Often they may be perceived as lackadaisical, unorganized, or unprepared.

hard to deal with unpredictability.

Factor Q4
vs.

Relaxed

The person who scores low on factor Q4 tends to feel relaxed and tranquil. They are patient and slow to become frustrated. Their low level of arousal can make them unmotivated, and because they are comfortable, they may be disinclined to change or push themselves.

Tense

The person who scores high on factor Q4 tends to have a restless energy and to be fidgety when made to wait. While a certain amount of tension can be focused effectively and can motivate action, extremely high tension can lead to impatience and irritability.

APPENDIX B

Personal Information Questionnaire

1. Social Security Number _____ 2. Age: _____
3. Grade level: _____
4. Academic Major _____
5. Intercollegiate Sport(s) in which you participate:
 Softball Basketball Volleyball
6. During what season do you train for each sport?
 Preseason Season Off season
7. Do you train year round for only one sport? Yes No
8. Do you do any cross training during the off season? Yes No
9. If so what activities do you engage in? _____

10. How many injuries have you had in each of the sports in the
 past year? _____
11. What sports did you participate in during high school?

12. Approximately how many injuries did you sustain during
 each year of participation in each of these sports?

Please inform the researcher if you wish to receive the results of your personality inventory.

APPENDIX C

Consent Form

I, _____, state that I am eighteen years of age or older and wish to participate in a study being conducted by J'nise A. Ramsey.

The study is designed to assess the personality traits of collegiate female athletes. The study involves the completion of Cattell's Sixteen Personality Factor Questionnaire and a personal information questionnaire. Cattell's questionnaire asks questions pertaining to one's personality and takes 30-60 minutes to complete. The personal information questionnaire requests information about sports participation, year in school, and the number of injuries sustained in one athletic season. The information obtained from both questionnaires will be identifiable only by your social security number. Individual scores will not be revealed within the context of the written thesis, and only the researcher will have access to the individual results.

I acknowledge that I may withdraw from participation at any time; that any inquiries which I may have will be answered by the researcher, and that my name will not be used within the thesis in question. I freely and voluntarily consent to my participation in this research project.

Signature of Volunteer _____
Date _____

Signature of Researcher _____
Date _____

APPENDIX D

Guidelines for Completing the Personal Information
Questionnaire

Please use the following guidelines for completing questions six and ten on the personal information questionnaire.

Guidelines for answering question number six:

Season:

Softball	January 1, 1994 - May 7, 1994
Basketball	November 1, 1993 - March 5, 1994
Volleyball	August 16, 1993 - November 6, 1993

Offseason:

Softball	May 8, 1993 - November 19, 1993
Basketball	March 6, 1993 - September 28, 1993
Volleyball	November 7, 1992 - July 5, 1993

Preseason:

Softball	November 19, 1993 - December 31, 1993
Basketball	September 20, 1993 - October 31, 1993
Volleyball	July 5, 1993 - August 15, 1993

Please use the following definition when answering question number ten.

Injury: A condition that required treatment by an athletic trainer or other medical care provider, other than an illness, that resulted in diminished performance or loss of playing time.

APPENDIX E

Responses on the Personal
Information Questionnaire

Subject	Number of injuries	age	sport(s)	season of training	H.S. injuries
01	0	20	VB SB	season	0
02	0	21	SB	off/pre/season	1
03	0	19	BB	off/season	0-1
04	1	18	SB	off/season	1
05	1	19	VB SB	season	0
06	1	19	VB SB	season	1
07	1	21	VB TR	season	0-1
08	2	24	SB	season	4
09	2	20	SB	off/season	2
10	3	18	VB TR	season	2
11	3	18	SB	off/season	3
12	3	19	SB	season	0
13	3	18	BB	off/pre/season	2
14	3	24	SB	pre/season	3

SB = softball BB = basketball VB = volleyball TR = track

APPENDIX F

Data Table of Raw Scores for the Sixteen
Primary Personality Factors

	01	02	03	04	05	06	07	08	09	10	11	12	13	14
A	10	14	16	18	20	12	18	20	21	21	9	19	22	16
B	10	14	9	10	10	10	13	6	12	8	8	8	7	10
C	7	16	9	19	12	12	5	20	18	10	8	14	12	4
E	5	14	16	13	10	4	17	20	17	13	8	12	17	20
F	17	18	15	20	18	8	18	20	17	17	11	11	26	20
G	12	14	14	7	14	18	8	6	4	14	10	15	6	14
H	1	20	14	15	4	4	19	18	20	20	2	6	14	12
I	10	9	10	10	10	8	11	12	8	12	12	11	3	4
L	8	9	13	15	6	14	8	10	10	11	13	13	13	6
M	6	8	7	11	6	12	16	14	7	8	12	7	10	4
N	13	12	7	10	10	16	10	6	6	6	19	13	11	6
O	10	14	16	5	12	18	14	2	20	6	17	17	8	12
Q1	5	8	18	22	8	12	20	26	21	19	13	15	12	9
Q2	4	2	6	0	4	10	7	0	6	7	13	0	8	7
Q3	6	14	12	4	6	14	3	6	5	12	4	19	8	14
Q4	13	14	9	11	8	18	19	10	11	7	19	7	18	20

APPENDIX G

Data Table of Raw Score for the Five
Global Factors

	01	02	03	04	05	06	07
EX	6.8	7.4	5.0	7.5	3.7	7.3	8.5
AX	6.6	5.5	6.0	7.2	8.1	4.4	4.5
TM	6.6	8.5	9.7	4.5	7.9	8.2	5.3
IN	6.8	5.7	1.0	7.3	2.8	3.2	7.0
SC	4.9	4.8	4.1	1.8	6.1	3.9	2.3
	08	09	10	11	12	13	14
EX	7.4	7.3	6.4	1.9	8.3	8.3	9.3
AX	8.0	6.2	5.4	7.8	4.7	5.9	2.0
TM	9.4	7.5	6.4	7.1	5.2	6.0	2.8
IN	7.3	6.2	4.7	2.9	6.9	7.8	9.7
SC	5.2	3.0	7.3	3.5	4.6	2.9	2.0