PREMATCH ANXIETY LEVELS AND RATES OF INJURY IN RUGBY

by

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ABSTRACT

The purpose of this study was to assess the relationship of injury rate in rugby with competitive trait anxiety, cognitive anxiety, somatic anxiety, self–confidence and percentage change in heart rate. A secondary purpose of this study was to investigate the relationship between state anxiety, as measured by the Competitive State Anxiety Inventory–2 (CSAI–2), and state anxiety, as measured by percentage change in heart rate. No significant relationship was found between rate of injury, and competitive trait anxiety, as measured by the Sport Competition Anxiety Test (SCAT); cognitive anxiety, as measured by CSAI–2; somatic anxiety, as measured by CSAI–2; self–confidence, as measured by CSAI–2; and percentage change in heart rate. These results indicated that anxiety, when isolated from other factors, is not a significant factor in regard to injury rate. A relationship between rate of injury and perceived game difficulty was found not to be significant. Furthermore, nonsignificant relationships were also found between CSAI–2 measures of cognitive and somatic anxiety and percentage change in heart rate. However, a significant relationship was revealed between self–confidence and percentage change in heart rate, $r\,(41) = -32$, $p < .05$. The finding of nonsignificant relationships between heart rate and cognitive and somatic (CSAI–2) anxiety measures reflects a gap which persists in our understanding about the nature of anxiety. The study revealed the difficulty of establishing a common, significant factor with regard to

the incidence of injury in rugby. No one variable, such as anxiety, would seem to be of single most importance. Rather it would seem that is is a collection of variables which, acting together, contribute to injury.

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DEDICATION

For my Mother and Father

Who Made It All Possible

CHAPTER 1

Introduction

Athletic injuries are often regarded as "occupational hazards" (part of the game). But accidents and injuries do not just happen – they are caused (Gordon, 1986, p. 2). A number of factors have been suggested as possible variables which contribute to injury. These include physical fitness, muscular development, skill, determination, reaction time, playing surface, and weather (Thomas & Reilly, 1975). However, it has been suggested that nearly every concern of human endeavour is thought to be affected somehow by anxiety and if we penetrate below the surface of athletic crises to discover their psychological causes, we continually encounter the problem of precompetitive anxiety (Klavora, 1976; Levitt, 1967).

Competition within sport is often synonymous with anxiety and evidence would suggest that athletes, at almost all levels, experience precompetitive anxiety (Cheatham & Rosentswieg, 1982; Power, 1982). The literature has indicated that reaction to anxiety will vary depending on: (a) a person's relatively stable, ongoing level of anxiety (A–trait), and (b) anxiety resulting from how a specific situation is perceived (A–state) (Martens, 1977; Spielberger, 1966).

A great deal of research has dealt with the relationship between anxiety and performance, the basis of which has been the Inverted "U" Hypothesis developed by Yerkes and Dodson (1908). However, to date, comparatively little work has been concerned with determining if anxiety influences variables other than performance. Nevertheless, highly anxious athletes have been profiled as being susceptible to injury (Cratty, 1983; Sanderson, 1982). It was suggested by Sanderson (1982) that

athletes tend to be worriers, feel insecure, and are generally uncomfortable. These feelings are in turn associated with heightened levels of anxiety with regard to the sports arena.

Sanderson (1982) argued that individuals who find the atmosphere of competitive sport very anxiety–inducing may attempt to counteract the anxiety by meeting it head on, by being overtly aggressive and fearless. This confronting of anxiety involves what Horney (1937) has described as the "process of ruthlessly marching over an anxiety" (p. 51). Sanderson (1982) further suggested that many rugby players are of the counterphobic type. They tempt fate by frequently testing their imagined invulnerability, a course of action which almost guarantees injury.

There is little doubt that anxiety affects performance (Martens, Burton, Vealey, Bump, & Smith, 1983). Wine (1971) has suggested that the mechanism by which anxiety inhibits performance is through the disruption of the attentional processes. Nideffer (1981) proposed a specific relationship between anxiety and attention which suggests that increases in anxiety will affect attention negatively, with regard to the task in hand. Landers, Furst, and Daniels (1981) found that high trait–anxious performers had difficulty maintaining effective concentration and narrowing attentional focus. With regard to state anxiety, Nideffer (1981) stated that as pressure (state anxiety) increases there is an increased tendency for athletes to revert to their dominant attention style. In other words, Nideffer is referring to a loss of attentional flexibility with an accompanying increase in the naturally preferred style. This emergence of the dominant style may result in the failure to attend to all relevant cues.

Bird and Cripe (1986) stated that there are two cognitively based explanations for the relationship between level of anxiety and attention. The first is based on

Easterbrook's (1959) cue utilization hypothesis which proposed that as anxiety increases there is a reduction in the number of peripheral cues a person can process. The second explanation, developed by Kahneman (1973), suggests that as anxiety increases, attentional shifts occur. There is limited evidence to suggest that anxiety can influence attentional style, which may ultimately lead to a decrease in sports performance through an inability to process all relevant cues (Bird, Ravizza, & Reis, 1986). However, to date there has been little research into a relationship among attentional style, anxiety, and injury rate.

The possibility of reducing potentially disabling injuries among rugby players is a compelling stimulus to identify and possibly control the responsible factors. The researcher would therefore suggest that there is a need for research in this area. It would be dangerous to dismiss injuries as only a by–product of the game situation. Injuries are caused and there is reason to believe that anxiety may be one of the influential factors.

Statement of the Problem

The purpose of this study was to determine:

1. whether there was a significant relationship between trait anxiety and rate of injury in the game of rugby;
2. whether there was a significant relationship between any of the components of state anxiety – cognitive, somatic, and self–confidence, as measured by the Competitive State Anxiety Inventory–2 (CSAI–2), and rate of injury in rugby players;

3. whether there was a significant relationship between state anxiety, as measured by heart rate, and rate of injury; and
4. whether there was a significant relationship between game status, and rate of injury in rugby.

A secondary purpose of the study was to determine:

1. whether there was a significant relationship between state anxiety as measured physiologically and state anxiety as measured by the Competitive State Anxiety Inventory, Version Two (CSAI–2).

Definition of Terms

Anxiety – "a mental interpretation on the part of the athlete, about the degree of threat which an impending event is about to impose, coupled with changes, (usually heightened) in activation–arousal levels" (Cratty, 1984, p. 94).

Arousal – "the intensity dimension of behavior – i.e., a state of the organism varying on a continuum from deep sleep to intense excitement" (Martens, 1977, p. 5).

Trait Anxiety (A–trait) – a "behavioral disposition that predisposes an individual to perceive a wide range of objectively nondangerous circumstances as threatening and to respond to these with A–state reactions disportionate in intensity to the magnitude of the objective danger" (Spielberger, 1966, p. 17).

Competitive Trait Anxiety (CTA) – "a construct that describes individual differences in the tendency to perceive competitive situations as threatening and to respond to these situations with A–state reactions of varying intensity" (Martens, Gill, Simons, Scanlan, 1975, p. 289).

State Anxiety (A–state) – "subjective, consciously perceived feelings or apprehension and tension, accompanied by or associated with activation or arousal of the autonomic nervous system" (Spielberger, 1966, p. 17).

Cognitive Anxiety – "a conscious awareness of unpleasant feeling about oneself or external stimuli, worry, or disturbing visual images" (Morris, Harris, & Rovins, 1981, p. 302).

Somatic Anxiety – "refers to the physiological and affective elements of the anxiety experience which develop directly from autonomic arousal. Somatic anxiety is reflected in such responses as rapid heart rate, shortness of breath, clammy hands, butterflies in the stomach, and shortness of breath" (Martens, Burton, Vealey, Bump, & Smith, 1983, p. 6).

Self–confidence – "the absence of cognitive anxiety" (Martens, Burton, Vealey, Bump, & Smith, 1983, p. 17).

Injury – physical damage or hurt suffered during the course of the game which requires the attention of the athletic trainer.

CHAPTER II

Review of the Literature

Introduction

The writer's review of the literature will be divided into a number of subsections. These sections are as follows:

1. Theories of anxiety
2. Measurement of anxiety
3. Anxiety and injury
4. Rugby and injury

Theories of Anxiety

Anxiety is one of the major characteristics of our time. Almost every aspect of human endeavour is thought to be affected somehow by anxiety. Hoch and Zuban (1950) stated that "anxiety is the most pervasive psychological phenomenon of our time" (p. v). Although the concept of anxiety is not new, Cohen (1969) points out that while the concept is clearly reflected in ancient hieroglyphics, it is only in the twentieth century that anxiety has emerged as a dominant theme. But what exactly is anxiety? Anxiety can be a mood, a feeling, an emotional response, a syndrome, an illness, and so on. The list of phenomena in which it has been claimed that anxiety plays a role is imposing. Nearly every identifiable form of pathology — psychological, physical, and social — is included. However, although we all understand the meaning of anxiety, in a broad sense, scientific theories of anxiety

have often failed to find common ground in explaining the phenomenon.

In psychology there has been a tendency to make anxiety the "villain of the piece." With regard to sport psychology Klavora (1976) stated that anxiety underpins almost every athletic crisis. In early psychology Freud (1923/1936) treated anxiety as the "internal state responsible for neurotic disturbances." May (1950) suggested that anxiety, has best been generally viewed as a negative construct, "an alien power which lays hold of an individual" (p. 37).

To take such a stance may however be a mistake, a misjudgement of anxiety. May (1950) cited Kierkegaard as stating that "anxiety is an even better teacher than reality, for one can temporarily evade reality by avoiding the distasteful situation, but anxiety is a source of education always present because one carried it within" (p. 43). In other words Kierkegaard believed that each individual's self–development could only reach maturity through confronting anxiety successfully.

Traditionally anxiety has been viewed from two perspectives. It refers to uneasiness, worry, apprehension, and as such it is a response. Its characteristics are known only through the introspective reports of the individual who is experiencing them, although one can attempt to infer them through observation or by physiological means.

Anxiety is also widely defined as an intervening variable. In this role it is a condition which activates specific behaviour as a means of reducing anxiety. For example, in psychoanalytic theory defence mechanisms are motivated by anxiety, whilst in learning theory the learning of behaviour which avoid punishment is motivated by anxiety. Thus anxiety can be thought of as a response which activates other responses.

This second view of anxiety received its initial impetus from Freud. He suggested that anxiety is important because it serves as a cue or a signal to the individual that he is in danger. In order to overcome the danger, defenses activate on the anxiety signal. However, it is often not clear whether it is the painful nature of anxiety that motivates the defense mechanisms, or the signal of anxiety, with regard to upcoming danger. This is an important issue. Lazarus (1966) stated that if it is the latter then it is not anxiety which is being defended against but rather an upcoming danger which is being signalled by the anxiety. However, if it is the painful nature of anxiety, then anxiety is clearly causing the defensive reaction and subsequent reactions are attempts at reducing or eradicating the anxiety.

Freud is probably the most important contributor to our present understanding of anxiety. In 1894 he had conceptualized anxiety neurosis as a discrete clinical syndrome but by 1923 he had changed his viewpoint and suggested that anxiety is "a specific state of unpleasure, accompanied by motor discharge along definite pathways" (p. 92). He observed that this state was characterized by physiological changes in heart rate, respiration, sweating, and muscle tension. He went on to distinguish three types of anxiety which differed with respect to provocation. Reality anxiety is appropriate to a threat posed by an object or situation. He suggested that to have reality anxiety is sensible and adaptive. Neurotic and moral anxiety are derived from Freud's well known tripartite concept of basic personality structure where conflict occurs between the Id, the Ego, and the Superego.

Pavlov (1927) did not use the word anxiety. However, he suggested that the cerebral cortex is susceptible to biological injury from overstimulation. As stimulation approaches an individual's level of tolerance, a process which he termed "transmarginal inhibition" is evoked. This process protects the individual from

overstimulation, although the process can produce withdrawal reactions and cataleptic states in its own right.

In the 1930's a movement known as Neo–Freudian developed. It changed the orientation of psychoanalysis from the biological and instinctual to the cultural and environmental. The movement obtained its initial impetus from Abram Kardiner (Levitt, 1967). Kardiner's psychoanalytic examinations of cultures showed that personality development and characteristics varied widely around the world. The Neo–Freudians regard human personality as primarily a product of social influence. They suggest that anxiety cannot arise before the individual has more awareness of his/her environment. What the Neo–Freudian views as "primary anxiety" comes about early in life — probably before the end of the first year. The child realizes that he/she is dependent on a guardian and it is the frustration, born out of dependency, which produces anxiety. The restricting and conforming of basic impulses leads to the development of defense mechanisms — primarily repression. In later life situations it is suggested that when an individual is provoked the original connection between parents' disapproval and expression of hostility may cause an upsurge in anxiety. This "secondary anxiety" arises as a consequence of the defense mechanisms employed against primary anxiety. Neo–Freudians suggest that most human anxiety is of this secondary nature.

For Goldstein (1939) anxiety developed from an individual's need to comprehend and cope with his/her environment. When this need is threatened he/she experiences anxiety through the dread of catastrophic reactions.

According to Dollard and Millar (1950) anxiety is a learned phenomenon acquired through a process known as "stimulus generalization." In this process the individual learns to be aware of objects or conditions that are descriptively similar

to an original fearsome stimulus. They further suggested that anxiety may also result from the conflict of two strong, competing drives.

For Rogers (1951) anxiety is experienced when the individual perceives something that is a threat to his/her self–respect. It is assumed that discrepancies between the self, as perceived, and perceptions of reality, produce anxiety. Kierkegaard, as represented by May (1950) related anxiety to decision. Whenever there is a decision to be made, anxiety is present. According to May (1950) anxiety is associated with personality. He argued that anxiety is a reaction which follows the perception of threat and that it is a developmental state in the emergence of fear. For Lazarus (1966) anxiety occurs when there is an appraisal of threat.

Spielberger (1966) stated that the ambiguity associated with the term "anxiety" arises from the use of the term to refer to two different concepts. In everyday parlance anxiety is most commonly used in a descriptive sense to denote a response that varies in intensity and fluctuates over time. However, the term is also used with reference to personality traits. In the case of the latter it refers to individual differences in the extent to which different people are characterized by anxiety states and by prominent defenses against such states.

Evidence for different aspects of anxiety has emerged from factor analytical studies conducted by Cattell and Scheier (1958). They identified two distinct anxiety factors which they labelled trait anxiety and state anxiety. The trait anxiety factor was interpreted as measuring a relatively stable, ongoing personality characteristic. Variables which contributed to the trait anxiety factor included ego weakness, suspiciousness, guilt proneness, and tendency toward embarrassment. State anxiety was defined as a state or condition which fluctuated over time. Physiological factors such as respiration rate and systolic blood pressure contributed

heavily to the state anxiety factor but lightly to trait anxiety.

Spielberger (1972) has suggested that in recent years progress has been made in the assessment of personality characteristics. In particular he stressed the advances made in the measurements of personality states. He argued that personality traits can be regarded as "relatively enduring individual differences among people in specific tendencies to perceive the world in a certain way and/or in dispositions to react in or behave in a specific manner with predictable regularity" (p. 31).

The trait perspective would suggest that by uniting various responses to various stimuli, broad consistencies in behaviour, known as traits, are produced. Allport (1961) defined a trait as a "neuro–psychic structure which renders stimuli into functional equivalents and which initiates and guides behaviour." In other words a trait is a predisposition to respond, in a certain manner, to various kinds of stimuli. Therefore, the expression of the overt behaviour of a personality trait is dependent on stimulation by appropriate cues. Should these cues be absent then the particular personality trait and associated behaviour will not be exhibited. On the other hand, in the presence of specific stimuli, anxiety, to varying degrees, will be experiences.

Spielberger (1966) suggested that this type of anxiety, known as trait anxiety (A–trait), can be more formally defined as a "relatively stable individual differences in anxiety proneness, i.e., to differences among people in the disposition to perceive a wide range of situations as threatening" (Spielberger & Sarason, 1975, p. 137). Mischel (1971) viewed trait anxiety as representing a person's characteristic level of anxiety.

Spielberger (1966) argued that A–trait is a reflection, in part, of past experiences which gives rise to individual differences in anxiety proneness. He

suggested that the most significant experiences relate back to childhood, involve the parent–child relationship, and are centered around punishment. Solyom, Beck, Solyom, and Hugal (1974) went further and suggested that there is evidence that certain anxiety traits are inherited.

A development within trait anxiety has been the differentiation between general trait anxiety and situation specific trait anxiety. The definition of trait anxiety given by Spielberger (1966) is a definition of general trait anxiety, whereby it is suggested that people who chronically perceive one situation as threatening will perceive all such classes of situation as threatening. However, it is clear that some individuals will view some situations as more threatening than others: they may perceive competitive sport as being more stressful than, for example, examinations. This has led to a refinement in the anxiety literature with trait anxiety being expressed in situational–specific terms, an example of which would be anxiety brought about through competition. Essentially it is a modification of the general A–trait construct, developed by Spielberger (1966), and represents a relatively stable factor which is deemed to be an important mediator of state anxiety responses to specific competitive situations.

Martens, Gill, Simons, and Scanlan (1975) termed this relatively stable predisposition toward competition as "competitive trait anxiety." This construct relates to "individual differences in the tendency to perceive competitive situations as threatening and to respond to these situations with A–state reactions of varying intensity" (Martens, Gill, Simons, & Scanlan 1975, p. 289). This theory therefore suggests that individuals, with high levels of competitive trait anxiety, will perceive more competitive situations as threatening than those individuals with lower levels of trait anxiety.

In contrast to the trait anxiety condition, an individual may experience anxiety at a particular moment. This construct, known as state anxiety (A–state), refers to an immediate and short term phenomenon.

Spielberger (1966) has proposed that the development of an A–state involved a sequence of temporally ordered events. There is first a cue or stimulus, external or internal, then an appraisal of the situation, and finally an A–state reaction. The consequence of an A–state response may come to light in a number of ways. The A–state reaction may serve as a signal that initiates a behaviour sequence designed to avoid or directly deal with the real or perceived danger. Cognitive or motor defensive mechanisms, which have been successful in the past in mediating A–state by altering the cognitive appraisal of the situation, may be alerted.

For many theorists the key intervening variable in the theory of anxiety is the concept of threat or danger (Lazarus, 1966; Michel, 1971). The characteristics of threat are twofold: (a) It is anticipatory; and (b) it results from cognitive processes involving perception, learning, memory, judgment, and thought.

Lazarus (1966) suggested that threat arises from present cues about future harm. Withey (1962) supported this position by implying that the presence of noxious stimuli is not always the case, rather it is only the cues heralding their coming that are involved.

With regard to sport, Cratty (1984) defined state anxiety as "a mental interpretation on the part of the athlete about the degree of threat that an impending event or opponent is about to impose, coupled with changes (usually heightened) in activation–arousal level" (p. 94). This definition of state anxiety, in terms of a threat, has also been suggested by Gerson and Deshaires, (1978), and Martens, Burton, Rivikin and Simon, (1980).

A consequence of defining threat in reference to harm requires that a distinction be made with regard to the threat stimulus and actual harm occurrences. Often the actual nature of the confrontation turns out to be different in character from that anticipated. Therefore, in defining anxiety in terms of threat one is essentially concerned with the uncertainty or indecision about an anticipated event. Furthermore, Cook and Barnes (1964) found that individuals will endeavour to minimize the period of uncertainty or indecision. In their study in which subjects had the opportunity to choose the amount of delay of electric shock, it was found that individuals predominantly selected minimal delays. With regard to longer periods of time Lazarus (1966) observed that threat increases with the imminence or the confrontation.

The cognitive processes in the development of threat are unique and therefore individual reaction to specific stimuli will vary. For state anxiety to occur an evaluation must be made of the situation to the effect that a harm, real or perceived, is present. The appraisal of a situation requires judgment, discrimination, and response based largely on previous experience.

James (1890) developed the following formulation which stated that "the bodily changes follow directly the perception of the existing fact, and that our feeling of the same changes as they occur is the emotion" (p. 449). Furthermore, when we perceive a situation as threatening we respond with heightened levels of anxiety. This in turn leads to psychological and physiological changes. According to Spielberger (1966) anxiety, as an emotional state (A–state), is characterized by "subjective, consciously perceived feelings of tension, apprehension, and nervousness accompanied by or associated with activation of the autonomic nervous system" (p. 17). The level of the A–state will vary in intensity and fluctuate over time and is

dependent on the situation and stress attached to that situation. In other words A–state involves a "right now" reaction to a threatening situation. Common behaviours associated with state anxiety include nervous laughter, insomnia, appetite loss and changes in heart rate, respiration, skin responses, and palmar sweating.

In his definition of trait anxiety Spielberger (1966) suggested that A–trait predisposes an individual to perceive a wide range of stimuli as threatening and to respond with heightened levels of A–state. The development of A–state involves a sequence of temporally ordered events beginning with the appraisal of real or perceived threatening stimuli. Spielberger argued that it is the individual differences in A–trait which determine the particular stimuli that are cognitively appraised as threatening. Since individuals vary with respect to what stimuli they regard as threatening it follows that individuals will respond with heightened levels of A–state to specific stimuli.

Using Spielberger's (1966) trait–state theory of anxiety, Martens, Gill, Simons, and Scanlan (1975) developed a theory of competitive stress with the primary objective being to predict the levels of state anxiety among different people in varying competitive situations. Martens, Gill, Simons, and Scanlan (1975) stated "competitive trait anxiety is a construct that describes individual differences in the tendency to perceive competitive situations as threatening and to respond to these situations with A–state reactions of varying intensity" (p. 289). Furthermore, as mentioned previously, Martens, Gill, Simons, and Scanlan (1975) suggested that individuals high in competitive A–trait will perceive more competitive situations as threatening than those with lower levels of competitive A–trait.

The Measurement of Anxiety

Traditionally two methods have been used to measure anxiety. The first involves physiological assessment of the individual. The second method involves a number of paper–and–pencil, self–report measures.

Psychological and physiological measures are often used interchangeably and it is often assumed that because a test, psychological or physiological, is a measure of anxiety, it must measure anxiety. However, although a large number of researchers have used the two methods of measuring anxiety, either separately or together, correlations between the two types of measurement have been weak. Physiological responses are routinely used by individuals, both as subjective and objective measures of anxiety. However, the relationship between how a person feels and how he responds physiologically is complex and not at all clear, even though common experience indicates a strong relationship. This is not a new idea and Foster and Humphries (1951) have stated that the concept of a relationship existing between anxiety and physiological variables can be traced back to the observations of Aristotle.

Hodges (1976) stated that one of the most puzzling aspects of anxiety research is the failure of subjective assessments of anxiety (pencil–and–paper tests) and objective assessments of anxiety (physiological measures) to correlate significantly when a person is under stress. Evidence of this has been found in the work of Bloom, Housten, and Burish 1976); Bond, James, and Lader (1974); and Morrow and Labrum (1978). In an analysis of six studies Weinstein, Averill, Opton, and Lazarus (1968) reported a range of correlations between state anxiety and heart rate from –.15 to +.31 with a mean correlation of .03.

The reason behind this phenomenon may lie with a number of factors:

1. There is no one single physiological measure of anxiety.

2. Physiological responses to anxiety provoking stimuli will be highly influenced by environmental factors, individual experiences, and physiological make up. Lacey (1967) reported different patterns of heart rate, skin conductance, and pupil dilation in differing situations.

3. Varying appraisals of the same stimuli may evoke differing physiological responses in individuals. Hodges (1976) reported that it is well documented that individuals have specific response patterns in autonomic functions; that some are high heart rate responders and others are perhaps high respiratory responders. Cattell (1972) stated that despite the dependency of physiological components on one nervous system, they do not react in a monotonic linear fashion.

4. The pencil–and–paper tests may not be a reliable measure of anxiety. Tenenbaum (1984) claimed that psychological inventories are not capable of detecting unexpected responses, given by individuals as a result of social desirability and other reasons. Therefore, low anxious individuals, as indicated by a psychological paper–and–pencil–test may not be "true" low anxious individuals.

Individuals experiencing anxiety often report increases in heart rate, sweating, breathing, and other autonomic physiological responses. Since the early work of Selye (1936) researchers have linked anxiety with numerous biochemical changes. It was claimed by Selye (1974) that whatever the nature of the initial stimulus, the

presence of anxiety is assured by its effects, which can often be observed and measured.

Frankenhauser and Rissler (1970) and Mason (1972) found self–reported stress to correlate significantly with amount of catecholamine excretion. The release of specific hormones, such as adrenalin, may also result in physiological responses which can be measured. These include accelerated pulse rate, elevated blood pressure, increase in the rate of blood circulation, and enhancement of blood sugar levels (Levitt, 1967).

Although there is evidence to support the use of heart rate as a measure of anxiety, this physiological method has been used sparingly. Levitt (1967) suggested that the difficulty in controlling extraneous variables has limited the use of heart rate as a measure of anxiety. The researcher cannot be certain that an increase in heart rate is directly the result of anxiety. However, Thomas and Reilly (1975) argued that pencil–and–paper tests intrude into the mental preparation of the athlete prior to competition. They stated that in the locker room the method of measuring anxiety must be unobtrusive, socially acceptable, and administratively convenient. It was suggested by Thomas and Reilly (1975) that heart rate fulfills these criteria.

Previous research has used high precompetition heart rates as a measure of anxiety. Astrand (1967) found a rate of 200 beats/minute for a downhill skier prior to starting his run. A heart rate of 138 beats/minute was recorded by Skubic and Hilgendorf (1964) for a female track runner 30 seconds before starting a race. Taggard and Gibbons (1967) reported rates of over 200 beats/minute for a racing car driver just prior to racing. Porter (1978) reported values of 126%, 253%, 147%, and 217% above resting heart rate for basketball coaches before games. Shepherd

(1968) suggested that competition, by its very nature, imposes psychological stress, to some degree, on all competitors. The level of stress experienced depends on the nature of the competition, the individual, and time. Shepherd (1968) further argued that psychological stress is greater during anticipation of exercise than during actual performance. This stress acts upon the cardiovascular system and the reaction of the heart may exceed that incurred during exercise.

By far the most popular method of measuring anxiety in the experimental situation involves the use of an anxiety inventory. Levitt (1967) suggested that the popularity of the anxiety inventory stems from its research advantages. It can be administered quickly and easily. It has greater reliability than physiological measures in that it is less affected by extraneous variables. However, one should be aware of the major disadvantage of the inventory, that is, the uncertainty about the subject completing the inventory honestly.

The Taylor Manifest Anxiety Scale (TMAS) is a questionnaire which gave an enormous impetus to research on anxiety. Developed by Taylor (1953) it was the first anxiety inventory to come into general use. The Freeman Manifest Anxiety Test (1953) employs an approach which differs from those of other anxiety measures. It is structured like an attitude inventory and asks the subject to agree or disagree with statements. The Subjective Stress Scale (SSS), developed by Kerle and Bialek (1958) consists of a fourteen–item scale to which various values have been assigned to each item. The subject is instructed to select the one word or expression which most adequately describes how he feels. The SSS is a measure of state anxiety. The Affect Adjective Check List (AACL) consists of a number of self–evaluative statements in which only the adjective is changed. The AACL, developed by Zuckerman (1960) can, by changing the instructions, be used to

measure either A–trait or A–state. The Stimulus–Response inventory (SR inventory) was developed by Endler, Hunt, & Rosenstein (1962). The inventory consists of brief descriptions of 11 specific situations. Fourteen response tendencies are listed and the subject responds by indicating on a five–point scale the intensity with which he/she experiences each of the responses in each of the 11 basic situations. The Fear Survey Schedule (FSS) developed by Geer (1965) is allied in principle to the SR inventory. It consists of 51 fears and the subject indicates the extent to which he/she fears the stimulus or situation on a seven–point scale. The FSS is essentially a measure of trait anxiety.

The State–Trait Anxiety Inventory (STAI) developed by Spielberger, Gorsuch, and Lushene (1966) is an instrument which can be used to measure both trait and state anxiety. The test consists of 20 self–descriptive statements to which the subject responds on a five point scale based on intensity of feeling. The items are identical for both A–trait and A–state and like the AACL only the instructions differ.

In 1975 Martens, Gill, Simons, and Scanlan developed the Sport Competition Anxiety Test (SCAT) as both an instrument for measuring competitive trait anxiety and as a means of predicting the levels of state anxiety for different people in various competitive situations. Martens, Gill, Simons, and Scanlan (1975) stated that competitive trait anxiety describes "individual differences in the tendency to perceive competitive situations as threatening and to respond to these situations with A–state reactions of varying intensity" (p. 289). Martens, Gill, Simons, and Scanlan (1975) hypothesized that high SCAT persons would experience higher A–state than low SCAT persons when in a competitive situation.

The test was initially developed for use with children but was later extended to

include adult assessment. Therefore, there are two forms of SCAT in use: SCAT–A for adults and SCAT–C for children. Only the instructions and one word in one question constitute the difference between the questionnaires.

The construction of the questionnaire was based on the following criteria:

1. A minimum of response bias.
2. An unambiguous procedure for taking the test.
3. A short time period to complete the test.
4. An easy method of scoring.

A total of 75 items formed the initial questionnaire and these were reviewed by six experts. Drawing from their conclusions 21 items were retained along with 9 spurious items.

The first inventory, Version 1, was administered to 193 school children and from an analysis of the results Martens was able to reduce the questionnaire down to 14 items with 7 spurious items. This second inventory, Version 2, was then administered to 175 children and from these results the test was reduced to 10 items with 5 spurious items. This third version constitutes what is now recognized as SCAT–A and SCAT–C.

The SCAT–A was first administered to a group of 155 university male and female athletes with the purpose of determining item discriminibility. All the items exceeded the criteria specified previously for item acceptance, a correlation coefficient of at least .40.

In total the development of SCAT took approximately five years. Gill (1986) suggested that the establishment of a reliable and valid final version involved the testing of 4,000 people and approximately 3,000 hours of work.

As a means of determining the reliability of SCAT the test–retest method was

used. A coefficient of r = .77 was established (Martens, Gill, Simon, & Scanlan, 1975).

A test of discriminate validity was determined by correlating other personality constructs with SCAT. Correlation coefficients of .28 to .46 were established between general A–trait scales (Manifest Anxiety Scale, General Anxiety Scale, and Trait Anxiety Inventory) and SCAT. This lends support to the validity of SCAT because if the correlations had been high then the results would have indicated that SCAT was measuring the same anxiety as the general anxiety scales. Furthermore, concurrent validity was also supported by these correlations, for had the correlations been lower, it would have indicated that SCAT bore no relation to general anxiety.

To fulfill the need for a competitive A–state anxiety inventory, Martens (1977), developed a 10–item questionnaire known as the Competitive State Anxiety Inventory, Version 1, (CSAI–1). It was based on the State Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) with construction of the questionnaire being centered on the following criteria:

1. Items must have validity for competitive sports situations.
2. Items must load significantly on rotated factors that relate significantly with SCAT.
3. Concurrent validity must be established.

Martens (1977) reported that the CSAI–1 was the best inventory for measuring state anxiety in the competitive situation. Furthermore, it was suggested that the CSAI–1 takes less time than the SAI to complete and that the instrument is well suited to repeated measures of anxiety in the individual and team setting (Gruber & Beauchamp, 1979).

Research however, in the area of anxiety, has led psychologists to view A–state

as a "multidimensional construct that involves three separate but interacting response components" (Karteroliotis & Gill, 1987). This multidimensional construct involves a set of psychological, physiological, and behaviourial components.

Very early, Sarason (1960) had suggested two components of state anxiety and labelled them cognitive worry and emotional arousal. Liebart and Morris (1967) separated state anxiety into cognitive worry and somatic anxiety. They found that cognitive worry was inversely related to performance whereas somatic anxiety related only to performance when cognitive worry was low. Support for this idea has also come from Borkovec (1976) and Davison and Schwartz (1976). They identified two similar components of anxiety which they labelled cognitive and somatic anxiety.

With the development of a multidimensional theory of anxiety Martens, Burton, Vealey, Bump, and Smith (1983) developed a sport specific inventory known as the Sport Competitive Anxiety Inventory–2 (CSAI–2). It is a self–report questionnaire consisting of 27 items which measure cognitive anxiety, somatic anxiety, and self–confidence. Field studies showed that CSAI–2 measured three separate components of state anxiety and that cognitive and somatic anxiety related differently to performance (Gould, Petlichkoff, & Weinberg, 1984).

Anxiety and Injury

According to Brown (1971) only 10 – 20% of all sports accidents occur through chance and that injuries may be caused through interaction with the sports environment, interaction with other people, or by self–induction. Gordon (1986) goes further and argued that although sports injuries are often regarded as

occupational hazards or part of the game, injuries do not just happen, they are caused.

It has been suggested that anxiety may be related to injury occurrence. According to Thomas and Reilly (1975) a relationship between athletes, profiled as being highly anxious, and rate of injury may exist. They concluded that this relationship may be due to the highly anxious individual's tendency to commit errors in stressful situations.

In recent years a number of studies have been concerned with the relationship between life stress and injury (Cryan & Alles, 1983; Lysens, Vanden Auweede, & Ostyn, 1986; Passer & Seese, 1983). One of the first studies in the area found that varsity football players, who incurred major injuries during a season, had experienced significantly greater life change in the preceding one–and–two–year periods than noninjured players. Cryan and Alles (1983) stated that a significant difference was found between football stress scores of injured and noninjured groups. Similar findings have been found by Lysens, Vanden Auweede, and Ostyn (1986). Their results showed that students who had experienced a high level of life change had a greater chance of obtaining injury than students who had experienced a low amount of stressful events.

There is some evidence that a link exists between trait anxiety and the incidence of injury. Thomas and Reilly (1975), in relating personality factors to injury, have found a positive relationship between apprehension and the number of joint injuries per season. Research in the area is limited although certain psychologists have outlined a number of theories which suggest that a relationship between anxiety and injury may exist.

Nideffer (1981) suggested that there is a relationship between anxiety and

attention. More specifically he suggested that each individual has a dominant attentional style and as anxiety increases we revert more and more to this dominant style. This loss of attentional flexibility denies us access to all cues about a specific situation and it may be argued that this lack of relevant information leads to injury.

Sanderson (1982) stated that most athletes get injured at some stage in their careers and as a result of this experience they are more able to avoid future situations in which injuries are likely. Sanderson (1982) however suggested that some athletes do not learn to avoid this situation and as a result are repeatedly injured. Ogilvie and Tutko (1971) supported this premise that failure to learn does not appear to be a function of intelligence. Rather Ogilvie and Tutko (1971) suggested that it is a direct result of high anxiety and an attempt to counteract this anxiety by meeting it head on. Levitt (1980) supported this notion and suggested that injury proneness is a product of intense, high anxiety.

The occurrence of injury which may be related to anxiety may originate from a number of sources. In their discussion on anxiety Ogilvie and Tutko (1971) suggested that there are three broad categories into which the psychologically injury prone athlete can be placed:

1. The athlete who sustains real injury.
2. The athlete who frequently complains of injury without being able to have his claims substantiated.
3. The malingerer who deliberately fakes injury.

Injury and Rugby

A number of studies have been conducted into injury in the game of rugby (Davis and Gibson, 1978; Dineen and Gallagher, 1981; Micheli and Riseborough,

1974). These studies were concerned with type and severity of injury and suggested that physical contact and poor technique were the major reasons for injury occurrence. Little or no mention was made of psychological variables.

According to Sanderson (1982) some highly anxious athletes will be attracted to sports, such as rugby, where a certain risk factor exists. Such people feel a need to test their vulnerability and an opportunity to overcome anxiety by meeting it head on. Rugby provides an opportunity to experience this risk.

Havkins (1986) stated that although rugby is typically viewed as a wild and brutal game, it is also recognized as a game of skill and strategy, with an element of risk. In a review of the literature Hawkins cited the following injury rates (injuries per 100 players per season): 9.7; 68.0; 69.3; 81.0 Hawkins also reported that 66% of female forwards and 52% of male forwards were injured and that injuries tended to be evenly distributed throughout the four quarters of play. Running plays produced the most injuries with women receiving 55% and men 50% of their injuries during this phase of play.

Summary

If one accepts that: (a) injuries do not just happen but are caused, and (b) that anxiety is at the root of all athletic crises, then it may be argued that anxiety is a contributing factor in the occurrence of injury.

Anxiety may be derived from a number of sources. It may be hereditary, it may be a product of social influence, or it may be a learned phenomenon. Regardless of the initial source, anxiety invariably incorporates an appraisal of threat, real or imagined, to our well being. This appraisal of threat which gives rise to anxiety in sporting situations, may follow two directions. Firstly, all competitive

situations may be regarded as threatening and this produces a constant, unchanging level of anxiety known as trait anxiety (A–trait). Secondly, anxiety may arise from feelings of apprehension and tension with regard to an imminent occurrence. This involved a "right now" feeling of anxiety which dissipates during and after the occurrence. This type of anxiety relates to state anxiety (A–state).

Historically the measurement of anxiety has followed two approaches, namely, physiological responses and introspective inventories. Correlations between these two methods of measurement have been for the most part weak with regard to individuals in specific situations.

The relationship between anxiety and performance has been well documented but little research has been conducted with regard to anxiety and injury. Injury is a complex phenomenon which may result from a wide range of variables. However, theories have been developed which lend support to the notion that a relationship between anxiety and injury is feasible.

Injury and its reduction in the sports arena is an important and pressing problem. Any factor which may influence injury reduction must be researched. In a game such as rugby where disabling injuries do occur, any step, no matter how small, which may result in a decrease in serious injury must be pursued.

Hypotheses

To fulfill the purposes of the study the following null hypotheses were tested:

1. There will be no significant relationship between levels of trait anxiety and rate of injury.

2. There will be no significant relationship between levels of state anxiety as measured by the components of CSAI–2 and rate of injury.

3. The components of state and trait anxiety, taken as a set, will not be significant predictors of injury rate.

4. There will be no association between state anxiety, as measured by heart rate, and rate of injury.

5. The perceived status of the game will not be significantly associated with rate of injury.

6. There will be no significant relationship between state anxiety as measured by heart rate and by CSAI–2.

CHAPTER III

Research Methods

This chapter is structured to describe the subjects, procedures, dependent variables, independent variables, and data analysis used in the study.

Subjects

The subjects were members of the first year rugby team (under 19 years of age) and/or the third rugby team at the University of Victoria. The permission of the coaches to use their players was given as was the consent of the players, and where appropriate, the parents (see Appendix C). All players had the option of withdrawing from the research project at any time.

Procedure

Two weeks prior to the collection of data each player's resting heart rate was recorded. This was achieved by means of a Sport Tester PE–3000 heart rate microcomputer which can record heart rate at five–second intervals. Each individual sat quietly for fifteen minutes before the measurement of heart rate was taken. Following another five minutes of rest, heart rate was again recorded. The lower of the two rates was noted. Measurement took place in the early morning and subjects had been advised not to eat that morning or to exercise prior to the testing. As each individual rested prior to heart rate measurement he completed the Sport

Competitive Anxiety Test (SCAT) of trait anxiety (see Appendix A).

On match days the 15 players selected to start the game and the five replacement players completed the Competitive State Anxiety Inventory, Version 2 (CSAI–2), in addition to having their heart rates recorded (see Appendix B). It should be noted that substitutions only occurred when a starting player had been injured and was unable to continue.

Prior to answering the questionnaire the players all participated in a set routine before each game (see Appendix D). This set routine had been developed so as to reduce extraneous variables and standardize the test. The players changed some 75 minutes before kick–off and were then permitted to stretch and warm up. Thirty minutes before kick–off the players returned to the locker room where they sat quietly for 15 minutes before recording of heart rate began. The Sport Tester PE–3000 heart rate microcomputer was again used.

The SCAI–2 was completed before the start of each game. In accordance with the work of Dowthwaite and Armstrong (1984) the test was administered ten minutes before kick–off. During testing no set pattern was followed with respect to player order.

With regard to heart rate two separate indices were used:

1. the absolute heart rate – mean for each subject over the number of games played;
2. the mean percentage increase for each mean prematch heart rate over basal heart rate.

Measurement of Injury Rate

An injury was deemed to have occurred each time (a) the referee stopped play

to check on the health of a player, and/or (b) when a player was assisted by the athletic trainer.

Few of the players participated in all the games owing to the policy of giving all players the opportunity to play in games. However, the number of injuries over the total time played was calculated to give an injury rate. Minimum total playing time was 210 minutes or three full games.

Game Difficulty

On each CSAI–2 questionnaire an extra question concerning game difficulty was added. It states "How do you rate this game: Easy, Moderately Difficult, Difficult." A value of 1 was assigned to "easy", 2 to "moderately difficult", and 3 to "difficult". The rating scores of each game were totalled and a mean "game difficulty score" recorded.

Independent Variables

Competitive Trait Anxiety. This was assessed by means of the Sport Competition Anxiety Test (Martens, 1977). See Appendix A.

State Anxiety. This was assessed by means of: (a) Competitive State Anxiety Inventory–2 (Martens, Burton, Vealey, Bump, & Smith, 1983); and (b) Heart rate (see Appendix B).

Dependent Variable

Injury Rate. This was assessed by totalling the number of occasions the

athletic trainer treated a player on the field. Each individual total of injuries was then divided by the total playing time so as to give an injury rate.

Limitations

1. By deeming that an injury only occured when the trainer treated a player on the field, there may have been instances when players were injured but went untreated, and similarly when players were treated but were actually uninjured.
2. It was the case that some players were treated more than once for a recurring injury. However, for the purposes of this study, once a player had been treated by the athletic trainer any subsequent stoppage, requiring treatment for that player, was considered as being a new injury.
3. Few of the players actively participated in all the games. Injury rates were assessed in terms of total time played. A minimal playing time of 210 minutes had to be achieved by all players before an injury rate was calculated.
4. With all the players participating in their first year of college rugby, dropouts occurred during the course of the season.

Delimitations

1. This study was not concerned with source or severity of injury — only rate.
2. Ability, position, experience, or previous history of injury were not taken into account during the study.

Statistical Analysis

The first procedure was to conduct a number of t–tests between the sets of data for each of the two teams. No significant difference was found between any of the assessments and therefore all the data were treated as belonging, not to two teams, but rather to one group.

Relationship Between Trait Anxiety, State Anxiety and Injury Rate. The primary purpose of the study was to determine if there was a significant relationship between trait and state levels of anxiety and rates of injury. High anxiety and low anxiety groups were determined by ranking anxiety scores on each of the various scores. The upper 50% on each scale were classified as a high anxiety group, the remainder as low anxiety. Rates of injury were also ranked, with the upper 50% being designated as a high injury group.

The tetrachoric correlation belongs to the group of statistics which are used to find the relationship between two variables when both are dichotomous. When both variables are really continuous, as is the case with anxiety levels and rates of injury, but have been artificially dichotomized, the tetrachoric correlation is the appropriate statistics (Mason, Ayers, & Taylor, 1973). Four correlations were conducted (all the data are interval data):

1. SCAT – Injury scores.
2. Cognitive anxiety – Injury scores.
3. Somatic anxiety – Injury scores.
4. Self–confidence – Injury scores.

Injury Rate and Game Status. To determine the relationship between injury rate and game status the games were equally divided by the researcher into

"difficult" and "easy," depending on the degree of difficulty attached to each game by the players. The number of injuries in each classification were totalled. Since there was an equal number of games in each classification, one would expect 50% of the injuries to occur in each of the groups if there were no relationship between injury and game difficulty. When dealing with expected and obtained proportions the appropriate statistic is the test of the significance of a proportion.

Injury Prediction. A final purpose of the study was to develop regression equations as a means of predicting injury. Simple regression will be used to develop equations from the following:

1. SCAT.
2. Cognitive anxiety.
3. Somatic anxiety.
4. Self–confidence.

(Simple regression was used as a means of establishing how each individual variable predicted injury).

Multiple regressions were used to develop equations using the following sets of predictors:

1. Cognitive anxiety, somatic anxiety, and self–confidence.
2. Cognitive anxiety, somatic anxiety, self–confidence, and SCAT.
3. Cognitive anxiety, somatic anxiety, self–confidence, SCAT, and percentage increase in heart rate.

(Both direct and stepwise approaches were used. The former results in equations comprising of all the variables. The stepwise approach is more selective and only permits variables of a certain value into the equation).

The Relationship Between Heart Rate and CSAI–2 Measures of Anxiety. The final procedure was to examine the relationship between heart rate and CSAI–2 measures of anxiety. Since two interval measures are available for each member of the study, Pearson's Product Moment Coefficient of Correlation was used to show the extent to which individual mean percentage heart rate changes are associated with mean CSAI–2 scores. Furthermore, the Pearson Product Moment Coefficient of Correlation indicated the direction and strength of the relationship between mean percentage in heart rate and mean CSAI–2 scores. CSAI–2 is composed of three subscales: cognitive anxiety, somatic anxiety, and self–confidence. Therefore, three correlations were completed:

1. Mean percentage change in heart rate / Mean cognitive anxiety score
2. Mean percentage change in heart rate / Mean somatic anxiety score
3. Mean percentage change in heart rate / Mean self–confidence score

CHAPTER IV

Results, Discussion and Conclusion

Results and Discussion

The results of this study are reported according to the research hypotheses outlined in Chapter II. This chapter also includes a discussion of the results with reference to existing research.

Although two different groups of players were investigated during the study, t–tests indicated that there was no significant difference between the teams on any of the measurements. Therefore, in the analysis of the results, all the data from both teams were brought together to form one group. This group of 41 players met the minimum playing time requirement of 210 minutes. The means, standard deviations, and levels of significant differences are presented in Table 1.

The Relationship Between Trait Anxiety, State Anxiety, and Rate of Injury

The means, standard deviations, and maximum and minimum scores for various anxiety measurements are presented in Table 2. Tetrachoric coefficients of correlation revealed no significant relationships between high anxiety groups and a high injury group: SCAT, $r\,(40) = .05$, $p > .05$; cognitive anxiety, $r\,(40) = .00$, $p > .05$; somatic anxiety, $r\,(40) = .06$, $p > .05$; self–confidence, $r\,(40) = .03$, $p > .05$; and percentage increase in heart rate, $r\,(40) = .23$, $p > .05$. These data are shown in Table 3.

Table 1

t–Tests of the Differences Between Team 1 and Team 2

Measure	t	Team 1	Team 2
Resting heart rate	.86		
M (beats/min)		58.63	57.30
SD		6.06	4.96
Prematch heart rate	.77		
M (beats/min)		97.24	99.23
SD		9.41	10.48
Percentage increase in heart rate	1.18		
M		67.05	76.62
SD		23.13	26.34
Injury rate	1.28		
M (injury/min)		0.00382	0.00499
SD		0.007	0.007
SCAT	.13		
M		19.37	18.23
SD		3.49	4.80
Cognitive anxiety	1.21		
M		19.88	18.50
SD		4.28	4.50

Table 1 (continued)
t–Tests of the Differences Between Team 1 and Team 2

Measure	t	Team 1	Team 2
Somatic anxiety	.90		
M		18.18	17.23
SD		4.09	3.95
Self–confidence	.36		
M		25.79	25.23
SD		4.31	4.85

Note: Means are not significantly different. ($p > .05$).

Table 2

Means and Standard Deviations for Anxiety Measures and Rate of Injury

Measure	n	M	SD	Max	Min
SCAT	41	18.62	4.38	29.00	11.00
CSAI–2					
Cognitive anxiety	41	18.77	4.36	28.80	11.38
Somatic anxiety	41	17.51	3.68	24.33	10.40
Self–confidence	41	25.69	4.72	35.00	16.00
Percentage increase in heart rate	41	73.40	25.50	143.14	36.23
Injury rate	41	0.0044	0.007	0.032	0.000

Table 3

Relationship Between Measures of Anxiety and Rate of Injury

Measure	r
Sport Competition Anxiety Test	.05
Competitive State Anxiety Inventory–2	
– Cognitive anxiety	.00
– Somatic anxiety	.06
– Self–confidence	.03
Percentage increase in heart rate	.23

Note. Relationships not significant. ($p > .05$)

The mean SCAT score for competitive trait anxiety was 18.62 and scores ranged from 11 to 29. This compared with mean SCAT scores of 26.33, 24.57, 20.41, 19.94, and 19.66 for adult track and field teams (Power, 1982); and 16.81 for college soccer players (Dowthwaite & Armstrong, 1984). Power (1982) suggested that a SCAT score between 23 and 30 indicates high competitive trait anxiety, whereas a score of 10 to 16 is representative of low competitive trait anxiety. The mean SCAT score in this study would therefore suggest that this group of rugby players was not overly concerned about competition.

The mean CSAI–2 cognitive anxiety score of 18.77 (range 11.38 to 28.80) was higher than values reported by Gould, Petlichkoff, Simons, and Vevera (1987) for pistol shooters prior to competition 16.54, 16.90, 16.55, and 18.00. This may, in part, be a result of the physical nature of the sport. Martens, Burton, Vealey, Bump, and Smith (1983) have reported that athletes participating in contact sports tend to have higher levels of cognitive anxiety than those in noncontact sports.

The mean CSAI–2 somatic anxiety score was 17.51 and ranged from 10.40 to 24.33. In the Gould, Petlichkoff, Simons, and Vevera (1987) study the values reported were considerably lower; 14.85, 14.15, 13.60, and 13.56. The differences in the rates may be a result of the physical contact aspect of rugby. It was also likely that in the Gould, Petlichkoff, Simons, and Vevera (1987) study, the pistol shooters made a conscious effort to control their levels of anxiety. However, in this study, the rugby players were not introduced to any mental skills with regard specifically to relaxation and anxiety reduction.

The mean CSAI–2 self–confidence score was 25.69 and ranged from 16.00 to 35.00. This compared with mean self–confidence scores of 24.59, 25.60, 26.13, 26.40, and 25.10 in the Gould, Petlichkoff, Simons, and Vevera (1987) study.

During the completion of the questionnaires it may well have been the case that occasionally players did not complete them truthfully. It is possible that some individuals gave what they believed to be socially desirable answers and this may have led to some distortion in the mean scores.

The mean percentage increase in heart rate was 73.40% and ranged from 36.23% to 143.14%. This compared with a mean percentage increase of 81.25% for professional soccer players in a study conducted by Thomas and Reilly (1975).

The mean injury rate (injury per minute) was 0.0044. It should be noted that the standard deviation of 0.007 is somewhat greater than the mean. This indicated that there was great variability in injury rate between individuals. Furthermore, the mean injury rate was influenced by the 14 individuals who recorded no rate of injury. This rate per minute is equivalent to 190.25 injuries for every 100 players over the course of a season. This compares with other injury rates for rugby of 9.6 (Micheli and Risborough, 1974); 69.3 (Havkins, 1986); and 81.0 (Davis and Gibson, 1978). The extremely high incidence of injury in this study may be due to the method of assessing injury and this is supported by Havkins (1986) who stated that "Many discrepancies in reported injury rates are due to differences in study methods" (p. 112). It was further suggested by Ekstrand and Gillquist (1983) that one of the major problems associated with injury–type studies lies in the inconsistent manner in which injury is defined and information is collected and recorded. The lack of agreement on injury definition and measurement has made comparison with other studies difficult.

The results of this investigation revealed no significant relationship among trait anxiety, cognitive anxiety, somatic anxiety, self–confidence, or percentage increase in heart rate, with rate of injury.

A nonsignificant correlation of $r\ (40) = .05,\ p > .05$ was found between trait anxiety and rate of injury. This suggested that there was little or no relationship between these two variables. This result supported a previous nonsignificant result of $-.03$ between trait anxiety and rate of injury (Kerr & Minden, 1988). However Thomas and Reilly (1975), using the Cattell 16PF, have suggested a relationship between injury rate and high levels of trait anxiety in soccer players. This finding was not supported in the present study and this may be a result of the low trait anxiety levels experienced by the majority of the players with regard to competition.

When examining the relationship between trait anxiety and injury it should be noted that certain studies have found a relationship between life stress and rate of injury. Cryan and Alles (1983) stated that college football players, who experienced a high level of life stress, had a greater risk of being injured than those players with lower levels of life stress. Lysens, Vanden Auweele, and Ostyn (1986) concluded that an accumulation of stress, over a given period of time, significantly increased the likelihood of an individual being injured. It is important to note that trait anxiety and life stress are not necessarily one and the same although it is clear that there may be a relationship. Allport (1955) defined a trait as a predisposition to respond, in a certain manner, to specific stimuli. The theory of traits, developed by Allport, suggested that heredity exerts a significant influence on personality through physique, intelligence, and emotional temperament. It is further suggested by Allport that since personality grows and given certain stimuli, specific traits will be developed. An example of such a development could be the effect of life stress on trait anxiety. The more life stress stimuli the greater the development and entrenchment of the anxiety trait. In the Cryan and Alles (1983) and the Lysens,

Vanden Auweele, and Ostyn (1986) studies it may well have been the case that the athletes with high levels of life stress experienced so much trait anxiety that they became accustomed to the fact that things would invariably go wrong. In other words they came to accept that they were to some degree injury prone. Furthermore, it may be argued that general trait anxiety may be more indicative of sports injury than competitive trait anxiety. For example, the athlete may not be concerned about an upcoming competition. However, he/she may be worried about events outside of the sports arena and these may ultimately lead to injury.

A nonsignificant correlation of $r\ (40) = .00,\ p > .05$ was established between cognitive anxiety and rate of injury. The relatively weak relationship between the two variables may have resulted from the inability of CSAI–2 to distinguish those athletes who were not overly concerned about the upcoming game but were worried about the possibility of receiving an injury. In a number of cases where individuals were experiencing high rates of injury, it would seem that CSAI–2 failed to detect any related anxiety.

A correlation of $r\ (40) = .06,\ p > .05$ was found between prematch somatic anxiety and rate of injury. It has been argued that somatic anxiety reaches its peak at the onset of a competitive event and dissipates over the course of the event (Morris and Engle, 1981). Therefore, it may be argued that decreasing levels of somatic anxiety will not be an influential factor with regard to injury during the course of the game. It was further suggested by Gould, Petlichkoff, Simons, and Vevera (1987) that somatic anxiety is only influential when levels of somatic anxiety are greater than cognitive levels and the athlete becomes overly concerned with how he/she feels.

A correlation of $r\ (40) = .03,\ p > .05$ was established between

self–confidence and rate of injury. This nonsignificant correlation was not at all unexpected given the previous nonsignificant correlation between cognitive anxiety and rate of injury. Martens, Burton, Vealey, Bump, and Smith (1983) suggested that cognitive anxiety and self–confidence represent positions at different ends of a cognitive evaluation continuum. Self–confidence is viewed as the absence of cognitive anxiety, and *vice versa.* The absence of a significant relationship between cognitive anxiety and rate of injury is mirrored by a nonsignificant relationship between self–confidence and rate of injury. The results of this study therefore suggest that a lack of self–confidence, with regard to an upcoming game, does not relate to an increased rate of injury.

A nonsignificant relationship of $r\ (40) = .23,\ p > .05$ was found between the percentage increase in heart rate and rate of injury. This is contrary to a previous finding of Thomas and Reilly (1975) who established that there was a significant relationship between absolute increase in heart rate and injury for professional soccer players. In this present study the failure to obtain a significant relationship may be a result of (a) the physical contact aspect of rugby; (b) lack of correct technique in young, inexperienced players and (c) the method of recording injury.

Injury Rate and Game Status

The means, standard deviations, and differences in anxiety measures and rate of injury for perceived difficult and easy games are recorded in Table 4. The results indicated that no significant difference was found among levels of cognitive anxiety, and easy and difficult games, $t\ (41) = .08,\ p > .05$; self–confidence, $t\ (41) = .04,\ p > .05$ and percentage change in heart rate $t\ (41) = 1.83,\ p > .05$. However, a significant difference was found between somatic anxiety and easy and difficult

games, $t(41) = 2.26$, $p < .05$. In total 18 games were played and these consisted of 9 easy and 9 difficult games. The total number of injuries for all the games was 78. These data are presented in Table 5. The test for the significance of a proportion between number of expected and observed injuries, over easy and difficult games, revealed no statistically significant relationship, $Z(78) = .95$, $p > .05$. This datum is shown in Table 5.

The results indicated that the players tended to be more anxious before what they perceived to be difficult games (see Table 4). This finding is supported by Dowthwaite and Armstrong (1984) and Gruber and Beauchamp (1979), both of whom reported similar findings. In this present study the difference was particularly strong with regard to somatic anxiety.

Deffenbacher (1980) and Morris, Davies, and Hutchings (1980) suggested that the two essential components of state anxiety, cognitive and somatic anxiety, are independent. Although it is still not clear, it is thought that different stimuli provoke cognitive and somatic anxiety (Martens, Burton, Vealey, Bump, and Smith (1983)). It would therefore be possible for somatic anxiety to increase substantially without a corresponding increase in cognitive anxiety. This would seem to be the case in regard to this study although it is still not clear what the antecedents of the somatic anxiety were. Martens, Burton, Vealey, Bump, and Smith (1983) have suggested that somatic anxiety resulted from the inward focusing of attention, rather than focusing externally on the task.

Table 4

Means, Standard Deviations, and Differences in Anxiety Measures and Injury Rate for Easy and Difficult Games

Measure	t	Game	
		Difficult	Easy
Cognitive anxiety	.08		
M		18.51	18.46
SD		4.47	4.53
Somatic anxiety	2.26*		
M		17.72	16.66
SD		3.80	4.25
Self–confidence	.04		
M		25.49	25.50
SD		3.80	5.17
Percentage change in heart rate	1.83		
M		99.88	96.05
SD		11.33	11.84

Note. *Significant at $p < .025$.

Table 5

Relationship Between Injury Rate and Game Status

Game Status	n	Z
Total number of games	18	
Difficult games	9	
Easy games	9	
Total number of injuries	78	
Expected number of injuries in difficult games	39	
Observed number of injuries in difficult games	40	
Statistical difference in the observed and expected number of injuries		.95

Note. No significant difference between expected and observed values. ($p > .05$)

The correlation for cognitive anxiety, $t\,(41) = .08,\ p > .05$ suggested that the players viewed the task in a similar fashion regardless of game difficulty. For example, they may have perceived the game to be difficult but believed that the task was to perform to the best of their ability — an objective which did not change regardless of game difficulty.

It might have been expected that players would have expressed more self–confidence before a game which they perceived to be easy. However it is possible, that since the coach expected them to perform well in easy games, self–confidence was kept in check.

The coaching staff continually stressed the importance of performance goals rather than outcome goals, that is, playing to potential was more important than simply winning. The nonsignificant difference in cognitive anxiety and self-confidence, for easy and difficult games, may reflect this coaching emphasis in that all players were required to treat all games in a similar fashion and that performing to potential was more important than winning.

The difference between easy and difficult games in percentage change in heart rate, $t\,(41) = 1.83,\ p > .083,$ was approaching significance. The somatic anxiety component, as measured by CSAI–2, represents perceived physiological reactions rather than actual responses. Karteroliotis and Gill (1987) have stated that it is reasonable to compare direct measures of physiological arousal with the somatic anxiety component of CSAI–2. It is therefore possible that differences in somatic anxiety scores may be reflected by corresponding changes in heart rate. This would seem to be the case in this study.

The Test of the Significance of a Proportion revealed that there was no significance between easy and difficult games and number of injuries, $Z\,(41) = .95,$

$p > .05$. It was proposed that a majority of the injuries would occur with difficult games (expected number = 39; observed number = 40). The results suggested that the increased level of somatic anxiety, for games which were perceived as being difficult, was not reflected in a corresponding, significant increase in rate of injury. On the other hand, there was no significant change in levels of cognitive anxiety or self–confidence. Therefore, it may well have been the case that these two variables, and not somatic anxiety, affected the players most in regard to perceived game difficulty and rate of injury. These results may well support the importance of being "mentally set" for games, with regard to cognitive anxiety, and that with the correct preparation game difficulty will not be a factor in the rate of injury.

Injury Prediction

Pearson's correlation coefficients for anxiety measures and their relationship with injury rate are presented in Table 6. No significant relationship was found between rate of injury and the following measures: SCAT, $r(41) = .0589$, $p > .05$; cognitive anxiety, $r(41) = .0025$, $p > .05$; somatic anxiety, $r(41) = .0625$, $p > .05$; self–confidence, $r(41) = .0375$, $p > .05$; and percentage increase in heart rate, $r(41) = .2382$, $p > .05$. A regression equation was developed for each anxiety measure, as a means of predicting injury, and these are shown in Table 7.

Three multiple regression equations were developed, as a means of predicting injury from the following:

1. Cognitive anxiety, somatic anxiety, and self–confidence ($R^2 = .01066$).
2. Cognitive anxiety, somatic anxiety, self–confidence, and SCAT ($R^2 = .02697$).

3. Cognitive anxiety, somatic anxiety, self–confidence, SCAT and percentage increase in heart rate ($R^2 = .08640$).

These equations are presented in Table 8.

The most obvious point with regard to the regression components is the extremely small value of the variables. They were so small that none of them satisfied the entrance requirements with regard to the stepwise approach for formulating multiple regression equations. Therefore, a simple enter approach was used for the computation of the multiple regression equations.

It should be noted that the correlations, formulated in the simple regression equations, differ from the values obtained in the tetrachoric correlations. None of the correlations are significant although the relationship between heart rate and rate of injury is approaching significance, $r\,(41) = .2382,\ p > .067$.

The Relationship Between CSAI–2 and Percentage Increase in Heart Rate

To determine if a relationship existed between a pencil–and–paper–test of anxiety (CSAI–2) and a physiological measure of anxiety (percentage increase in heart rate) existed, a Pearson's product moment correlation was applied. A significant negative correlation was found between self–confidence and percentage increase in heart rate, $r\,(41) = -.32,\ p < .05$. These results are shown in Table 9.

Table 6

Relationship Between Anxiety Measures and Rate on Injury

Measure	r
SCAT	.0589
CSAI–2	
– Cognitive anxiety	.0025
– Somatic anxiety	.0625
– Self–confidence	.0375
Percentage increase in heart rate	.2382

Note. Values are not significantly related at $p > .05$.

Table 7

Simple Regression Equations for the Prediction of Injury Rate

Predictor	Equation
Trait anxiety	$y = .003 + 9.715E{-}05x$
Cognitive anxiety	$y = .005 - 4.093E{-}06x$
Somatic anxiety	$y = .007 - 1.230E{-}04x$
Self–confidence	$y = .006 - 5.742E{-}05x$
Percentage increase in heart rate	$y = 6.752E{-}05x - 4.396E{-}04$

Note. The exponent follows the letter "E". These equations are formulated from an enter approach. A stepwise approach was also used but none of the variables satisfied the entry requirements.

Table 8

Multiple Regression Equations for the Prediction of Injury Rate

Measure	Equation
Cognitive anxiety, somatic anxiety, self–confidence.	$y = 1.153\text{E–}04x - 2.560\text{E–}04x - 1.047\text{E–}04x + .006$
Cognitive anxiety, somatic anxiety, self–confidence, SCAT.	$y = 1.451\text{E–}04x - 4.898\text{E–}04x - 4.027\text{E–}05x + 2.966\text{E–}04x + .006$
Cognitive anxiety, somatic anxiety, self–confidence, SCAT, percentage increase in heart rate.	$y = 2.724\text{E–}04x - 5.265\text{E–}04x + 8.310\text{E–}05x + 2.414\text{E–}04x + 7.550\text{E–}05x - .004$

Note. The exponent follows the letter "E". These equations are formulated from an enter approach. A stepwise approach was also used but none of the variables satisfied the entry requirements.

Table 9

Relationship Between CSAI–2 Measures of Anxiety and Percentage Increases in Heart Rate

Measure	r
Cognitive anxiety	–.13
Somatic anxiety	.07
Self–confidence	–.32*

Note. *Significant at $p < .025$.

This significant negative correlation for self–confidence and percentage increase in heart rate is surprising considering the relatively weak correlation between cognitive anxiety and heart rate, $r(41) = -.13$, $p < .05$. Martens, Burton, Vealey, Bump, and Smith (1983) defined self–confidence with reference to the absence of cognitive anxiety. In regard to this definition, the significant relation between self–confidence and heart rate was unexpected. It may well be the case that cognitive anxiety and self–confidence are not true reflections of each other, or that they are not necessarily on the same continuum. For example, a player may be worried about performing at his best although, since the opposition are poor, he is extremely confident of winning. When an athlete has a number of goals it is possible that he may be worried about achieving one goal but confident of being successful with regard to another. However, in this study players with high levels of self–confidence tended to have low percentage increases in heart rate. This would indicate that these two variables were influenced most strongly by one particular factor or goal.

Finally, the nonsignificant relationship between heart rate and cognitive anxiety, $r(41) = -.13$, $p > .05$ and between heart rate and somatic anxiety, $r(41) = .07$, $p > .05$, supported previous research findings which suggested a nonsignificant relationship between heart rate, as a measure of anxiety, and pencil–and paper–tests of anxiety (Bond, James, & Lader, 1974; Weinstein, Averill, Opton, & Lazarus, 1968).

Conclusion

The results of the study revealed no significant relationship between rate of

injury and competitive trait anxiety, cognitive anxiety, somatic anxiety, self–confidence, or percentage change in heart rate. An injury rate of 190 injuries for every 100 players over the course of the season was obtained. This particularly high rate of injury may in part be due to the method of injury assessment.

The findings of a nonsignificant relationship between competitive trait anxiety and rate of injury supported a previous finding of Kerr and Minden (1988). However, it does not reflect an earlier finding of Thomas and Reilly (1975) who found a significant relationship between trait anxiety and injury. Furthermore, a number of studies have reported a significant relationship between life stress and sports injury (Cryan & Alles, 1983; Lysens, Vanden Auweele, & Ostyn, 1986). Although it is not at all clear, it is possible that life stress may be related to trait anxiety. Thus, in instances of high life stress and injury, it may well be that trait anxiety will also be significantly related to injury rate.

A nonsignificant relationship was found between somatic anxiety and rate of injury. Gould, Petlichkoff, Simons, and Vevera (1987) have stated that somatic anxiety is only an important factor in performance when both it and cognitive anxiety levels are high. However, in this study neither somatic nor cognitive anxiety levels were especially high. Nonsignificant relationships were also found between (a) self–confidence and rate of injury, and (b) percentage change in heart rate and injury rate. Levels of self–confidence tended to be consistent for all players over all games. Therefore, any concern about injury was not reflected in fluctuating levels of self–confidence.

No significant difference was found in levels of cognitive anxiety, self–confidence, and percentage change in heart rate for perceived easy and difficult games. Furthermore, no significant difference in the number of injuries was found

between easy and difficult games. In regard to perceived game difficulty, the only variable which differed significantly from easy to difficult games was somatic anxiety. However, since somatic anxiety is (a) thought to be influenced by the level of cognitive anxiety, and (b) dissipates over the course of a game, its effect on injury rate would seem to be limited. The nonsignificant difference in injury rate but significant difference in somatic anxiety levels indicated that in this study this would seem to have been the case.

A number of regression equations were formulated as a means of predicting injury rate. However, owing to the nonsignificance of the results, the terms in the equations tended to be small.

No significant relationship was found between anxiety, as measured by percentage change in heart rate, and pencil–and–paper measures of cognitive and somatic anxiety. This result supported previous research findings (Bloom, Housten, & Burish, 1976; Bond, Jones, & Lader, 1974; Weinstein, Averill, Opton, & Lazarus, 1988). There are a number of factors which may have contributed to these nonsignificant findings. Firstly, there is no one single measure of anxiety. Secondly, environmental factors may influence physiological responses. Thirdly, pencil–and–paper tests may not be a reliable measure of anxiety. However, an unexplainable significant negative result was found between self–confidence and percentage change in heart rate.

Finally, this study highlighted the difficulty in establishing a common factor with regard to injury rate. It would seem that anxiety is only one of a number of factors which together contribute to injury. Therefore, when isolated from other variables, anxiety itself would seem to have a limited effect on injury rate in rugby.

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APPENDIX A

Sport Competition Anxiety Test

Illinois Competition Questionnaire - SCAT

Below are some statements about how persons feel when they compete in sports and games. Read each statement and decide if you HARDLY EVER, SOMETIMES, or OFTEN feel this way when you compete in sports and games. There are no right or wrong answers. Do not spend too much time on any one statement. Remember to choose the word that describes how you usually feel when competing in sports and games.

1. Competing against others is socially enjoyable.	1 hardly ever	2 sometimes	3 often
2. Before I compete I feel uneasy.	1 hardly ever	2 sometimes	3 often
3. Before I compete I worry about not performing well.	1 hardly ever	2 sometimes	3 often
4. I am a good sportsman when I compete.	1 hardly ever	2 sometimes	3 often
5. When I compete I worry about making mistakes.	1 hardly ever	2 sometimes	3 often
6. Before I compete I am calm.	1 hardly ever	2 sometimes	3 often
7. Setting a goal is important when competing.	1 hardly ever	2 sometimes	3 often
8. Before I compete I get a queasy feeling in my stomach.	1 hardly ever	2 sometimes	3 often
9. Just before competing I notice my heart beats faster than usual.	1 hardly ever	2 sometimes	3 often
10. I like to compete in games that demand considerable physical energy.	1 hardly ever	2 sometimes	3 often
11. Before I compete I feel relaxed.	1 hardly ever	2 sometimes	3 often
12. Before I compete I am nervous.	1 hardly ever	2 sometimes	3 often
13. Team sports are more exciting than individual sports.	1 hardly ever	2 sometimes	3 often
14. I get nervous waiting to start the game.	1 hardly ever	2 sometimes	3 often
15. Before I compete I usually get uptight.	1 hardly ever	2 sometimes	3 often

APPENDIX B

Competitive State Anxiety Inventory–2

Name: _____

Illinois Competition Questionnaire – Form B

DIRECTIONS: A number of statements which athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now — at this moment. There are no right or wrong answers. Do not spend too much time on any one statement, but choose your answer which describes your feelings right now.

			Not at All	Somewhat	Moderately So	Very Much So
(c)	1.	I am concerned about this competition ...	1	2	3	4
(s)	2.	I feel nervous ...	1	2	3	4
(sc)	3.	I feel at ease ...	1	2	3	4
(c)	4.	I have self–doubts ...	1	2	3	4
(s)	5.	I feel jittery ...	1	2	3	4
(sc)	6.	I feel comfortable ...	1	2	3	4
(c)	7.	I am concerned that I may not do as well in this competition as I could ...	1	2	3	4
(s)	8.	My body feels tense...	1	2	3	4
(sc)	9.	I feel self–confident	1	2	3	4
(c)	10.	I am concerned about losing ...	1	2	3	4
(s)	11.	I feel tense in my stomach ...	1	2	3	4
(sc)	12.	I feel secure ...	1	2	3	4
(c)	13.	I am concerned about choking under pressure	1	2	3	4

(s)	14.	My body feels relaxed	1	2	3	4
(sc)	15.	I am confident I can meet the challenge ...	1	2	3	4
(c)	16.	I am concerned about performing poorly ...	1	2	3	4
(s)	17.	My heart is racing ...	1	2	3	4
(sc)	18.	I am confident about performing well ...	1	2	3	4
(c)	19.	I am worried about reaching my goal ...	1	2	3	4
(s)	20.	I feel my stomach sinking ...	1	2	3	4
(sc)	21.	I feel mentally relaxed ...	1	2	3	4
(c)	22.	I am concerned that others will be disappointed with my performance ...	1	2	3	4
(s)	23.	My hands are clammy	1	2	3	4
(sc)	24.	I am confident because I mentally picture myself reaching my goal ...	1	2	3	4
(c)	25.	I am concerned I won't be able to concen–trate ...	1	2	3	4
(s)	26.	My body feels tight	1	2	3	4
(sc)	27.	I am confident about coming through under pressure	1	2	3	4

HOW DO <u>YOU</u> RATE THIS GAME?	EASY	MODERATELY DIFFICULT	DIFFICULT

APPENDIX C

Consent Forms

UNIVERSITY OF VICTORIA
P.O. BOX 1700, VICTORIA, B.C., CANADA V8W 2Y2
TELEPHONE (604) 721-8373 TELEX 049-7222

SCHOOL OF PHYSICAL EDUCATION

September 17, 1987.

To the parent/guardian of _____

Dear Parent/Guardian,

I am a graduate student working in the area of Sport Psychology and at present I am investigating the effects of prematch anxiety. As a means of investigation I propose to issue two simple questionnaires to each player before the start of every rugby game. These questionnaires are concerned with establishing how the individual feels prior to each game — nervous, calm, excited, or apprehensive. Furthermore, as a second measure of anxiety, I propose to record each individual's heart rate prior to every game.

_____ has agreed to participate in this study (see enclosed consent form). It would be appreciated if you would give your consent by signing the enclosed form and returning it to me in the envelope provided.

Thank you for your cooperation. Should you require any further information please write.

Yours sincerely,

David Scott,
Researcher

Dr. H. David Turkington,
Supervisor

INFORMED CONSENT

I understand that the purpose of this study is to examine the prematch anxiety levels of male rugby players.

I confirm that _____ participation as a subject is entirely voluntary. No coercion of any kind has been used to obtain my/his cooperation.

I understand that I/he may withdraw my/his consent and terminate his participation at any time during the study.

I understand that all results will remain completely confidential, and that if requested the data will be destroyed after analysis.

Signature: _____
(Parent/Guardian

Date: _____

APPENDIX D

Prematch Protocol

PREMATCH PROTOCOL

Activity	Time Before Kick Off (Mins.)
Change and Warm Up	75
Return and Sit Quietly in the Locker Room	30
Recording of Heart Rate Begins	15
CSAI–2 Administered	10
Leave Locker Room	5

VITA

Surname: SCOTT Given Names: David

Place of Birth: Northern Ireland Date of Birth: November 17, 1963

Educational Institutions Attended, with Dates of Entering and Leaving:

UNIVERSITY OF ULSTER, NORTHERN IRELAND	1982 to 1986
UNIVERSITY OF VICTORIA	1986 to 1988

Degrees, Diplomas, Etc., Awarded, with Dates and Names of Institutions:

B.A. (Hons.)	1986	UNIVERSITY OF ULSTER
Post Grad. Cert. Ed.	1986	UNIVERSITY OF ULSTER

Honors and Awards:

Dean's Graduate Scholarship, 1988

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Title of Thesis:

PREMATCH ANXIETY LEVELS AND RATES OF INJURY IN RUGBY

Author: [redacted]
(Signature)

DAVID SCOTT
(Name in Block Letters)

18th August 1988.
(Date)