STRESS AS A SOURCE OF INJURY

AMONG A GROUP OF

PROFESSIONAL BALLET DANCERS

by

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DEDICATION

To my wonderful caring and very special husband and true partner Michael, and two beautiful and loving daughters, Gabi and Rafaela, I could not have done this without your patience understanding, encouragement and love, thank you.

ABBREVIATED SUMMARY

Sport and dance injuries have increased despite improvements in coaching techniques and medical care. Other factors, including psychological ones, were therefore thought to play a role in injury vulnerability. Most of the attempts to explain how psychological variables can affect an athlete's predisposition to injury have been based on anxiety or stress concepts. In this survey type study an interactive approach to stress has been adopted with the goal of finding a relationship between stress and injury in a group of professional ballet dancers. No simple direct relationship was found. Multiple regression analysis was performed and a more complicated relationship between stress indicators and injury was found. When an attempt was made to investigate the significant interaction, no significant correlations were found. However, the correlations were found to be large and negative. This could indicate that if the sample size had been larger significant correlations may have been found.

KEY WORDS

Survey; Nonrandom sample; Criterion variable-injury; Predictor variable-stress; Pearson product moment correlations; Principle component analysis; Multiple regression; Descriptive statistics; Content analysis; National athletics injury/illness reporting system; Healthier dancer questionnaire; Daily hassles and uplifts scale.

SUMMARY

In the last decade sport and dance injuries have increased despite the improvements in safety equipment, training, coaching techniques and medical care. Other factors including psychological ones were therefore thought to play a role in injury vulnerability. Most of the attempts to explain how psychological variables can affect an athlete's predisposition to an injury have been based on anxiety or stress concepts. In this survey type study an interactive approach to stress has been adopted, with the goal of finding a relationship between stress and injury, in a group of professional ballet dancers using the Daily Hassles and Uplifts Scale. No simple direct relationship was found between stress and injury. However when multiple regression analysis was performed a more complicated relationship between stress indicators and injury was found. When an attempt was made to investigate the significant interaction, no significant correlations were found, however the correlations were found to be large and negative. This could indicate that if the sample size had been larger significant correlations may have been found.

The researcher can neither agree nor differ in terms of supporting the stress-injury relationship in a group of professional ballet dancers, as evidence would contradict a rejection of the null hypothesis as the presence of a more complicated relationship than initially thought has been shown. Due to the small sample size future research is needed to verify this result.

KEY WORDS

Survey; Nonrandom sample; Criterion variable-injury; Predictor variable-stress; Pearson product moment correlations; Principle component analysis; Multiple regression; Descriptive statistics; Content analysis; National athletics injury/illness reporting system; Healthier dancer questionnaire; Daily hassles and uplifts scale.

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CHAPTER 1

AIMS AND MOTIVATION

Numerous factors contribute to making the pursuit of excellence possible. In the world of the athlete having the necessary physical attributes, an appropriate learning environment, certain personality variables, and strategies for managing high stress levels all contribute to this pursuit of excellence (Kerr & Minden, 1988).

The rate of injury in the pursuit of athletic excellence is high, and according to van Mechelen, Hlobil and Kemper (Morris & Summers, 1995, p.456) the health cost associated with sport injuries is higher than those associated with motor vehicle accidents for most western countries.

Morris and Summers (1995) reported that during the last decade sport injuries have increased despite the improvements in safety equipment, coaching techniques, safety training practices and medical care. They concluded that external causes alone cannot and do not fully explain the occurrence of sport injuries in athletes or the variability of the injury. There are other factors including psychological ones that may play a role in injury vulnerability. The extent of the psychological contribution to the variance in sport injury is thought to be as high as 30% (Morris & Summers, 1995). The genesis of injury is extremely complex and there is no doubt that it is a multi-factor equation that includes both physical and psychological states as well as many other factors such as skill level, training conditions and the expertise of the coach (Kerr & Minden, 1988).

Most of the attempts to explain how psychological variables can affect an athlete's predisposition to an injury have been based on anxiety or stress concepts. Much of the research literature in the field of sport psychology has reported a significant positive relationship between the variable life stress and the variable athletic injury. This is true for both contact sport (Bramwell, Masuda, Wagner, & Holmes, 1975; Cryan & Alles, 1983; Passer & Seese, 1983), and non-contact sport (Hardy & Riehl, 1988; Kerr & Minden, 1988; May, Veach, Reed, & Griffey, 1985; Smith, Smoll, & Ptacek, 1990).

There is little agreement within the field of psychology in general as to the precise definition of stress. Early researchers viewed stress as a response, a response to demands made on the organism (Selye, 1956). Later stress was viewed as a stimulus, a stimulus that needed to be adapted to (Holmes & Rahe, 1967). The current view of stress, and the one adopted by the present study considers stress to be both a stimulus and a response. Stress in this sense is understood as an interaction or a transaction that is influenced by both the individual and the environment and is the result of the appraising of a situation (Lazarus, 1981; Lazarus & Folkman, 1984; Meichenbaum, 1985).

Attempts have been made to explain how stress may lead to injury. Nideffer (1983) noted that the physiological response that could result from not coping with stress and anxiety was muscle tension, which in turn reduces motor coordination and flexibility. May and Sieb (1987) noted that relatively low or high levels of arousal can impair concentration and in so doing lessen perceptual effectiveness. A narrowing of the visual field occurs and the relevant cues in the environment may be overlooked.

Until recently much of the research into the relationship between stress and injury was done without a theoretical framework. However Anderson and Williams (1988) addressed this issue and incorporated the ideas of Nideffer (1983) and May and Sieb (1987) into a theoretical interactional model. The model focussed on the relationship between a potentially stressful athletic situation, the stress response and the sport injury. The core of the model deals with the stress response as a result of a person's appraisal of a potentially stressful situation (Hanson, McCullagh & Tonyman, 1992). Once the stress response is activated, it will manifest physiologically (muscle tension) and cognitively (attentional changes), emotionally or behaviourally influencing physical injury. This model is based on an interactive view of stress and forms part of the theoretical base of the present study.

The measurement of stress began in the 1960's with the Social Readjustment Rating Scale (SRRS) of Holmes and Rahe (1967), this scale was said to measure life event stress. The scale that will be used in the present study will be the Daily Hassles and Uplifts Scale validated as a measuring instrument of the variable stress by Kanner, Coyne, Shaefer and Lazarus (1981). Everyday problems have been found to be more powerful than life events in predicting

psychological symptoms (Kanner, et al., 1981; Burkes & Martin, 1985; Monroe, 1983; Lazarus & Folkman, 1984).

Both the Daily Hassles and Uplifts Scale and the more recent Life Event Scales (1970's) measure stress as an interactive variable, meaning stress is seen as a transaction influenced by both the individual and the environment and is therefore measured in a way that reflects individual variability.

Very few studies to date have examined the relationship between daily hassles and injury risk. Petrie and Falkstein (1998) recommended that additional research be done in differing athletic populations in order to illustrate the usefulness of the Daily Hassles and Uplifts Scale as a measure of stress in athletic populations.

The focus of the present study is on the relationship between daily stress and injury in the professional ballet dancer. The life world of the ballet dancer is closely allied to that of the athlete.

The Professional Ballet Dancer

Historically classical ballet dates back four centuries to the time of the court dances of Renaissance Italy. Catherine de Medici was later to bring ballet to the French court (Micheli, Gillespie, & Walaszek, 1984). Different ballet traditions have evolved from Italy, France, and Russia in particular. These traditions share a common technique, which is based on the five positions of the feet and the body. The five positions have one characteristic in common, that of external rotation of the hips or 150 degree "turn out". This emphasis on turnout can contribute to the physiological origin of many of the injuries that are seen in the professional ballet dancer (Micheli, et al., 1984).

The life world of the professional ballet dancer is conducive to studying the stress-injury relationship in that not only is the range of permitted movement narrow as in all athletics, there is in addition an aesthetic component. This component serves to further refine body movement, and will allow for an easier detection of injury. Performing the technical feats that are required

from a dancer today, demands skill and physical perfection (Triegaart, 1987) injury in the life world of the ballet dancer is difficult to compensate for.

The dance environment is both stressful and challenging (Micheli, et al., 1984; Hamilton, Hamilton, Meltzer, Marshall & Molnar, 1989). It has been documented that the physical and psychological demands of the ballet dancer rival and may even exceed those of the athletic sporting codes. The career challenges that the professional ballet dancers face, include long working hours, excessive rehearsals, difficulty in expressing individuality, and the insecurity of the profession (Brinson & Dick, 1996). By and large very few studies have focussed on the life world of the professional ballet dancer to investigate the link between stress and injury.

Professional ballet dancers are vulnerable to injury, and this has significant implications for all dancers, when injuries happen, performances are spoiled, audiences are disappointed, and careers imperilled (Brinson & Dick, 1996). In addition according to Macdonald and Hardy (Macchi & Crossman,1996, p.223) the physical loss of not being able to train and perform is usually accompanied by a loss of self-identity. The majority of dancers will experience an injury and the potential is always there that this can lead to the end of an otherwise promising career. The extremely high rate of injury amongst ballet dancers has been well documented. Kerr, Krasnow and Mainwaring (Macchi & Crossman, 1996, p.223) found that 97% of the 39 female dance majors studied over an 8 month period were injured, with an average of 2,4 injuries per dancer. Brinson and Dick (1996) found in their 12-month longitudinal investigation concerning the health of dancers that 83% of professional ballet dancers had sustained at least one self-reported injury in the previous 12 months. They cited the following: in the U.S.A. Stephens and Ryan (1982) reported that more than 90% of the professional ballet dancers in Ballet West and the advanced students from summer programmes had sustained at least one injury in their careers. In Sweden Ramel and Moritz (1985) found that 95% of professional ballet dancers had been injured. In Australia the rate was found to be much lower by Geeves (1989) and an incidence rate of 56% was recorded. A study by Bowling in 1988 of British professional dancers found an incidence rate of 84% of the dancers sustaining at least one injury.

Ballet shares athletic components with professional sport and therefore it is likely that both dancers and athletes share similarities in their psychological constitutions (Brinson & Dick, 1995;

Hamilton, et al., 1989). In dealing with the issue of the relationship between stress and injury in dancers it is possible to benefit from the life stress-injury studies and the body of knowledge in the field of sport psychology. Ballet dancers can be considered to be "artistic athletes" (Brinson & Dick 1996) as, like athletes they experience high levels of both physical and mental demands. Both have to deal with the same painful consequences and side effects such as a limited career life span that can be over in minutes due to a serious physical injury and both have to perform under the eyes of many, the many maybe a highly critical audience (Bakker, 1990).

The main difference between athletes and dancers is, in dance the aesthetic aspect transcends the athletic aspect (Micheli, et al.,1984). Dancers can therefore benefit from sport psychology research and athletes can in turn benefit from dance psychology research.

Ballet is generally considered to be an individual activity (Bakker, 1987). A search of the available literature in the professional ballet environment has revealed that very little research has been documented concerning the stress-injury relationship. The majority of the injury research in the professional ballet environment has focused on the type and the site of the injury. Recently however, there has been a growing awareness as to the contribution that psycho social variables such as life stress (Brinson & Dick 1996; Patterson, Smith & Everett, 1998) and personality factors (Hamilton, et al., 1989) may contribute to the occurrence of dance injury.

The Value of the Present Research

The findings obtained from this research study have potential value in several areas namely: (1) In the area of injury reduction, as it is only after the identification of and the awareness of potentially alterable risk factors associated with injury that the question of injury reduction can be addressed. (2) The findings may facilitate education and awareness of the stress-injury relationship and help in the designing of programs that will lower the risk of injury. (3) Teachers and coaches in the ballet profession can be made more aware of the stress-injury relationship and this should improve the working environment of the dancer. (4) It may enhance a tenable career as programs can be developed that maximise a dancer's performance and at the same time avoid injury; such programs have been developed in the field of athletics. (5) Younger dancers may benefit from early training in stress reduction. (6) This research study may help to verify the

stress-injury relationship in the suspected stressful environment, yielding knowledge that can be added to the already existing body of knowledge in both dance and sport psychology. (7) The present research study will attempt to be able to adopt and generalise, from the field of sport psychology to a ballet population the mainstream psychological theories on the outcome of stress (Nideffer, 1983; May & Sieb, 1987), as well as the relationship between stress and injury (Anderson & Williams,1988). To date there are no South African studies that address the issue of the relationship between stress and injury in the life world of the ballet dancer. This study will therefore serve as pioneering research into the life world of the South African ballet dancer.

The Theoretical and Empirical Objectives

The theoretical and empirical objectives of this study are to define the concepts of stress, coping and injury. This study aims to establish stress as a source of injury in professional ballet dancers and to note other perceived sources of injury.

For the purposes of this study, the terms "stress", "coping" and "injury" are defined in the following way:

"Stress" refers to the daily stress experienced by the ballet dancer. It is the imbalance between perceived environmental demands and the perceived ability to meet the demand. The demand is appraised as taxing, or exceeding the person's resources and endangering their well being (Lazarus & Folkman, 1984).

"Injury" for the purposes of the present study is defined according to the National Athletic Injury/Illness Reporting System NAIRS and measured in terms of time loss. A reportable injury is defined as any injury that causes a cessation of customary participation for at least 1 day after the injury. In this system, injuries are classified as either minor (missing 1 to 7 days of practice/competition due to injury), moderate (missing 8 to 21 days of practice/competition due to injury) or severe (missing more than 21 days of practice/competition due to injury). Moderate and severe injuries are considered to be significant injuries.

"Coping" is viewed as a response to perceived stress and is defined as the deliberate

attempt to master external and internal demands. This attempt may or may not be successful. It is the failure to cope with the perceived demands made on the individual that results in the physical, psychological and behavioural symptoms of stress (Lazarus & Folkman, 1984).

The theoretical concepts underlying the present research study are based upon Lazarus, Kanner, and Folkman, (1980b), Lazarus, (1981) and Lazarus and Folkman's (1984) theory of stress, whereby a situation is only considered to be stressful if it is perceived by the individual to be taxing or endangering their resources and well being. Cognitive and behavioural efforts result in an attempt to cope and manage the stressful situation.

CHAPTER 2

LITERATURE REVIEW

The theoretical objective of defining the concepts of stress, coping and injury has been achieved in chapter 1. In this chapter the theoretical approaches to stress are discussed with stress being defined as an interactive variable, encompassing both appraisal and coping, and measured using the Daily Hassles and Uplifts Scale (the other measurement scales will be reviewed). In addition the possible personal, environmental and workplace daily stress of the athlete/dancer will discussed. Injury and the theory of its association with stress in the athletic environment as well as a model proposed in this regard by Anderson and Williams (1988) will be presented. Finally the literature pertaining to the stress-injury relationship will be reviewed.

The Theoretical Approaches to the Experience of Stress

Stress researchers within the field of psychology have not reached a consensus on the meaning of the concept of stress. There have however been three main approaches to stress: In the early years Selye (cited in Sutherland & Cooper, 1990), viewed stress as a response, a physiological, psychological, and/or a behavioural response to demands made on the organism. Later stress was viewed by Holmes and Rahe (1967) as a stimulus, that is a disruptive environmental agent that needed to be adapted to. The contemporary approach to the understanding of stress addresses a number of shortcomings of earlier approaches and therefore has been adopted by the present study. This approach embraces an interactive viewpoint and considers stress to be both a stimulus and a response whereby stress is understood as an interaction that is influenced by both the individual and the environment and is the result of the appraising of a situation. Stress is a psychological state, an imbalance between the perceived demand and the perceived ability to meet the demand, and occurs when the demand is appraised as taxing, or as exceeding the person's resources and endangering their well-being (Lazarus, et al., 1980b; Lazarus, 1981; Lazarus & Folkman, 1984; Meichenbaum, 1985; Cox, 1986; Hardy & Riehl, 1988; Anderson & Williams, 1988; Sutherland & Cooper, 1990; Morris & Summers, 1995).

Coping is an integral part of stress viewed from an interactive perspective. It is the deliberate attempt to master, tolerate, reduce, and minimise stressful conditions. This attempt may or may not be successful. It is the failure to cope, that results in the physical, psychological and behavioural symptoms of stress (Cox 1986; Lazarus & Folkman, 1984).

For the purposes of clarity the three approaches to the experience of stress will be discussed, and diagrammatically presented.

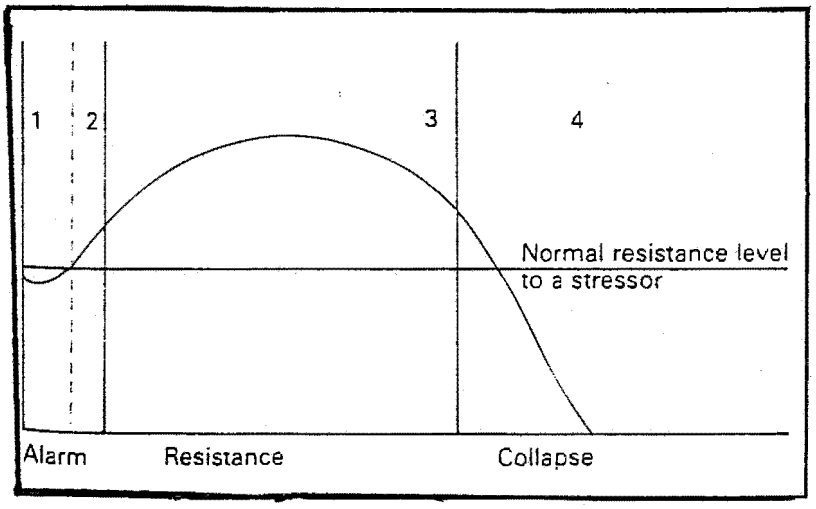
The Response-based Model of Stress (stress as a dependent variable)

Sutherland and Cooper (1990) have noted that because it is not always possible to see stress, only its consequences, a response-based meaning is often given when asked to describe stress (i.e. strain, pressure, tension). According to this model, stress is an intangible phenomenon and is viewed as the dependent variable, that is a response to disturbing stimuli. The conceptual domain therefore is the manifestation of stress (the symptoms of stress), on a physiological, psychological and/or a behavioural level. The work of Hans Selye, a Canadian physiologist, often referred to as the "father of stress", marks the beginning of the response-based approach to stress (Sutherland & Cooper,1990).

Selye introduced the idea of stress-related illnesses explaining such illnesses in terms of a General Adaptation Syndrome (GAS). He focussed on the body's defence alarm mechanism of 'fight or flight' as a response to situations (Morris & Summers, 1995). "Stress is the non-specific responses of the body to the demand made upon it ..."(Selye, 1956 cited in Sutherland & Cooper, 1990, p.13), that is the body undergoes the same non-specific responses, whether the stressor is negative or positive. The stress response is therefore seen to be independent of the nature of the stressor.

Selye (1974) maintained that stress was an inevitable part of human life, with moderate stress initially motivating people to grow and develop. However excessive, repetitive or prolonged stress was thought to be destructive, resulting in physiological complaints, cognitive impairment and impaired performance. The reasoning behind this is that human beings have a limited reservoir of energy to cope with stressors (Selye, 1974).

Although stress has no specific cause, the General Adaptation Syndrome is recognisable by symptoms, which are adaptations to stressors. The General Adaptation Syndrome appears in three phases that reflect the course of the organism's adaptation to a stressor, namely the alarm/shock stage, the resistance stage and the collapse stage (see figure 2.1)(Selye, 1956; Sutherland & Cooper, 1990).



Key: 1 Shock;
2 Countershock
3 Resistance;
4 Collapse.

FIGURE 2.1: A DIAGRAMMATIC REPRESENTATION OF THE GENERAL ADAPTATION SYNDROME (GAS)(Sutherland & Cooper, 1990:13)

- The first stage is the General Alarm Reaction: This is the immediate physiological response. The initial shock phase is followed by counter shock. It is at this stage that the "fight or flight" response is activated. The body is prepared physiologically for action, injury and infection. The organism is preparing to deal with the stressor.

- The second stage is Resistance to a continued stressor: The organism returns to equilibrium/homeostasis, however if the reaction is too intense or too frequent the energy needed for adaptation becomes depleted. The organism is coping with and adapting to the stressor.

- The third and final stage is Exhaustion: This is the phase after the depletion of the organism's resources by a repetitive or prolonged stressor. The organism is at risk of illness.

The frequency and the duration of the arousal will affect the susceptibility of the organism to fatigue, illness, ageing and death. The specificity of the diseases of adaptation are ascribed to intervening variables, known as internal and external conditioning factors, which determine the level of stress an individual can tolerate. The internal conditioning factors include genetic predisposition, age, sex and past experiences. The external conditioning factors include diet, drugs, climate and an individual's social setting (Sutherland & Cooper, 1990).

A response-based approach to stress contributed to an initial understanding of stress, and, is valid for some typical stressors for example the physical factors of heat and cold (Sutherland & Cooper, 1990). However this approach and the research of Hans Selye have been questioned as psycho social stress is not explained, and the issue of a psychological response to stress or how a potential threat may in turn become a stimulus for a different response, i.e. the presence of a feedback loop, is not addressed (Sutherland & Cooper, 1990). Moreover recent physiological research has contradicted the idea that the stress response is independent of the nature of the stimuli. It has been found that responses do not always follow the same pattern and are in fact stimulus-specific and dependent on different types of hormonal secretions, for example, anxiety-producing situations are associated with adrenaline while noradrenalin is associated with aggression producing events (Sutherland & Cooper, 1990).

In terms of the present study Selye's (1956) basic idea, that stress, is an inevitable part of human life and not necessarily harmful with a limited degree of stress being essential for motivation, seems similar to the idea of arousal in the field of sport psychology, where arousal is essentially a physiological response that "elicits images of activity, alertness and activation on a continuum from low to high without any negative overtones. It is the lift of intensity required for successful competitive performance. At its optimal level, this state is seen as a positive contributor to performance" (Morris & Summers, 1995, p. 274). However the idea that the frequency and the duration of arousal as a stressor affects the susceptibility of the organism to fatigue, illness, ageing and death has not been supported. Writers and researchers in sport psychology have instead

recognised that arousal and stress/anxiety are not synonymous. They are separate multidimensional processes that contain both psychological and physiological properties and manifestations. Both have been identified from cognitive and somatic measures (Morris & Summers, 1995). Stress is a separate multidimensional process and is generally defined in the field of sport psychology in terms of a person's experience of negative emotions, unpleasantness or general discomfort as part of an interactive process and not due to continued arousal as the response-based model of stress would suggest. It is part of a cycle of changes to the person's perceptions and cognition's, as well as changes to their physiological functioning (Cox, 1986).

A response-based approach to stress deals with stress as the dependent variable. Stress is a response to disturbing stimuli with the main conceptual domain being the manifestation of stress on a physiological, psychological and/or a behavioural level. The work of the Canadian physiologist Hans Selye, marks the beginning of the response-based approach to the study of stress (see figure 2.2)(Sutherland & Cooper,1990).

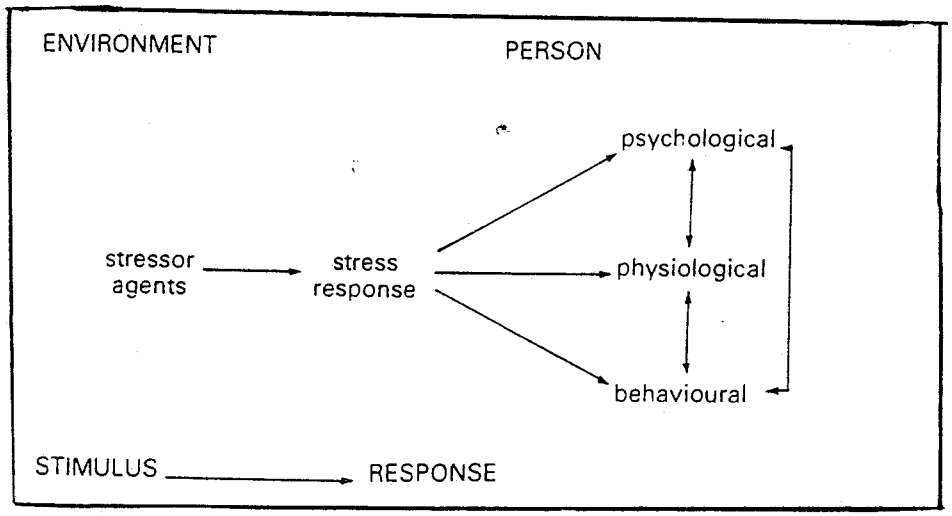


FIGURE 2.2 A DIAGRAMMATIC REPRESENTATION OF A RESPONSE-BASED MODEL OF STRESS (Sutherland & Cooper, 1990, p. 11)

The Stimulus-Based Model of Stress (Stress as an Independent Variable)

The identification of potential sources of stress is the main idea behind the stimulus-based model of stress. This approach has its origins in physics and engineering and links health and disease to conditions in the external environment. The rationale of this approach is that an external force will impinge on an organism and disrupt it in some way (Sutherland & Cooper, 1990). The analogy given by Sutherland and Cooper (1990) is as follows "stress can be defined as a force exerted, which results in a demand or load reaction which causes distortion" (p.16). All matter has a tolerance level and if this level is exceeded either temporarily or permanently, damage occurs. Organisms are constantly faced with potential sources of stress from the environment. According to this model one innocuous event can alter the balance between coping and not coping (i.e. a breakdown).

The stimulus-based model contributed to stress research in that it focussed on and identified sources of environmental stress. However the analogy (whereby a machine does not need to recognise the load in order to register its presence) disregards the individuals ability to recognise stress and act in ways to change the situation. Human beings process their stress loads, and it is the intervening psychological processes that mediate individual variability in tolerance levels and outcomes. Two individuals may be exposed to the same situation/stimulus and react in completely different ways (Cox, 1985, cited in Sutherland & Cooper, 1990, p.23).

Defining stress as the stimulus-based model does would mean that stress could be dealt with through the simple process of identifying potential sources of stress and removing them from the environment. Lazarus (Sutherland & Cooper, 1990, p.17) states that no objective criterion can describe a specific situation, only the person experiencing the event can do this. The stimulus-based model of stress may focus on and identify environmental stress, however individual needs, values, past experience, personality traits and appraisal are not taken into account (Sutherland & Cooper, 1990).

The work done in the 1960's by Holmes and Rahe on life event stress was based on the stimulus-model's underlying rationale. That is, that an external force impinges disruptively on an organism. The Social Readjustment Rating Scale (SRRS) measured life event stress. A life event

(external force) was a significant, chronic and discrete happening in a person's life. The changes experienced required substantial readjustment by the individual. Life event change in response to the impinging environmental stress was quantified by a fixed measurable value, with no allowance made for variability between individuals. The values were added as it was thought that the cumulative effects of life event change eventually led to illness as the organism became overwhelmed, with 'the last straw breaking the donkey's back' (Holmes & Rahe, 1967).

Bramwell (et al., 1975) modified the items in the Social Re-adjustment Rating Scale (SRRS) of Holmes and Rahe (1967) for use in athletic populations. The new scale was called the Social and Athletic Readjustment Rating Scale (SARRS) of Bramwell (et al., 1975). This scale shared the theoretical base and hence the limitations of the SRRS. However when the SARRS was used in athletic populations of football players a relationship was found between stress and injury (Bramwell, et al.,1975; Cryan & Alles, 1983).

A stimulus based approach to stress deals with stress in terms of the independent variable, that is, as a stimulus, (an external force impinging disruptively on an organism). The main consideration according to this model would be to identify the sources of stress and remove them from the environment (see figure 2.3).

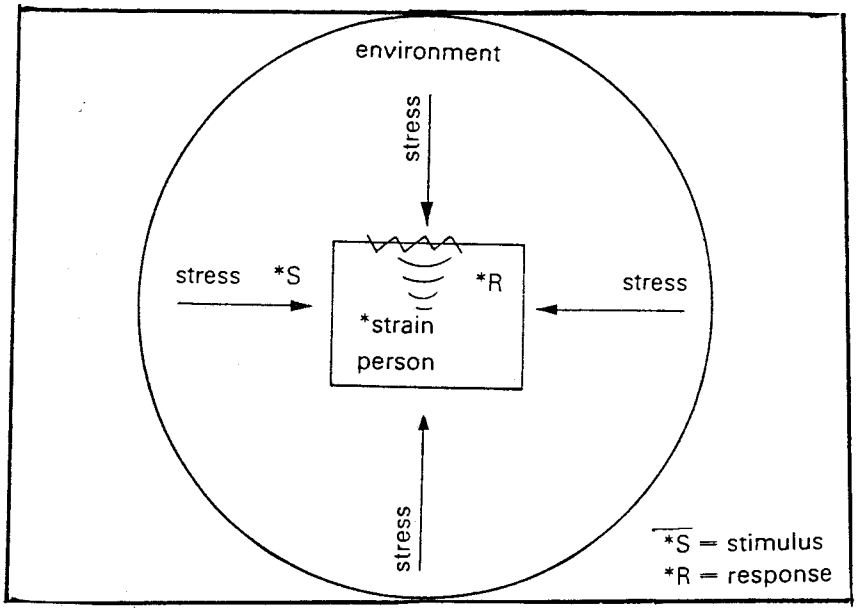


FIGURE 2.3 A DIAGRAMMATIC REPRESENTATION OF A STIMULUS-BASED MODEL OF STRESS (Sutherland & Cooper 1990, p. 16)

According to the previous discussion, it appears that both the response-based and the stimulus-based models of stress have limitations that need to be addressed. A model of stress therefore that addresses these limitations and considers and encompasses the stressor source, the individual's perception of the situation and the response of the individual should be considered.

Such a model would be a combination of the response and stimulus-based models. Stress would be understood as an interaction (Sutherland & Cooper, 1990) or a transaction (Lazarus, 1981) that is influenced by both the individual and the environment and is the result of the appraising of a situation, with coping being seen as integral to the process. Viewed from this perspective, a situation is not inherently stressful, only potentially so individuals interpret what they are confronted with. It is the appraisal of the event that underlies psychic stress and not the absolute level of demand.

The Interactive Model of Stress (Stress as an Interactive Variable)

In presenting a framework of an interactive model of stress Sutherland and Cooper (1990) encompassed all three domains of the stress process namely: the source of stress; mediators of the stress response; and the manifestations of stress. In terms of mediating the stress response five aspects were considered, firstly: the individual cognitively appraises a potentially stressful situation; that is stress is a subjective experience. Secondly: a situation is appraised and influenced by the individual in terms of his/her attitudes, needs, values, past experiences and personality traits. Thirdly: the pressure or the demand is the product of actual demand, perceived demand, perceived ability and actual ability. Needs and desires influence how a demand is perceived. Fourthly: environmental and situational factors have an influence i.e. the potential source of stress is not perceived in a vacuum. Fifthly: as cognitive appraisal is a judgement of threat it does not necessarily reflect true ability, rather it is a reflection of how the individual weighs his perceived ability against the perceived demand.

Stress, distress, pressure or strain is therefore the imbalance between perceived ability and perceived demand. The inability to cope with the said stressful response results in symptoms of stress, which may be, physiological, psychological or behavioural in nature. Successful coping restores the imbalance. The importance of feedback at all levels is specified in this model, the

symptoms of stress, feeds back into the individual's future appraisal and become part of future situational factors (see figure 2.4).

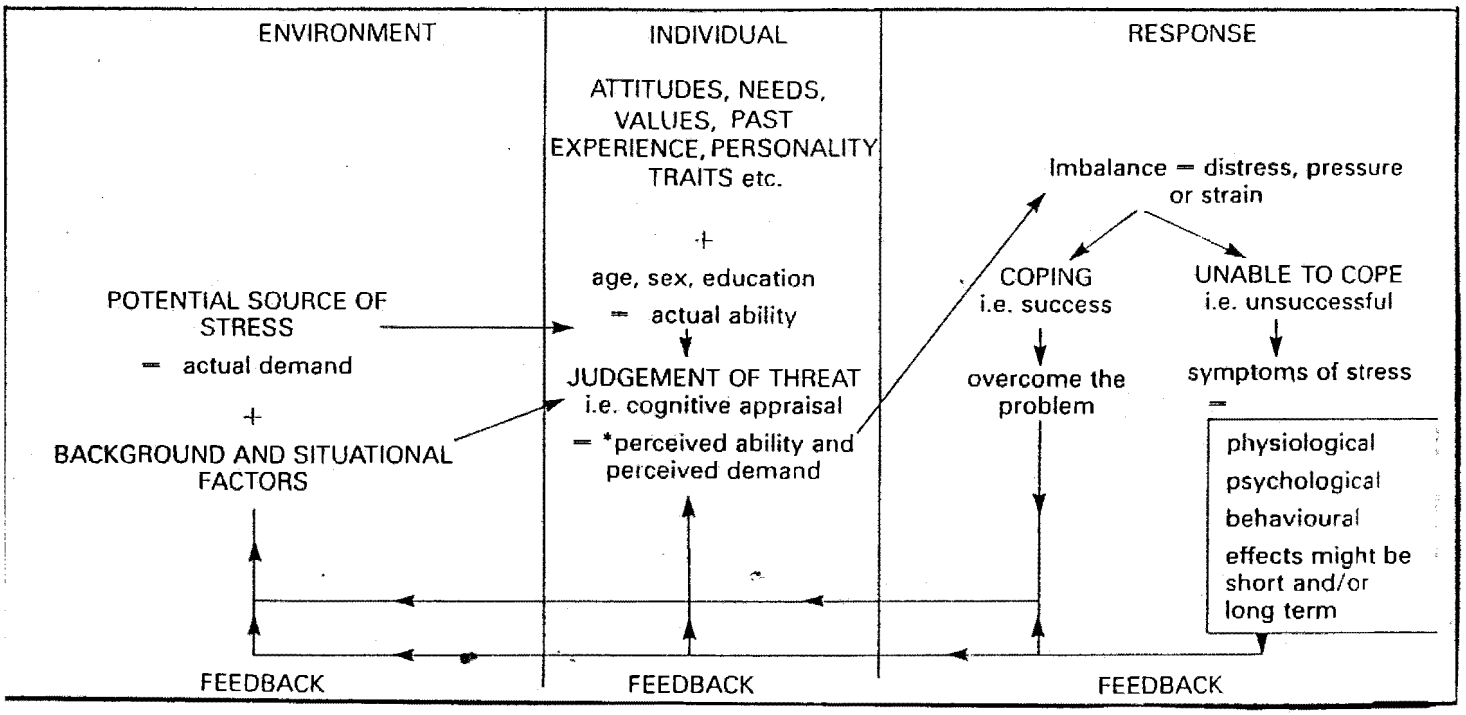


FIGURE 2.4 A DIAGRAMMATIC REPRESENTATION OF THE INTERACTIVE MODEL OF STRESS (Sutherland & Cooper, 1990, p. 18)

Lazarus (1981) studied stress from the viewpoint of psychology and characterised his interactive approach as transactional whereby stress was seen as a relational concept embracing both environmental and personal variables (the person and his/her environment cannot exist

independently a point not made by the interactive model of stress). Individuals interpret what they are confronted with, and it is this interpretation that leads to stress reactions. The appraisal of an event is central to Lazarus's theory of stress with appraisal being thought to be the underlying cause of psychic stress. Coping is integral to this approach and is described as a deliberate attempt at mastering a problem situation. This implies that there is a constant changing of cognitive and behavioural efforts to manage the demands that are appraised as taxing the resources of the individual. Appraisal and coping are thought to continuously engender and influence each other throughout an encounter making appraisal the most important factor accounting for the variability in coping (Folkman & Lazarus, 1980).

According to Lazarus and Folkman (1984) coping consists of three processes of appraisal; namely primary, secondary and reappraisal.

- Primary appraisal occurs at a superficial level and it is the initial ongoing process whereby the individual decides whether a situation is irrelevant, will have a positive outcome or will be stressful that is, is it threatening?

- Secondary appraisal relates to the cognitive aspects of coping if the situation is perceived to be threatening. The individual evaluates what coping options are available and which would be the most successful. It is an evaluation of the options and the personal resources that are available to cope with the threat/stress.

- Reappraisal refers to the changing of an appraisal in response to new information from the environment.

In 1981 Lazarus proposed that daily hassles were a better measure of stress than life events. He criticised and challenged the stimulus based assumptions of stress made by Holmes and Rahe (1967) and noted that firstly, the particular events that their item checklist state as "recent life events" might differ in relevance for different groups of people. Secondly, life event stress does not take into account the way an individual may appraise a situation or cope with that situation. Thirdly, the positive statistical relationship found between life event scores and illness is not a strong relationship. Fourthly, the life event approach does not explain how life events are

translated into stress that is experienced on a daily basis. Finally, life event stress is based on the idea of change, yet much of the stress that is experienced is because of "the sameness" that flows from the lack of change, that is boredom or continuing tensions, and a lack of meaning and commitment.

Daily hassles are human experiences that involve disagreements, disappointments, accidents or unpleasant surprises. They are the irritating, frustrating, distressing demands that to some degree characterise everyday transactions with the environment. Daily hassles that impact on a person's physical and mental health may be influenced by a number of factors that include uplifts. Uplifts are events that make one feel good. These events can be sources of peace, satisfaction, or joy, pleasant positive experiences that happen on a daily basis such as hearing good news, feeling healthy or relating well to friends (Kanner, et al.,1981).

The effects of daily hassles should be examined concurrently with daily uplifts/positive experiences in order to evaluate the ultimate impact of stressful events. Daily uplifts are thought to serve as emotional buffers against stress disorders as they are thought to play an important role in coping as they function as "breathers" from regular stressful encounters, "sustainers" of coping ability and "restorers" that contribute to the replenishment of depleted resources in recovering from loss or harm (Kanner, et al.,1981).

Hassles and uplifts should therefore not be viewed in isolation, as this would produce a distorted conception of the relationship between stress and illness. Hassles are thought to act cumulatively and even though they are a very strong source of stress, their effect is felt in the presence of compensatory positive experiences. This view is supported by Bradburn (1969), Lowenthal and Chiriboga (1973), Gersten, Langer, Eisenberg and Orzeck (1974) and Epstein (1976) (Kanner, et al.,1981, p.6).

There are other factors other than uplifts that may affect the impact of daily hassles on the physical and mental health of the person. These include a high frequency of hassles, as well as the repetition of daily hassles of psychological importance to the individual. The heightening of the intensity of hassles that are experienced in a given time frame. Major life events such as death or divorce occurring concurrently in the individual's life, are thought to influence the impact of the

ongoing daily hassles. The personality of the person is also thought to influence the way an individual will handle the daily hassles that he/she is exposed to. The routine of a person's environment is thought to impact on the effect of daily hassles, as some environments are more disruptive than others. The characteristic style of coping that the individual may have acquired over time is also thought to impact on the way that daily hassles are dealt with. These factors are important on their own; however, their influence is all the more poignant when they interact with each other. Specific details of hassles are less important than the overall level of hassles and the subjective stress that they indicate (Kanner, et. al., 1981).

Stress in Terms of Daily Hassles and Uplifsts

According to Lazarus (1981), Kanner (et al., 1981) and Lazarus and Folkman (1984), "daily hassles" and "daily uplifts" are a measure of cognitive stress. Kanner (et al., 1981) validated the Daily Hassles and Uplifts Scale as a measurement of daily stress.

The Daily Hassles and Uplifts Scale takes all stress into account as well as coping. The scale covers major catastrophes, which includes major changes affecting large numbers of persons and major changes affecting one or a few persons. It also takes into account the irritating and frustrating demands that characterise everyday transactions with the environment. These demands are the daily hassles. In addition the scale is said to measure coping, in that the daily hassle experienced by the individual at any given time, are said to be a reflection of the hassles experienced, as well as the individual's aptitude or inaptitude in coping with those hassles. A high number of hassles will reflect not only the transactions of a person's life, but also an inaptitude in coping (Kanner, et al., 1981).

In a study conducted by Kanner (et al., 1981), the Daily Hassles and Uplift Scale was validated as a measure of stress. The scale was compared to a life event scale in terms of the prediction of psychological symptoms. The findings indicated that everyday problems (hassles) and life event stress were not independent of each other. Life stress was thought to be one of the factors that influenced the effect that daily hassles have on the physical and mental health of the individual. It was thought that major life events could operate by affecting the person's pattern of daily hassles. Ongoing everyday problems were found to be significantly better predictors of

psychological symptoms than life events. Statistically, life events were found to have little predictive power independent of everyday problems. Therefore research that has used life event scales could possibly have achieved a more 'sensitive' stress result using the daily hassles and uplifts scale as a more 'refined' measure of stress. It should be noted that when the effects of the life event scores were omitted a significant correlation between hassles and symptoms still existed.

In general Kanner (et al., 1981) found the hassles sub scale and the uplifts sub scale to be positively related. By way of explanation they suggested that this relationship could reflect a common response style, a tendency for people who have many hassles to also have many uplifts and for those individuals who experience their hassles intensely to experience uplifts in much the same way. Possible other relationship patterns suggested by Kanner (et al., 1981) were that, people with a high proportion of hassles to uplifts may be unhappy, with the result of more frequent illness and visa versa. It was also suggested by Kanner (et al., 1981) that hassles and uplifts that could be isolated and distinguished when describing a group within a sample could yield a descriptive content "theme".

Monroe (1983) in agreement with Kanner (et al., 1981) found that in principal relatively minor life events (daily hassles) are significantly better independent predictors of subsequent psychological symptoms. It would seem that hassles reflect a unique psycho social dimension predictive of dysfunction. Monroe (1983) noted that some of the shared variance, between daily hassles and life event stress has been unravelled, however much still remains to be done verification through replication, by using other samples was suggested.

Burks and Martin (1985) in agreement with both Kanner (et al., 1981) and Monroe (1983) found in a stepwise regression analysis that ongoing everyday problems were significantly better in predicting psychological symptoms than life events. They described the ongoing everyday problems as chronic, and not necessarily minor, but "everyday" in the sense that they are common situations which people face on an ongoing, day-to-day basis, rather than unusual or unforeseen circumstances. The emphasis was on chronic stress and not "change" stress.

In the present study stress will be defined as an interactive variable (taking both the individual and the environment into account) integrally connected to coping and appraisal. Defined

in this manner the Daily Hassles and Uplifts Scale (Kanner, et al., 1981) will be used to measure daily stress.

Possible Factors that may Influence an Athlete/Dancer's Daily Stress and the Professional Stress Syndrome

Morris and Summers (1995)[1] noted the possible personal and situational factors that may influence the daily stress experienced by athletes. It should be remembered at this point that dancers have been defined as artistic athletes (Brinson & Dick, 1996). Professional athletes/dancers have chosen their respective worlds as careers and therefore their daily environment should be considered to be a workplace, Sutherland and Cooper (1990) noted possible sources of workplace daily stress. Gardner and Hall (1981) listed the possible physiological, psychological and behavioural symptoms of stress that have been associated with highly skilled professional employees. Athletes /dancers should by virtue of their skill and talent be considered as highly skilled professional employees.

The personal factors that may influence the daily stress experienced by athletes/dancers include a number of variables. These will be discussed as follows: The expectations of the athlete/dancer: The expectations that are referred to are related to performance expectancy of the athlete/dancer based on past performance. This in turn is related to success and a fear of failure, success can induce anxiety in athletes/dancers in that success brings responsibilities and future expectation, while failure to perform and meet personal expectations and the expectations of significant others can be a source of daily anxiety for athletes/dancer's. Perfectionism: Athletic and dance performance requires a striving for perfection, the athlete/dancer may become unable to distinguish between realistic and idealistic standards, this may lead to high levels of self-criticism in terms of athletic/dance performance. In addition perfectionists are rarely happy with their performance, and as they are expecting to fail, they tend to induce a state of high anxiety. Low self-confidence: Vealey (1986) cited in Morris and Summers (1995), points out how low self-confidence and self-doubt in the athlete/dancer can be a source of daily anxiety as the individual

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Morris and Summers (1995) use the concepts of stress and anxiety interchangeably, as "Stress has become a general descriptor....." (Morris & Summers, 1995 p. 273). It should be noted that stress produces the same feelings as anxiety, and in this sense they can be seen to be synonymous. Stress however is usually linked to a significant other or an event, while anxiety is more vague, it is an undefined tense feeling of dread that is experienced and is difficult to control.

is uncertain of his/her ability to be successful, low self confidence can affect the athlete's performance in a circular manner. Personality: Trait anxiety, is an enduring personality characteristic which if present can prove to be a constant source of daily stress for an athlete/dancer at it elicits state anxiety and the tendency to perceive situations as threatening.

The situational /environmental factors that may influence the daily stress experienced by athletes/dancers are related to competition in athletes and stage performance in dancers. Competition/performance anxiety may be induced in the athlete/dancer when he/she is in the presence of at least one other person who is aware of the expected criteria. This results in the athlete/dancer being evaluated. This is threatening because of the fundamental need of the athlete/dancer to feel competent, be successful and to meet internal and/or external demands.

The workplace sources of stress as noted by Sutherland and Cooper (1990) can clearly be applied to the athletic/ballet workplace once a professional career choice has been made. The following workplace factors may influence the athlete/dancer's experience of daily stress and include: Working long hours: A link has been established between working long hours and stress and ill health. Repetitiveness and monotony: Researchers have found that work that is found to be dull, repetitive and monotonous can induce daily stress and be detrimental to the well being of the individual. Exposure to risk: It is the exposure of risk to injury and its consequences that can create a stressful working environment. Responsibility: Too much work related responsibility or too little can create a stressful environment. Poor work relationships: Relationships are important within the workplace and those relationships that are characterised by low trust and supportiveness among co-workers can potentially be very stressful. An unstable work environment: A stable work environment is thought to generate feelings of security and confidence while an unstable work environment in terms of redundancy (job loss) has been associated with several health problems which include muscular and emotional complaints. Abrasive personalities: Within organisations there may be people that ignore the feelings and sentiments of others. These individuals may be achievement orientated, hard driving and intelligent however, they function less well at an emotional level and are consequently a constant source of daily stress to those around them. Status incongruence: Should a reasonable and justifiable disparity exist between the actual status of an individual within an organisation/ballet company and what the individual believes his/her status should be, stress and frustration may result. Career choice: The actual career that

that a person follows can in itself be a source of workplace stress.

According to Brinson and Dick (1996) the personal and situational factors mentioned by Morris and Summers (1995) are experienced by the professional ballet dancer as well as the workplace stress as noted by Sutherland and Cooper (1990). It should be remembered that a career in dance is brief and requires near perfection in performance, while at the same time within this perfection there is ferocious competition for professional position. In addition there are no absolutes in terms of dance performance measurement, instead subjective evaluation criteria are used to assess dance performance (Hamilton, et al., 1989).

According to Gardner and Hall (1981) the professional stress syndrome is associated with highly skilled employees in the workplace. Athletes and dancers hold high-status positions by virtue of their individual skill levels and therefore may manifest the physiological, psychological and behavioural symptoms of stress that have been associated with professional employees. These symptoms constitute the "Professional Stress Syndrome".

Table 1 The "Professional Stress Syndrome" (according to Gardner & Hall (1981)

Physiological	Psychological	Behavioural
Anorexia	Feelings of disorientation	Quickness to anger
Uncontrolled eating	Anger	Frustration responses
Urinary frequency	Frustration	Suspiciousness
Insomnia	Depression	Excessive risk taking
Lethargy	Apathy	
Muscle tension/headache	Helplessness	
Rashes	Fear	
Diarrhea	Irritation	
Palpitations		
Tightness in the chest		
Increased blood pressure		
Increased perspiration		
Hyperactivity		

Table 1 reflects the symptoms of stress that may manifest on a physiological, psychological and/or behavioural in the professional employee. This manifestation is known according to Gardner and Hall (1981) as the "Professional Stress Syndrome"(see section 4.3).

Injury in Athletes

Injury in an athletic or dance population has a different meaning to injury in the general population. In the athletic environment traditional emergency department records are meaningless as injuries regarded as minor in the general population, such as an ankle sprain, could be career threatening in the athletic population. "Injuries and their severity must be defined and viewed in the context of the specific demands inherent in the activity" (Garrick & Requa, 1993, p.586).

The process for defining and classifying injury for dancers is even more difficult as dance injuries need to be seen as a measurable physical impairment as well as an artistic compromise. Being able to execute a movement is not enough as the movement needs to be aesthetically pleasing (Garrick & Requa, 1993). The range of permitted movement is narrow and together with the aesthetic component it is difficult to compensate for, or to hide an injury (Micheli, et al., 1984; Hamilton, et al.,1989).

For the purposes of this research study injury will be defined in terms of time loss, as proposed by The National Athletic Injury/Illness Reporting System (NAIRS).

A reportable injury is defined as any injury that causes cessation of customary participation for at least one day beyond the day the injury occurred. A minor injury is a reportable injury if one is able to return to participation within one week from the day of onset. A significant injury is one with time loss greater than seven days. Within the significant category, there is a moderate category, that is, return to practice within 8-21 days and a major category, that is, the inability to return to practice within 21 days. The term severe is used for a permanently disabling injury (Alles, Powell, Buckley, & Hunt, 1979).

This definition assumes that all dancers respond to injury in a similar manner. There is no scientific way to determine when an injury should impair a dancer's performance. There is therefore a strong subjective component, as the same injury in two different dancers may cause one to stop participating while another will experience little impairment. Defining an injury by time lost only provides a general indication that an injury has occurred. More exact information would be needed to define the actual injury (Noyes, Lindenfeld & Marshall, 1988). The focus of the

present study is not a physiological one and the exact nature and range of the injury is therefore not a central issue.

The Theoretical Relationship Between Stress and Injury

Williams and Roepke (1993) cited in Williams and Anderson (1988) reviewed 20 studies examining the relationship between stress and injury in athletes. They indicated that 18 of the 20 studies reviewed had found a positive relationship between high stress and sport injury. This finding was consistent over all types of sport that is contact and non-contact in nature. Furthermore the findings showed that injuries tended to occur two to five times more frequently in athletes with high life stress scores compared to low life stress scores. It would appear that stress and injury are related and that the vulnerability to injury in an athletic population is mediated by stress. It should be noted that the vulnerability to injury in an athletic population can be mediated by factors other than stress such as extrinsic factors, which include the nature of the sport, (externally inflicted injuries in a contact sport such as football), poor field conditions or equipment failures, and intrinsic factors which include over training and fatigue that is, excessive demands made on the body over long periods of time (Morris & Summers, 1995).

Theoretical Approaches to the Relationship Between Stress and Injury in Athletes

Most of the attempts to explain how psychological variables can affect an athlete's predisposition to an injury have been based on anxiety concepts that is anxiety or stress once induced is thought to affect the athlete cognitively, physiologically and behaviourally which in turn may result in injury (Bramwell, et al., 1975; Landers,1978 cited in Hardy & Riel, 1988; Cox, 1986; Nideffer, 1983; May & Sieb, 1987; Anderson & Williams, 1988; Morris & Summers,1995). Cox (1986) noted that the state of stress is often accompanied by negative emotions such as an unpleasantness or a general discomfort. These emotions begin the cycle of changes in the person's perceptions and cognition's as well as in the person's behavioural and physiological functions.

Physiological and attentional problems are thought to follow the stress response and have been given as possible reasons for injury outcome (Hanson, et al.,1992).

Attentional explanations for injury occurrence associated with stress have been based on the athlete's sense of self pre-occupation and internal focus leading to mental errors. Bramwell (et al., 1975) noted that the attention focus of individuals who experience anxiety and stress is one of self-preoccupation. This is reflected in the thoughts and feelings of the individual and may result in inappropriate decisions that could lead to an injury in that self-preoccupation can lead to personalising, which can result in cognitive distortions such as exaggeration or over generalisation, the distortions affect the appraisal and the judgement of the situation. Landers (1978) cited in Hardy and Riehl (1988) suggested that as stress increases, the attention field of the athlete narrows involuntarily and attention becomes internally focussed. This narrow-internal focus restricts the athlete's ability to analyse and rationally deal with information in the environment. Sarason (1988) cited in Morris and Summers (1995) noted that a response to state anxiety focuses attention internally rather than externally and the athlete becomes preoccupied with 'uptight' feelings. Self-preoccupation and the interpretation of events influence the athlete's receptivity to available information. The stress response has thus been associated with attentional problems whereby the athlete may not focus externally for optimum performance rather the athlete's focus is internal on non-productive thoughts that distract him/her from the task at hand and inhibit the processing of relevant information. This predisposes the athlete/dancer to injury.

The following theorists have specifically noted the perceptual narrowing of the visual field that occurs when an athlete is anxious. Williams and Roepke (1993) cited in Morris and Summers (1995) noted the attentional narrowing of the anxious athlete with the focus on specific stimuli instead of generally scanning the peripheral field of vision and anticipating stimuli. May and Sieb (1987) noted that relatively low or high levels of arousal can impair concentration and in so doing lessen perceptual effectiveness. A narrowing of the visual field occurs and the relevant cues in the environment may be overlooked. Williams, Tonyman and Anderson (1991) cited in Morris and Summers (1995) found that subjects experiencing more life stress had a greater narrowing of their peripheral vision.

Physiological responses that could result from stress have been suggested by the following theorists. Weinberg and Hunt (1976) cited in Morris and Summers (1995) suggested that stress induces an increase in somatic functioning such as muscular tension. Nideffer (1983) noted that

the physiological response of muscle tension that could result from not coping with a situation reduced the motor coordination and the flexibility of the athlete.

In general both physiological and attentional responses to anxiety in sport could produce poorer performance that could result in injury. Stress distracts the athlete emotionally (negative feelings) cognitively (overly narrow and internal attention) and physiologically (muscular tension may increase).

A Working Model of the Relationship between Stress and Injury in Athletes (Anderson & Williams, 1988)

The physiological and attentional responses to anxiety and how this could result in injury in sport needed a larger framework in order to accommodate possible moderating variables. Anderson and Williams (1988) developed a multi-component framework to explain the relationship between cognitive stress, moderating factors and athletic injury.

"It is hypothesized, that individuals with a lot of stress in their lives, who have personality traits that tend to exacerbate the stress response and few coping resources will, in a stressful situation, be more likely to appraise the situation as stressful. They will exhibit greater muscle tension and attentional changes, and thus be at greater risk of injury compared to individuals who have the opposite profile" (Anderson & Williams, 1988, p. 298).

According to Anderson and Williams (1988) the stress response is mediated by three moderating factors that interact with each other. Singularly or together they influence physiological and attentional aspects of performance and therefore injury outcome. The moderating factors are both personal and situational, and include personality factors (e.g., hardiness, locus of control, sense of coherence, anxiety, achievement motivation), history of stressors (e.g., life events, daily hassles, previous injuries), and coping resources (e.g., social support, stress management skills) (Morris & Summers, 1995; Blackwell & McCullagh, 1990).

Within the framework of this model the psychological variable stress and how it affects an athlete's predisposition to injury is based on the work of Nideffer (1983) and May and Sieb

(1987). Nideffer (1983) noted that the physiological response that could result from an inability to cope with stress and anxiety was muscle tension. The ramifications are a reduction in motor co-ordination and flexibility (Morris & Summers, 1995). May and Sieb (1987) suggested that relatively low or high levels of arousal could impair concentration and in so doing lessen perceptual effectiveness. As the narrowing of the visual field occurs the relevant cues in the environment may be overlooked for example a football player experiencing high levels of arousal may miss important peripheral cues (Morris & Summers, 1995).

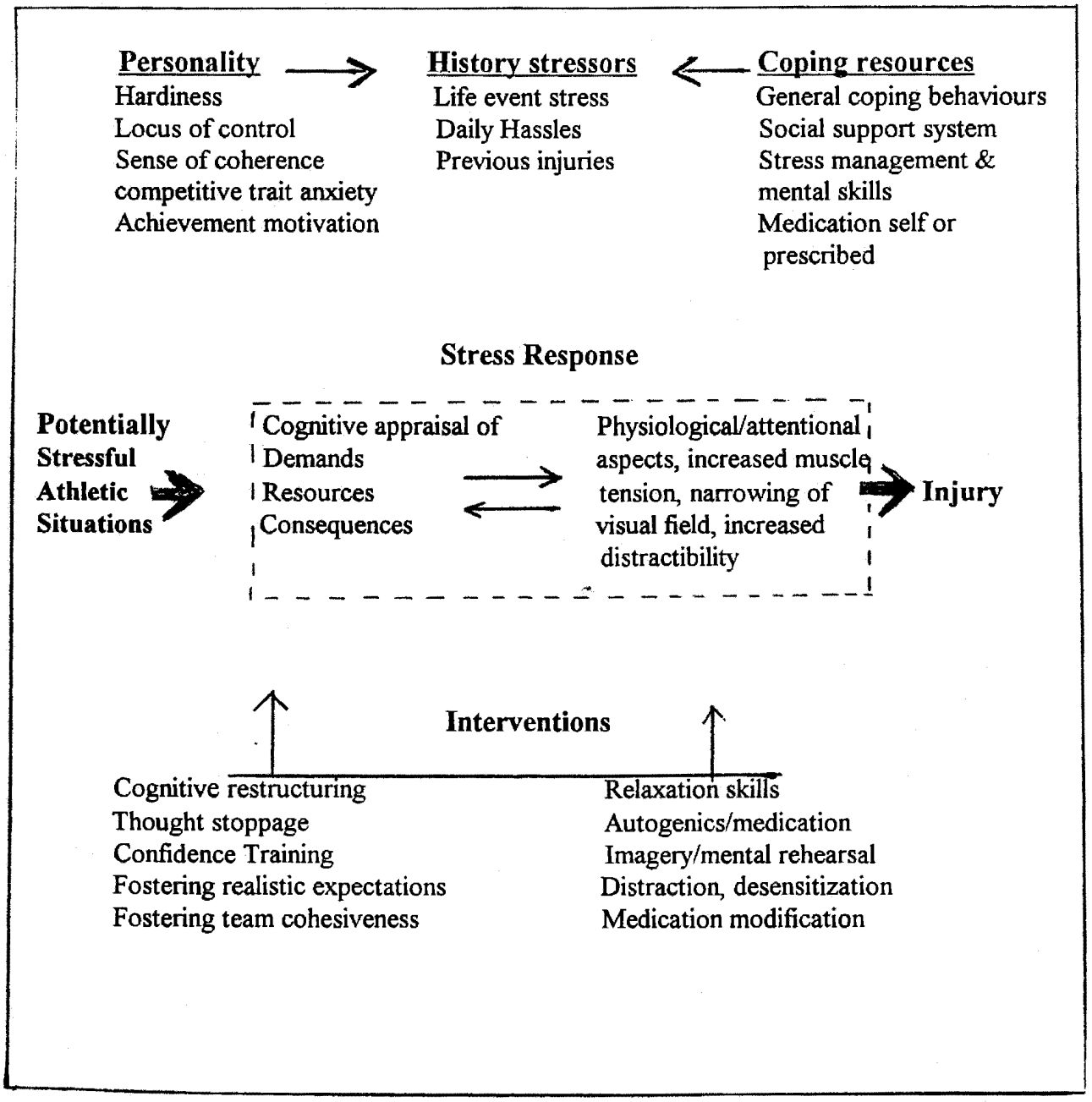


FIGURE 2.5 A DIAGRAMMATIC REPRESENTATION OF THE MULTIDIMENSIONAL STRESS-INJURY MODEL (Anderson & Williams 1988)

"It is hypothesized that one's stress history contributes directly to the stress response while personality factors and coping resources may act on the stress response directly or through the history of stresses"(Anderson & Williams,1988, p. 298).

The present research study will measure daily stress, personality and coping through the history of stressors. The theoretical base of the Model of Anderson and Williams (1988) allows for this. The Daily Hassles and Uplifts Scale takes into account daily stress (chronic daily problems) life event stress (major life events) and coping (Kanner, et al.,1981).

Personality has been found to be an important variable in the field of dance and injury. Personality profiles were found to be significantly related to injury by Hamilton (et al., 1989), who studied 29 dancers from the New York City Ballet and The American Ballet Theatre. The results indicated those personality characteristics suggestive of the "overachiever" when combined with physical stress characterised dancers who had experienced the greatest number of injuries due to extreme repetition of movements. Ironically the personality traits that contribute to injury in professional ballet dancers are the very qualities that are needed to succeed in the drive for physical perfection, however when taken to the extreme these personality traits can lead to a history of chronic injuries.

The ballet subculture seems to attract persons who possess particular personality traits, making the variation in personality differences small. Bakker (1987) studied personality differences between dancers (n=30) and non-dancers (n=61). Some significant differences emerged. Dancers were found to have lower self-esteem, and less favourable attitudes to their physical self-concept. They were also found to be significantly more introverted and more achievement motivated than non-dancers. Bakker (1990) confirmed the results of the 1987 study and found a typical personality profile of dancers to be introverted, relatively high on emotionality, strongly achievement motivated, and exhibiting less favourable self-attitudes. The importance of this study is the conclusion that personality difference between dancers who had continued their professional ballet education and those who had dropped out was small indicating a self-selection process whereby the ballet subculture attracts persons who possess particular personality traits.

The theoretical framework of the Anderson and Williams model (1988) was tested by Hanson et al.(1992), in track and field athletes using the Athletic Life Experience Survey (ALES)

to measure stress and the Colorado Injury Reporting System to measure injury. The effects of personality traits, history of stresses and coping resources on severity and frequency of injury were examined to determine which variables were most highly related to injury. The results supported a stress-injury relationship and found that positive life stress was associated with the frequency of injury while negative life stress was associated with the severity of injury. No relationship was found between minor life events and injury and this was attributed to the measuring instrument. Hanson (et al., 1992) therefore recommended the Daily Hassles and Uplifts scale be used as an improvement over the inventory that was used.

The present research study will use the Anderson and Williams model (1988) as a framework to explain the relationship between stress and injury in a group of professional ballet dancers, should such a relationship be found.

The Measurement of Stress and Injury

Daily stress viewed as a result of appraisal has been measured using the Daily Hassles and Uplifts Scale (Kanner, et al., 1981). Life event stress viewed as a result of appraisal has been measured using various Life Event Scales such as The Athletic Life Experience Survey (ALES)(Passer & Seese, 1983). Kanner, (et al., 1981) in their validation study compared the standard life events methodology to one focussing on relatively minor events (daily hassles) and found that relatively minor events (daily hassles) were a better measure of interactive stress than life events. Presented below is the history and development of the measurement scales.

According to Petrie and Falkstein (1998) most of the scales used to assess life stress in research on sport injury prediction used modifications of the Social Readjustment Rating Scale (SRRS), by Holmes and Rahe (1967). This scale was first modified for use with a football college population by Bramwell (et al., 1975) and was called the Social and Athletic Readjustment Rating Scale (SARRS). The new instrument had 57 items, each of which has a predetermined life change value associated with it. A total life change score was obtained by summing the life change scores across all the life events the athlete reported experiencing in the last 12 months. Conceptually, the SARRS is based upon a stimulus perspective of stress and is limited because it assumed that the "stress" associated with the event resides in the event itself, (each life event has a predetermined

life change score) and not in the interaction between the person and the event (Petrie & Falkstein, 1998). It does not account for the fact that individuals may experience life stress differently. Bramwell (et al., 1975) did not present psychometric information for the SARRS.

Passer and Seese (1983) adapted Sarason, Johnson, and Siegel's (1978) Life Experience Survey (LES) to athletes and created the Athletic Life Experience Survey (ALES). The original LES was designed to separate positive and negative life events to test the influence of each on illness. The negative, but not the positive, change score have been shown to correlate significantly with measures of anxiety, depression, general psychological discomfort and illness (Sarason, Sarason, Potter & Antoni, 1985). Petrie and Falkstein (1998) point out that the LES was an advancement from Holmes and Rahe (1967) who assumed that any major change positive or negative would be onerous to the individual's health. The LES rated life events on a 7 point Likert scale (-3 to +3) reflecting the individual's appraisal of the life event. It thus represented an interactive approach to stress. The ALES is however limited because the items that comprise the measure were determined by the LES. The items may therefore not be content valid for all athletes as Passer and Seese (1983) only deleted the items from the LES that did not apply to football players. Passer and Seese (1983) did not report psychometric information on their modified scale.

The Daily Hassles and Uplift Scale (Kanner, et al., 1981), was validated in a community sample of 100 middle-aged adults who completed the questionnaire every month for 9 consecutive months, along with other measures assessing life events. Psychological symptoms were measured during the second and tenth months using the Hopkins Symptom Checklist. It was found that everyday problems were more powerful than life events in predicting psychological symptoms such as anxiety, depression, obsessive-compulsive behaviour and somatisation, and that life events had little predictive power independent of everyday problems. In addition most of the variance in symptoms associated with life events was already accounted for by everyday problems. Major life events could operate by affecting the person's pattern of daily hassles. It is the adaptational significance of the relatively minor stresses and pleasures of everyday life that ultimately has significance for health outcomes (Kanner, et al., 1981; Lazarus, 1981). In addition Burks and Martin (1985) and Monroe (1983) found that everyday problems were more powerful than life events in predicting psychological symptoms.

Both the SARRS and the ALES tap into changes in responsibilities. The former is based on a stimulus-based model and the latter is based on an interactional model. However, neither measures both ongoing daily stress and life event stress. The present study will therefore use the Daily Hassles and Uplift scale to measure life event and daily stress.The Daily Hassles and Uplift Scale is a self-report measure. This should not be a disadvantage as it has been found that self-reports of illness possess adequate reliability with significant positive relationships being found when verified with information from physicians. There is however evidence to suggest that self-reports overestimate acute and recently noticed conditions and that the effects of distress may influence the self reporting (Sarason, et al.,1985).

Injury will be measured according to a national surveillance system namely the National Athletic Injury Reporting System (NAIRS)[2]. This system has been used to collect data on sports related injuries since 1975. NAIRS defines an injury as: one that is reported and causes cessation of customary participation for at least the day of and one day after the injury. In this system, injuries are classified as either minor (missing 1 to 7 days of practice/competition due to injury), moderate (missing 8 to 21 days of practice/competition due to injury) or severe (missing more than 21 days of practice/competition due to injury. Moderate and severe injuries are considered to be significant injuries. With this system the number of minor, moderate, or severe injuries are the outcome measures, therefore life stress will be related to the number of minor, moderate or severe injuries that have been experienced. Time-loss will be the measure of severity. This measure is based on the functional consequences following injury and is used in nationally based sports injury studies (Alles, et al., 1979).

Most of the research concerning the stress-injury relationship in sport and dance has considered injury in terms of time loss. (Bramwell, et al., 1975; Coddington & Troxell, 1980; Cryan & Alles, 1983; Passer & Seese, 1983; Micheli, et al., 1984; May, Veach, Southard, and Herring, (1985) cited in Morris and Summers (1995), May, et al., 1985; Hardy & Riel, 1988; Kerr & Minden, 1988; Patterson, et al., 1998; Hamilton, et al., 1989; Blackwell & McCullagh, 1990).

[2]A breakdown of NAIRS is repeated here in order to aid the reader.

A significant relationship was found between stress and injury in a group of professional ballet dancers using NAIRS to measure both the incidence and severity of the injury (Patterson, et al.,1998).

A Review of the Stress-Injury Relationship

The stress-injury literature by and large supports a relationship between stress and injury in athletes. This relationship has been found in both contact sport (Bramwell, et al., 1975; Coddington & Troxwell, 1980; Cryan & Alles, 1983; Passer & Seese, 1983; Blackwell & McCullagh, 1990) and non-contact (May, Veach, Southard, & Herring, (1985) cited in Morris & Summers (1995) ; May, et al., 1985; Kerr & Minden, 1988; Hardy & Riel, 1988; Patterson, et al., 1998). The latter includes dance (ballet) as a non-contact sport.

The stress-injury relationship was researched at first based on a stimulus perspective of stress. Using the Social and Athletic Readjustment Rating Scale (SARRS) as a measure of life event stress both Bramwell (et al., (1975), and Cryan and Alles (1983) found a positive relationship between life events and injury in contact sport. The samples were male football players. Although these findings may be consistent the intermediary mechanisms through which major life changes attain their adverse effects was not taken into account (Monroe, 1983). The studies of Bramwell (et al., 1975) and Cryan and Alles, (1983) are important as they provided the initial research that was needed to establish a relationship between a psycho social variable namely stress, and injury.

May, Veach, Southard and Herring, (1985) cited in Morris and Summers (1995) also used the SARRS to measure the effects of life stress on injury, illness, and performance. Their sample (n=97) consisted of male and female athletes who were drawn from five different areas in sport namely, biathlon, race walking, figure skating, gymnastics and basketball. It was found that the higher the life stress score was, the more likely it was for the person to become ill or injured during the season. The importance of this study is that it allowed the relationship between stress and injury to be compared across different sports that is contact and non-contact sport. These findings were based on a small sample and therefore should be treated with caution (Morris & Summers, 1995). In addition both male and female athletes participated in the varying sports

however in the analysis no account was taken of gender.

The studies that follow have measured stress using life event scales that support a variation score and hence an interactive perspective. Coddington and Troxell (1980) modified the SARRS and developed the Life Events Scale for Adolescents (LESA). Injury was measured according to NAIRS . In the analysis no statistical relationship was found between injury and either positive or negative life events (as assessed by the LESA). However, a relationship between an emotional state and the risk of injury was discovered by chance in the process of the analysis of the descriptive data. It was found that those players who experienced more family instability, particularly those who experienced parental illnesses, separations, divorce and death, were more likely to have sustained a significant injury.

Passer and Seese (1983) used the Athletic Life Experience Survey (ALES) to measure the stress-injury relationship in two teams of football players and found that negative, but not positive, life events were associated with injury in team one, but not in team two. Passer and Seese (1983) broadened the scope of research on stressful life events and injury, by including three possible moderator variables of the life events-injury relationship namely trait anxiety, competitive trait anxiety and locus of control. Trait anxiety and locus of control were found to bear no relationship to the football injuries incurred. The early consistency of the findings (using the SARRS) was dampened by the inconsistent results recorded by the second team of Passer and Seese (1983) who recommended further research into comparing the life change assessment measures.

The trend concerning the focus of the stress-injury relationship changed in the 1980's that is from contact sport to non-contact sport such as skiing and gymnastics. Researchers tried to determine whether the relationship between stress and injury extended into non-contact athletics. Using life event stress measures, a relationship between life stress and injury was found (May, et al., 1985; Kerr & Minden, 1988; Hardy & Riehl, 1988).

May (et al., 1985) researched 73 male and female members of the United States' Alpine ski team. Their findings indicate that, life changes, along with other psychological variables such as depression, uncontrolled emotions, increased tension, and lower life satisfaction can influence injury, illness and performance in athletes. As in the May, Veach, Southard and Herring, (1985)

study cited in Morris and Summers (1995) they failed to consider possible gender effects.

Kerr and Minden (1988) conducted a retrospective survey type study amongst 41 elite female gymnasts. The data indicated that stressful life events were significantly related to both the number and the severity of the injuries that were incurred with an increase in injury rate as competition's approached. Gymnasts with the highest life event scores had four times the injuries, in addition the injuries were more severe, compared to those gymnasts with low life event scores. Kerr and Minden (1988) concluded that a possible reason for finding a relationship between stress and injury (incidence and severity) was that stressful life events demand attention leaving less attention available for the task at hand. This conclusion was congruent with the most commonly reported perceived cause of injury by the gymnasts themselves namely 'a lack of concentration'. A second possible reason which was cited was fatigue due to stress, rendering the athlete susceptible to injury. It should be noted that the sample in this study was relatively small and limited to females. In addition the retrospective nature of the study could have confounded the results as individuals experiencing psychological symptoms may report greater levels of stress in an attempt to explain away their difficulties, known as "effort after meaning" (Brown, (1974) cited in Kerr & Minden, 1988, p.172).

Hardy and Riehl (1988) addressed the issue of gender. They tried to establish life stress as a predictor of athletic injury among both male (n=49) and female (n=37) participants in intercollegiate non-contact sport (baseball, softball, tennis and track teams). Life stress was measured using the ALES. Injury was measured using NAIRS. The results indicated that life stress is predictive of the frequency of injury among non-contact sport participants, particularly for track and female athletes. Hardy and Riehl (1988) concluded that as track is characterised as an activity requiring maximal effort expenditure it is possible that the addition of life stress overloads the performer's adaptive resources resulting in a depletion of the adaptive resources necessary for performance. The importance of this study is that it highlights a possible intervening variable in the stress-injury relationship, namely gender.

The majority of the stress-injury studies including the present study are retrospective in design. The present study has however addressed the following issues: Firstly the issue of gender, the majority of stress-injury studies used samples of either male or female athletes, when the sample was of mixed gender there was generally a failure to account for gender differences. The

present research study will use a mixed gender sample, and address the issue of gender if necessary in the analysis as a possible intervening variable between stress and injury. Secondly the issue of measurement, scales used to measure stress have largely been life event measurement scales, with some studies using a stimulus-based measurement scale (Bramwell, et al., 1975; Cryan & Alles, 1983; May, et al., 1985 cited in Morris & Summers, 1995) and others using an interactive-based measurement scale of life events (Coddington & Troxwell, 1980; Passer & Seese, May, et al., 1985; Kerr & Minden, 1988; Hardy & Riel, 1988). The relationship between daily hassles and sport injuries has therefore been neglected and the present study attempts to address this issue.

The literature concerning the relationship between psycho social factors and injury in professional ballet dancers, and in particular, the association between stress and injury is sparse. The high injury rate among ballet dancers is only just beginning to be addressed from a psychological point of view. No research studies to date could be found concerning the South African professional ballet dancer in this regard.

The early international research concerning injury in professional dancers found that the majority of injuries were "overuse injuries". Micheli, (et al., 1984) focussed on the physiological aspects of injury and conducted a study in 1980 at the Boston Ballet among nine elite professional ballerinas. In 1982 a second study was conducted among students at the Boston Ballet Summer School. In an attempt to address the issue of high injury rates, the studies focussed on the "science of movement". The findings indicated that elite dancers are aerobically fit with high muscle endurance and remarkable flexibility. A profile indicating the type of injury that is most common to ballet dancers was drawn up as a valuable guide to anticipating problems. The psychological dimension of injury was ignored in favour of the physiological dimension.

In contrast to the above study Hamilton (et al., 1989) studied 29 dancers from the New York City Ballet and The American Ballet Theatre. They focussed on both personal factors and environmental factors that could affect the stress-injury relationship. The psychological status of the dancers was measured in two ways; firstly the Adult Personality Inventory (API) was used to measure 21 traits associated with normal personality functioning. Secondly three measures were used to measure occupational stress, strain and coping: The Occupational Environment Scale, the Personal Strain Questionnaire and the Personal Resources Questionnaire. The results indicated

that gender was not part of the injury pattern as there were no significant differences in injury between male and female dancers. Personality profiles were significantly related to injury, indicating a relationship between a psychological variable and injury in the life world of the ballet dancer. The study indicates that marked differences did exist between personality, occupational stress and strain, and coping mechanisms in male and female dancers. The marked differences in personality were not in the traits that were found to contribute to injury. Hamilton (et al., 1989) found that the differences in stress, strain and coping indicated that the male dancers experienced more stress than the female dancers. By way of explanation they concluded that classical ballet's emphasis is on the ballerina, possibly making this a feminine profession that is at odds with a masculine identity in male dancers, and therefore could potentially create work related stress.

Hamilton (et al., 1989) noted that both physical and psychological factors are thought to contribute to the occurrence of injury, together and separately. The personality characteristics suggestive of the "overachiever" when combined with physical stress characterised dancers who had experienced the greatest number of injuries due to extreme repetition of movements. They noted that ironically the personality traits that contribute to injury in professional ballet dancers are the very qualities that are needed to succeed in the drive for physical perfection, however when taken to the extreme they lead to a history of chronic injuries. The occupational stress and strain scores were not significantly related to injury in these elite dancers. Hamilton (et al., 1989) reasoned that it is likely that the few dancers who reach the level of principal, soloist or ballerina do so because of their ability to triumph over the stresses and strains inherent in the ballet world. In conclusion Hamilton (et al., 1989) found that the psychological construct of personality, and not gender or stress, distinguished the dancers who incurred the most injuries.

Brinson and Dick (1996) distributed a total of 3,500 questionnaires in England, South Asia, Scotland and Wales. The questionnaire was called "The Healthier Dancer Questionnaire" and focussed on the physical and the mental health of the dancer. The response rate was 658 usable replies, which was the largest response of British dancers ever achieved for research purposes. Fifty percent of the respondent's (n=330) were pre-professional students and fifty percent were professional dancers. The findings of this longitudinal descriptive study were borne out by in-depth interviews with individual dancers and agreed with Hamilton (et al., 1989) in that both physical and psychological factors contribute to injury in the professional ballet dancer.

The dancers themselves cited the major causes of dance injury to be fatigue and overwork. In addition they cited multiple and inter-related causes for their injuries such as cold rehearsal halls. The psychological risk factors that were found to contribute to injury were depression, stress and decreased self-esteem. The present study will use "The Healthier Dancer Questionnaire" to allow dancers to self-report on the physical and psychological factors that they feel may have contributed to their injury.

The research conducted by Patterson (et al., 1998) focussed on the association of life stress and injury in ballet dancers. Their study of 46 dancers, all affiliated to major ballet companies in the western United States, used the adult version of the Perceived Events Scale to measure positive and negative life events. Separate total impact scores for positive minor and major events and for negative minor and major events were obtained. The study, a prospective one, supported the life stress-injury relationship in dancers, and illustrated that the athletic stress-injury relationship can be generalised to a population of ballet dancers. The findings indicated that recently experienced negative life events were significant predictors of subsequent injuries and accounted for nearly 50% of the injury variance in dancers who reported low levels of social support in their lives. Predictive relations were found for totally negative events and minor negative events. The correlation's for major negative events did not achieve statistical significance. These findings are consistent with the findings of Kanner (et al., 1981) who found that "micro stressors" or daily hassles could exhibit stronger relations with measures of well being than major events, which occur less frequently. Patterson (et al., 1988) concluded that in addition to previously identified physical and biomechanical factors, psycho social factors could affect injury vulnerability in ballet dancers. Patterson (et al., 1988) noted that the endemic stress and lack of support found in the ballet environment needed to be addressed.

In conclusion the research has shown that the support for the stress-injury relationship in athletes/dancers is divided but by and large is well supported. The different scales of measurement for the variables stress and injury make it difficult to compare studies, however if a relationship is usually found between stress and injury even when using different measurement scales this should give more credence to the relationship between the two variables. It would appear that when perceived demands are greater than perceived ability to meet those demands stress will result. If dancers are unable to control their stress they may become injured due to attentional deficits or physiological muscle tension. Stress involves the individual, the environment, appraisal

and coping. That is the environment is not absolved of responsibility, by defining the experience of stress inside the dancer only (response-based model), and the dancer is not absolved of responsibility by blaming the environment only (stimulus-based model). Personal, environmental and workplace factors that could interact and affect the dancers daily experience of stress were noted and it was decided that the best measure of this daily stress would be the scores recorded on the Daily Hassles and Uplift scale.

Based on the literature survey the present study puts forward the hypothesis that,

"The experience of daily stress is positively related to the occurrence of injury in professional ballet dancers."

CHAPTER 3

RESEARCH DESIGN

The Statement of the Problem

There are numerous questions to be addressed in the ever-evolving area of the psycho social antecedents of athletic injury. The goal of the present research was to establish a relationship between stress and injury and to note perceived sources of injury amongst a group of professional ballet dancers.

In order to achieve this aim, this study needed to:

- Show a positive correlation between the experience of stress and the occurrence of injury in professional ballet dancers.

- Report on other possible sources of injury.

The Research Question and Hypothesis

The research study was based on the following research questions:

- "Is there a positive relationship between daily stress and injury in professional ballet dancers?"

- "What sources of injury, other than daily stress can be identified?"

In investigating the first question the following research hypothesis was tested;

The experience of daily stress is positively related to the occurrence of injury in professional ballet dancers.

Research Design

For purposes of ease and simplicity, a diagrammatic representation of the component parts of the research design is presented in diagram 3.1. The research design was an ex-post facto survey type design, using a single group. The reason for the selection of this design was because the variables were classification variables. In addition survey design is most useful in obtaining personal and social facts, beliefs and attitudes (Kerlinger, 1986).

This type of design has several advantages which include:

- The information being collected from a wide range of cases in order to investigate a particular issue, which in this case was, the sources of injury. The focus is on the scope of the information and not on the depth (Kerlinger,1986).

- The sample being a representative cross-section of the population, which in this case was a cross section of the international ranking system that exists within the population of professional ballet companies.

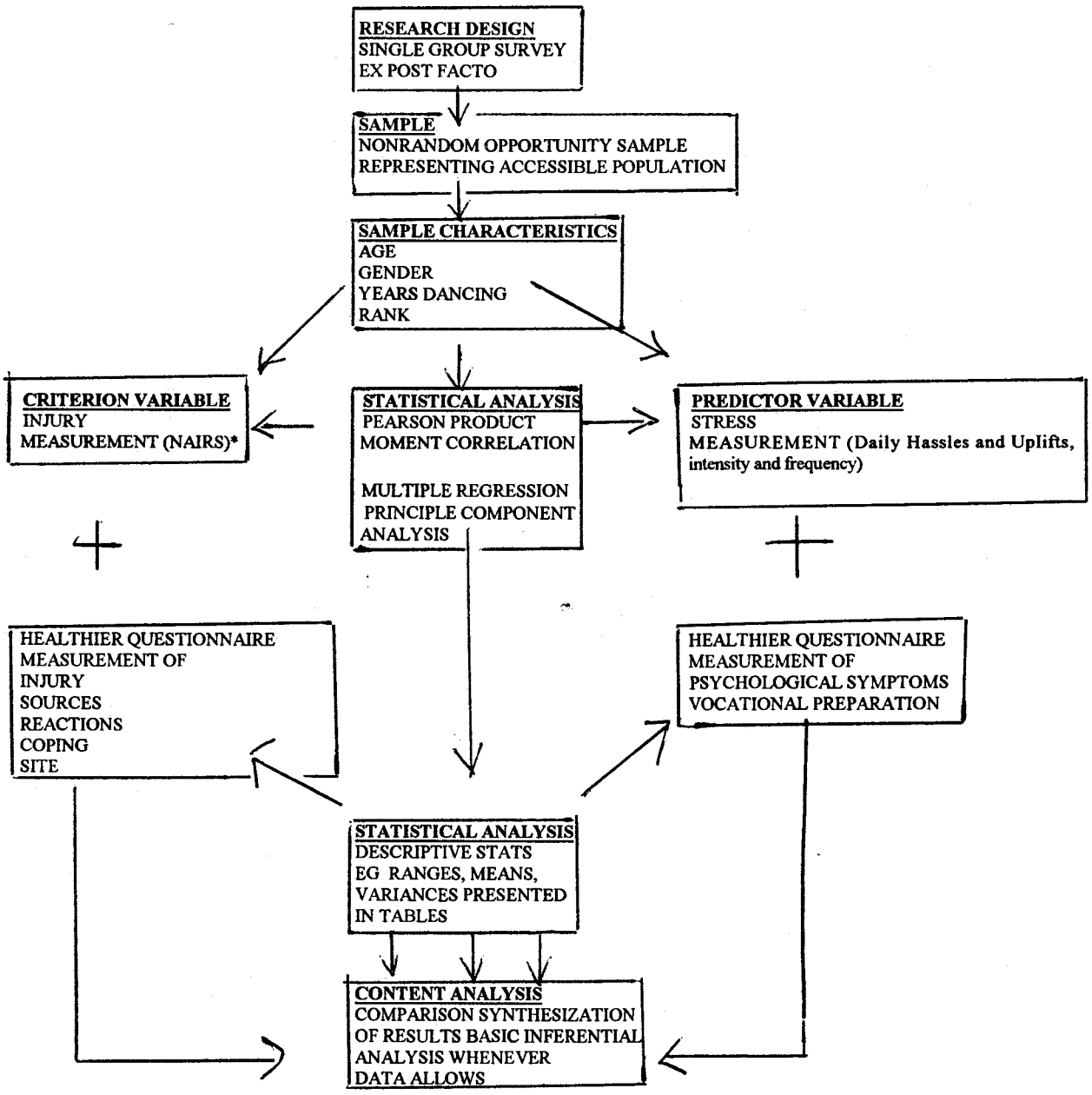
- Comparisons between the sub-groups such as injured and non-injured, male and female ballet dancers become possible. As well as the qualitative/descriptive analyses of the responses to open-ended questions.

A Description of the Sample

The sample needed to be reasonably large as the quality of the survey depended on the sample size (see diagram 3.1). The sample was expected to be relatively heterogeneous on the variables that were being measured, namely daily stress, and incidence and severity of injury. Despite the fact that ballet dancers share a common context, which is one requiring extraordinary dedication, a high capacity for hard work and the ability to persevere, enduring more or less constant pain (Hamilton, et al., 1989), variability was expected amongst the dancers. Ballet dancers' physical characteristics differ in terms of flexibility, alignment ability, inherent muscle strength and age. In

addition dancers vary in their psychological make up which affects the way that they appraise and cope with situations. The differences may result in varied demands and consequently varied stress levels and varied injury levels.

Diagram 3.1: A diagrammatic representation of the research study



*NAIRS is a national surveillance system used since 1975 and is known as the National Athletic Injury and Reporting System.

Sample Selection and Procedure

A nonrandom opportunity sample was selected from two premiere ballet companies in South Africa namely the State Theatre Ballet (STB) and Cape Town City Ballet. All the dancers were given a questionnaire (see appendix B and C), and were asked to complete and return it anonymously. Participation was voluntary and confidentiality was assured. In all, 37 questionnaires were returned by 9 male and 28 female dancers (see table 2). This represented a response rate of 46,0%. There could have been many reasons for non participation, however non participation was mainly attributed to language difficulties as many of the dancers, mainly male, were from non English-speaking countries such as Russia and Bulgaria. The SBT sub sample consisted of 58% of the full accessible population from graduate level upwards, with 7 males and 22 females, participating. The total number of accessible dancers within the ballet company was 50. At the time of testing there were 7 dancers who were absent, and 3 who were leaving the company within a week and showed little interest in the questionnaire. 12 chose not to participate, in addition to language problems there could have been a lack of interest in the survey or more likely a lack of trust in the real motive for the survey. SBT itself was going through turbulent times in that the company was threatened with the closure at worst, or a 'scaling down' at best. This was due to the financial problems faced by the State Theatre, SBT is dependent on and integrally connected to the State Theatre. Change was inevitable and it is feasible under these circumstances that the dancers felt threatened by a psychological survey of any type. The Cape Town City Ballet sub sample consisted of 26% of the full accessible population from graduate level upwards with 2 males and 6 females participating. At the time of selecting the sample the number of dancers within Cape Town City Ballet was 31, of which 23 chose not to participate.

There are different levels/ranks within a ballet company, these different levels/ranks indicate the difficulty level in terms of repertoires and artistry, level/rank one is the most difficult. The dancers are assessed over a period of time. In order to advance from level/rank eight to level/rank two would take a minimum of six years. Theoretically dancers will not execute repertoires that are beyond their capability as the selection mechanism that operates within the company is a control mechanism that attempts to control for the possibility of injury due to lack of ability (see table 2).

Table 2: **The position, gender and level/rank of the participants (n=37)**

Position	Male	Female	Level/rank	Total
Ballerina	0	0	1	0
Principle	1 (11,1)*	3 (10,7)	2	4 (10,8)
Character Principle	2 (22,2)	0	3	2 (5,4)
Senior Soloist	1 (11,1)	2 (7,1)	4	3 (8,1)
Soloist	1 (11,1)	3 (10,7)	5	4 (10,8)
Senior Corp	1 (11,1)	6 (21,4)	6	7 (18,9)
Corp	2 (22,2)	7 (25,0)	7	9 (24,3)
Graduate	1 (11,1)	7 (25,0)	8	8 (21,6)
Total	**9 (25)**	**28 (75,6)**	**NA**	**37 (100)**

*Percentages are in brackets

Sample Characteristics/Demographics of the Sample and representivity

Demographic information, including gender, age, number of years spent dancing regularly, level/rank within the ballet company and home language were requested from those who participated. The sample consisted of 37 professional ballet dancers. The majority of the participants were female (n=28; 75,6%) and English speaking (n=30; 81%). There were far fewer participants whose home language was Afrikaans (n=4; 10,8%), three of the participants home language was neither English nor Afrikaans. The gender and language distribution of the sample differs from that of the ballet companies (SBT and Cape Town City Ballet) where the representation of non English speaking dancers is higher than represented in the sample and gender is split 50/50 between male and female dancers.

The majority of the participants were found to be between the ages of 20-24 (n=17; 45,9%) and 16-19 (n=10; 27%). A smaller percentage of dancers were found to be between the ages of 25-29 (n=8; 21,6%) and 35-49 (n=2; 5,4%). The rank of the dancers within the ballet companies was negatively related to the number of dancers holding that rank, that is the higher the rank the fewer the dancers. This was represented by the sample with the majority of the participants coming from ranks 8, 7 and 6 (see table 2). There was a difference in the amount of years spent in regular training between male and female participants. The mean number of years spent in

training for female participants was 5,5 years and 11,5 for males.

Description of the Research Variables

The present study was a correlational study with classification variables. The primary purpose of this investigation is to determine if there is a relationship between the experience of daily stress and the occurrence of injury amongst a group of professional ballet dancers.

The classification variables were as follows:

The criterion variable was injury and the predictor variable was daily stress.

Assessment Measures

All the subjects completed two questionnaires (anonymously, voluntarily and confidentially) namely; The Healthier Dancer questionnaire (see appendix B) and the Daily Hassles and Uplifts scale (see appendix C). The dancers were given an introductory letter thanking them for their participation. The questionnaire began with a demographic section for statistical purposes, instructions, and an assurance of confidentiality to enhance participant compliance.

The sample characteristics that were noted were gender, age, number of years spent dancing regularly, rank within the ballet company and home language. These variables may correlate with injury or with stress and therefore this information will be recorded for the purpose of making recommendations for future research.

The Healthier Dancer Questionnaire

With the aid of a published semi-structured inventory called "The Healthier Dancer" (Brinson & Dick, 1996) extensive descriptive data was captured pertaining to the opinions and experiences of the dancers in respect of dance and injury. The questions were especially designed to probe the following; the anatomical site and severity of the injury, the professional help sought, warning

signs, the perceived causes of injury, as well as the timing of the injury, in relation to rehearsals or performance and perceived social support (see appendix B, The Healthier Dancer Questionnaire). This questionnaire had closed ended as well as open-ended questions and was used in order to obtain comprehensive background data regarding the life world of the ballet dancer.

The Healthier Dancer questionnaire was used by Brinson and Dick (1996) in order to investigate the physical and the mental health of dancers in England, South Asia, Scotland and Wales. These researchers distributed, by post a total of 3,500 questionnaires. The response rate was 658 usable replies, which was the largest research response of British dancers ever achieved. Fifty percent of the respondents (n=330) were pre-professional students and fifty percent were professional dancers.

Reliability and Validity

Brinson and Dick (1996) verified their findings with qualitative data in the form of in-depth individual interviews. However ,a face validity assessment of The Healthier Dancer Questionnaire was felt to be necessary as there were no reliability or validity figures available. Four participants were used in the face validity assessment. The participants were all professional ballet dancers at one time, and even though they were no longer dancing professionally they were all actively involved in the world of dance (see table 3). They acted in the capacity of the scientific community for the purposes of the face validity check (Neuman,1996).

Table 3 **The sample characteristics of the face validity sample**

Respondent	Gender	Age (years)	Occupation	*Dancing	*Teaching
1	Female	24	**Dance mistress	15	4
2	Female	42	Dance Body conditioner/ teacher	21	5
3	Female	37	**Dance mistress and choreographer	20	12
4	Female	45	**Dance mistress and examiner	17	23

*Dancing and teaching refer to years dancing and years teaching.

**Dance mistress is the formal name given to a ballet teacher

The participants were asked to read and assess the Healthier Dancer Questionnaire (see appendix D for the instructions that were given). The purpose of the face validity assessment was to obtain an indication of the extent that this is a valid descriptive measure of injury amongst professional ballet dancers. The face validity of the questionnaire depends on the questions being phrased carefully and unambiguously, each question needs to pertain to one referent only, each question needs to be short, simple and clearly worded, and none of the questions should be leading. This is a qualitative consensus method of measurement validity, where aspects of research may be scrutinised by others in order to assess that the questionnaire appears to be measuring at face value what it has set out to measure (Neuman, 1994).

The face validity findings were as follows, all the respondents found the questionnaire to be well phrased and unambiguous. The questions were found to be simple with clear wording and easily understandable. The questions were not found to be leading. All the respondents understood the questionnaire to be about injury and the physical and the psychological side of dance.

No suggestions were made as to improvements to the questionnaire. The following is a comment that was made by one respondent and echoed independently by all the respondents.

"The questionnaire is excellent."

The Daily Hassles and Uplifts Scale

Very few studies could be found to date that examined the relationship between daily stress and athletic injury. No studies were found that examined the relationship between daily stress and dance injury. Kanner (et al., 1981) proposed the immense adaptation that relatively minor stresses (hassles) and pleasures (uplifts) need (see appendix C, the Daily Hassles and Uplifts questionnaire). This adaptation is often not appreciated because the unit of stress seems so small, and is considered to be less important than more dramatic life event stress. However it is the cumulative value of minor stresses that challenges the idea that they are "only minor irritants" (Kanner, et al., 1981). Since no person leads a hassle free life, the impact of hassles on physical and mental health must depend on the frequency of the hassles, how repetitive they are, or how heightened they are during a given period, for example during a crisis. In any sample major life events may or may not occur to those involved, however everybody in the sample would have experienced daily hassles and uplifts. A measure of the frequency and the intensity of daily hassles and uplifts would yield an understanding of the stress faced by the sample.

The general instructions given to the respondents on how to complete the Daily Hassles and Uplifts scale was standard (see appendix C). Giving clear standard instructions tends to reduce the errors of measurement (Kerlinger, 1986).

The Daily Hassles sub scale consisted of 117 items, in which hassles were considered to be *"irritating, frustrating demands that to some degree characterise everyday transactions with the environment. They include annoying practical problems such as losing things or traffic jams...arguments, disappointments and financial and family concerns"* (Kanner et al, 1981, p. 3).

The dancers were required to indicate which of the 117 hassles they had been exposed to in the past 12 months prior to testing. This is based on the assumption that people will in general experience the same amount (frequency) of daily hassles from month to month. In addition to indicating which hassles they had been exposed to dancers were asked to rate each of the 117

hassles on a 3-point severity scale, ranging from somewhat to extremely severe, the purpose of the scoring was to generate two summary scores for analysis, namely:

- A frequency score, consisting of a simple count of the number of items marked, this could range from 0 to 117.

- An intensity score, consisting of a score that was calculated by dividing the cumulated severity score, (this is the sum of the three point severity rating) by the frequency score. This would give an idea of how strongly or intensely the average hassle was experienced, regardless of the number of hassles marked (Kanner, et al., 1981).

The intensity with which the hassles are experienced and the type of hassles may vary. The details of which hassles are cited by the person are less important than the overall level of hassles and the subjective stress that they indicate (Kanner, et al., 1981).

The Daily Uplifts sub scale is constructed in a manner similar to the hassles sub scale and uses the same content areas. It consists of 135 items in which uplifts were considered to be *"Events that make you feel good. They can be sources of peace, satisfaction, or joy. Some may occur often while others are relatively rare, they include relaxing and using ones skills well"*(Kanner, et al., 1981).

Dancers were required to indicate which of the 135 uplifts they had been exposed to in the past 12 months prior to testing. The participants then rated each of the 135 uplifts on a 3-point scale, ranging from somewhat to extremely often, the purpose of this as with the hassles sub scale was to generate two summary scores for analysis, namely:

- A frequency score, consisting of a simple count of the number of items marked, this could range from 0 to 135.

- An intensity score, consisting of a score that was calculated by dividing the cumulated frequency score (this is the sum of the three points "often" rating) by the frequency score.

This would give an idea of how strongly or intensely the uplift was experienced, regardless of the number of uplifts marked. (Kanner, et al., 1981).

Stress was therefore measured by several index's namely hassles frequency, hassles intensity, uplifts frequency and uplifts intensity represented by two sets of summary scores namely hassles and uplifts.

The Daily Hassles and Uplifts Scale was verified by Kanner (et al., 1981). The sample that was used for the verification of this measure consisted of 100 respondents (52 women, 48 men). The persons were selected from a population previously surveyed in 1965 by the Almeda Human Population Laboratory (HPL). This population was surveyed again in 1974 (n=4864) and it was from the 1974 panel sample that the participants were drawn.

The participants were white, primarily Protestant (n=93) Catholic (n=6) and Jewish(n=1), they all had at least a ninth-grade level of education (mean=13.7 years of education) and an adequate income ($ 7,000 or above in 1974; mean=$11,313), They were not previously disabled. Age was stratified into 5 year periods: 45-49 (n=27), 50-54 (n=25), 55-59 (n=24), and 60-65 (n=24). (See section 2.2 for more detail on the Kanner (et al.,1981) study.)

Reliability and Test Validity

According to Kanner (et al., 1981) the reliability correlation's of the frequency scores were higher than those of the intensity scores. The test-retest reliability for frequency scores of the hassles sub scale was 0,79 and 0,48 for intensity scores. The test-retest reliability for the frequency scores of the uplifts sub scale was 0,72 and 0,60 for the intensity scores.

The test-retest reliability could not be computed for the present study. Instead as a measure of internal consistency reliability of the Daily Hassles and Uplifts Scale a Kuder-Richardson 20 test was carried out. The reliability was computed to be 0,98 for frequency for both the hassles and uplifts sub scales. It would appear that the items that measured the daily hassles and uplifts measured them consistently (Lemke, & Wiersma,1976).

With regard to test validity Kanner (et al., 1981) found that there was a relationship between the hassles sub scale and the uplifts sub scale. In general these two sub scales were positively related to each other. In terms of frequency the positive correlation was found to be 0,51 and in terms of intensity it was found to be 0,28.

Correlations were carried out between the hassles, and the uplifts sub scales of the present study. The means and standard deviations are given in Table 4(a) while the Pearson correlation's coefficients have been shown in Table 4(b).

Table 4(a): The means and standard deviations of the Hassles and Uplifts sub scales of the present sample

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
Hassle F	37	40	31,45	1480	2	117
Hassle I	37	1,60	0,33	59,34	1	2,22
Uplift F	37	73,4	32,33	2716	10	135
Uplift I	37	1,94	0,33	71,98	1,4	2,68

Table 4 (b): Pearson Correlation Coefficients between the hassles and uplifts sub scales (n=37)

	Hassles F***	Uplifts F	Hassles Int	Uplifts Int****
Hassles F	1,00000 - - 37			
Uplifts F	0,59439 **(0,0001)*** 37	1,00000 - - 37		
Hassles Int	0,24628 (0,1417)** 37	-0,13466 (0,4268) 37	1,00000 - - 37	
Uplifts Int	0.20059 (0,2339) 37	0.49976 **(0,0016)** 37	-0.15674 (0,3542) 37	1.00000 - - 37

* Bold indicates significant correlations at the 0,05 level of significance
** The p values are given in brackets below the correlations
*** F refers to frequency (hassles and uplifts sub scales)
****Int refers to intensity (hassles and uplifts sub scales)

The sub scale hassles and the sub scale uplifts were found to be significantly positively correlated in terms of frequencies ($r=0,59$; $p<0,05$). That is, participants who experienced a high number of hassles also experienced a high number of uplifts. A similar positive relationship was not found for the sub scales of hassles and uplifts in terms of intensity ($r=-0,15$). This means that if dancer A indicates a small number of hassles compared to dancer B it is possible to predict that A will indicate a small number of uplifts compared to a larger number of uplifts by B. But this does not hold for intensity scores. There was a tendency for those who indicated uplifts to also score a higher intensity on indicated uplifts($r=0,49$; $p<0,05$). This is implied by the positive correlation between intensity and frequency for uplifts. The greater the frequency of uplifts reported, the more intensely these uplifts were experienced by this sample group.This did not hold true for the intensity and frequency of the hassles sub scale. That is the intensity by which a score was indicated was not significantly correlated at the 0,05 level of significance to the frequency of the scores indicated ($r=0,24$).

By way of predicting psychological symptoms The Daily Hassles and Uplifts scale was compared to other forms of stress measurement such as a life event scale. Regression analysis showed daily hassles to be considerably better predictors of psychological symptoms than life events (Kanner, et al., 1981). The correlation between the frequency of hassles and psychological symptoms was found to be 0,60 for the total sample. This provided construct validation for the hassles sub scale via its relationship to a significant adaptational outcome, namely, psychological symptoms as recorded on the Hopkins Symptom Checklist (HSCL; Derogatis in Kanner et al, 1981, p.17). In addition a positive correlation of 0,53 was found in females between the frequency of the uplifts sub scale and psychological symptoms.

In the present study a principle component analysis was performed on both the hassles frequency sub scale and the uplifts frequency sub scale in order to check their uni-dimensionality (Mulaik, 1972). The preferred choice would have been a factor analysis, however because of the small sample size (a sample of three to five times the number of items is needed) a principle component analysis was performed because it is mathematically possible to carry out this test despite the small sample size.

Table 4(c): Principle Component Analysis

Number of components	Percentage for hassles sub scale*	Percentage for uplifts sub scale*
one	38,1	28,9
two and beyond	5,5	6,0

*Percentage of variance explained by different components

It was found that in the case of the hassles sub scale as well as the uplifts sub scale there was one underlying theme. In the case of the hassles sub scale the first component explained as much as 38,1% of the variance, while components two and beyond each explained less than 5,5%. In the case of the uplifts sub scale, the first component explained 28,9% of the variance while components two and beyond each explained less than 6%. In other words no sub themes could be demonstrated and therefore the status quo was accepted . This analysis should be treated circumspectly because of the small sample size.

The National Athletic Injury/Illness Reporting System (NAIRS)

NAIRS is a simple rating system and has been incorporated into the Healthier Dancer Questionnaire (see appendix B). An injury for the purposes of the present study is defined accordance with NAIRS.[3].

A reportable injury is defined as any injury that causes a cessation of customary participation for at least 1 day after the injury. In this system, injuries are classified as either minor (missing 1 to 7 days of practice/competition due to injury), moderate (missing 8 to 21 days of practice/competition due to injury) or severe (missing more than 21 days of practice/competition due to injury. Moderate and severe injuries are considered to be significant injuries. With this system the number of minor, moderate, or severe injuries are the outcome measures, therefore life stress will be related to the number of minor moderate or severe injuries that have been experienced. Time-loss will be the measure of severity. This measure is based on the functional consequences following injury and is used in nationally based sports injury studies (Alles, et al., 1979).

[3]NAIRS rating system has already been defined in section 2.6, however, for the ease of the reader it has been defined again.

Physicians' ratings can be used in addition to time loss to verify incidence and severity of physical injury. In the present study unsuccessful attempts were made to obtain Physicians' records in order to verify the self-reported physical injury of the dancers as recorded in the Healthier Dancer Questionnaire.

Sarason (et al., 1985) found that self report measures of illness possess adequate reliability. In their study on positive and negative life events, social support and illness Sarason et al.(1985) used two types of illness data namely self-reports (a 67-item self-report health questionnaire) and information obtained from medical files. The self-reports of illness were found to be significantly related to the information provided from physicians in terms of illness. There was however evidence to suggest that self reports overestimate acute, and recently noticed conditions, and that the effects of psychological distress influence self-reports, however not significantly so.

Nuisance Variables

The two primary disadvantages of the survey type design applied in this study are:

- The data are susceptible to significant or historical events that may have occurred at the time of testing and can influence the results (Kerlinger 1986).

- In the analysis, the different cases lose their individuality as the data is analysed according to the question asked (Kerlinger 1986).

It should be noted that any variables that prove to significantly influence the results can be controlled for, by defining them as classification variables in the analysis of the data (refer to diagram 3.1).

External Validity

The external validity of this design was limited to the target population of ballet dancers, and more particularly to the accessible population of ballet dancers of SBT and Cape Town City Ballet. The

External Validity

The external validity of this design was limited to the target population of ballet dancers, and more particularly to the accessible population of ballet dancers of SBT and Cape Town City Ballet. The results may not yet be generalised to other non-contact athletic sports, since indices of representivity have not yet been established (Kerlinger 1986; Neuman, 1994).

Internal Validity of the Design

In addition to the nuisance variables mentioned in 3.7 the present study is limited by its retrospective design. Asking subjects to review past events involves memory, and recall. There is a risk of retrospective contamination or of effort after meaning (Brown, 1974 cited in Kerr & Minden 1988, p. 172), in which the reports of past events are exaggerated in order to explain subsequent difficulties. It is possible that ballet dancers will over-report past life events to account for more recent injuries.

The reliability and test validity of the measuring instruments have been investigated and found to be acceptable. Standard instructions and procedures were followed during the data gathering phases of the study.

Statistical Methodology

The following statistical procedures were used to analyse responses to the questionnaires(see diagram 3.1)

Principle Component

In the present study a principle component analysis was performed on both the hassles sub scale and the uplifts sub scale (frequency) in order to check their uni dimensionality (Mulaik, 1972).

Kuder-Richardson 20 coefficient

In the present study a Kuder-Richardson 20 coefficient was calculated as an index of the internal consistency reliability of the daily hassles (frequency) and uplifts (frequency) sub scales (Lemke,& Wiersma,1976). The concern was that the items of the test were measuring consistently and that there were no renegade items that could lower the reliability of the whole scale.

Descriptive Statistics

The sample characteristics, levels of cross training, classes and rehearsals attended as well as details of physical injury such as incidence, severity, type and site were tabulated and analysed with descriptive statistics, e.g. frequencies, means and standard deviations. Tables have been used to summarise the data (Kerlinger, 1986).

Parametric Versus Non-Parametric

As sample sizes were small (n=37), the researcher considered using non-parametric techniques such as for example Spearman Rank order correlation coefficients, Wilcoxon rank order tests etc (Siegel & Castellan, 1988). However, when analysing the data it became clear that possible interaction effects on the criterion variable had to be investigated, for which a suitable non-parametric test was not available. In this study use was made of multiple regression analysis because of its power to investigate complex effects (Draper & Smith, 1981). Because of the small sample size however, results were analysed with circumspect and caution.

Inferential Analyses

Whenever the classification of the data allowed basic inferential analyses were performed by computing Pearson Product correlational coefficients. These coefficients were used on variables that were either dichotomous for example gender or interval for example age in order to establish relationships between the variables (Hays, 1963; Kerlinger, 1986).The resultant statistic varies from -1 (a perfect negative linear relationship) through zero (no linear relationship) to +1 (a

perfect positive linear relationship).The statistic was then interpreted for example, suppose there was a correlation between "Years practising as a dancer" and "Degree of injury" that is r= 0,60 this indicates that "the longer the dancer has been practising, the greater the degree of injury". If the correlation had been negative, r= -0,60 the interpretation would be: "the longer the dancer has been practising, the lesser the degree of injury". The correlation does not tell us what the exact degree of injury is for any one, or more groups. For such information one would have to examine the mean scores for the various groups involved.

Level of Significance

Conventionally, the levels 0,05 and 0,01 are used by most researchers as levels of significance for statistical tests performed (Winer,1971).These levels of significance are rather severe because the purpose is to control the so-called type-I error rate (Hays 1963 p. 273, 280-281), that is, to limit the risk of incorrectly rejecting the null hypothesis, or concluding a significant result. Often however in the human sciences, we are just as concerned with missing a significant result because of having made a type-II error.

Another important consideration in the choice of a level of significance is the total number of statistical tests to be performed by the researcher. As the total number of tests increases, the probability of a type-I error also increases. One approach to counter this accumulating effect is to set the level of significance smaller for the individual statistical test so as to compensate for the overall type-I error effect. This choice remains to a large extent arbitrary (Winer,1971).

In the present study the sample size was small (n=37) and there was the possibility of making both a type-I (finding a significant relationship when the relationship is not significant) and a type-II error (missing a significant relationship). Therefore in order to guide against making a type-I error a significance level of 0,01 has been decided on for exploratory correlational statistics (for example injury measures and external variables). When testing the main hypothesis of the study, namely the relationship between injury to stress a significance level of 0,05 was used in order to ensure that any possible indication of a statistically significant relation was captured. In order to

guard against making a type-II error, findings should be treated with circumspect and verified on bigger samples.

Cp Mallows "Best" Subset Regression Statistic

In order to investigate joint explanatory effects of various predictors on the criterion, multiple regression analyses were performed. It is recognised that due to the small sample size (n=37) the results of such a parametric procedure need to be approached with circumspect. Various predictors such as for example the product of Uplift frequency and Uplift intensity (Uint) were created to test for interaction effects (see chapter 4 section 4.4 for an elaboration of all predictor correlates used) A "Best" subset regression analysis (Draper and Smith,1981) was performed to rank various solutions from best to worst, using the Statistical Analysis Systems (SAS).

Limitations

Any study has limitations and this study is no exception. It is important to spell out the limitations with a view that conclusions are drawn within the parameters of the limitations.

- The data was gathered cross-sectionally, and this precludes the possibility of controlling for baseline levels of stress, for example if a dancer scores x score there is no way of knowing how high or how low that score is for her/him at that moment in time (Kerlinger,1986).

- Retrospective stress-injury studies are difficult to interpret because the injury itself is a stress. This can bias the results of the stress measure (Petrie & Falkstein, 1998).

- The design did not allow for interaction effects between the different moderator variables according to the Anderson and Williams model (1988) to be statistically calculated (see section 2.5.2).

Ethical Considerations

Ethical considerations are important in psychological research and as in most professions psychology has a code of ethics that guides the conduct of those in the profession (Breakwell, Hammond,& Fife-Shaw,1995; Neuman,1994).

The confidentiality of the questionnaire was assured in that the names of the dancers do not appear anywhere. This precaution was taken to ensure that the dancers did not feel threatened in any way. The results were compiled as a composite report, thereby ensuring that no particular dancer could be singled out by rank. The risk of a minimal possibility of being recognised in the research was brought to the attention of the participants as many of the dancers are well-known figures. Participation was voluntary, in addition any dancer could have withdrawn at any point.

The questionnaire has value in that there is little research in the field of professional ballet dancers in terms of the relationship between stress and injury. The life world of the professional ballet dancer is conducive to studying the stress-injury relationship in that not only is the range of permitted movement narrow as in all athletics, there is in addition an aesthetic component. This component serves to further refine body movement, and allow for an easier detection of injury. In addition the Daily Hassles and Uplifts Scale as a measure of stress has not to date been known to have been used in the field of dance.

The sample is at a low level of risk with the only risk being that the participants may have brought to awareness the possible connection between stress and injury. A debriefing discussion was offered to the participants.

The potential benefit of the research to the subjects can be on a level of their own personal insight and growth. However, longer-term outcomes of the research are expected to benefit dancers in general should an association be made between life stress and injury. The benefit is seen to be in the prevention of injury.

Summary

The present research, in investigating the possible sources of injury in professional ballet dancers, hypothesised that stress could be a possible source of injury. In order to investigate this possibility a single group ex post facto survey type design was used as it is the most useful in obtaining personal and social facts, beliefs and attitudes (Kerlinger, 1986). A nonrandom opportunity sample representing the accessible population of professional ballet dancers from two major ballet companies was used. The noted sample characteristics were age, gender, years dancing and rank within the ballet company. This study, a correlational study, with classification variables, (criterion variable - injury; predictor variable - stress) defined and measured injury according to NAIRS,(a simple rating system incorporated into the Healthier Dancer Questionnaire) while stress was defined as daily stress and measured using the Daily Hassles and Uplifts Scale. The reliability and the validity of the assessment measures were determined. The nuisance variables, the internal and external validity of the design, the different statistical procedures used to analyse the responses to the questionnaires and the limitations and ethical considerations were discussed.

CHAPTER 4

RESULTS

In this chapter the general demographic characteristics of the sample have been described in section 4.1. To ease the identification of important correlations, the significant correlations at the 0,01 level of significance have been highlighted. Thereafter descriptive statistics regarding the measurement of physical injury of dancers as well as the correlations between the incidence of injury and severity of injury with external variable correlates from the two questionnaires (the Healthier Dancer Questionnaire and the Daily Hassles and Uplifts Scale-see appendix B and C) have been shown in section 4.2. This is followed in section 4.3 by descriptive statistics regarding the psychological stress of the dancers as well as the correlations between the four sub scales of stress (defined as hassles and uplifts) with external variable correlates from the two questionnaires(the Healthier Dancer Questionnaire and the Daily Hassles and Uplifts Scale-see appendix B and C).The main analysis in section 4.4 focuses on the relationship between the experience of stress and the incidence as well as severity of injury. Parametric tests have been used with the full knowledge of the limitations and the possible violations of assumptions. However, it was deemed necessary for the sake of uncovering possible underlying relationships. The results of open-ended questions will be reported in the sections that they pertain to.

The Demographic Profile of the Sample

Table 5 shows the gender distribution of the sample according to age. It would appear that the gender distribution of the sample does not fully reflect that of the ballet companies involved in the present study (see sample characteristics in chapter 3) while age does. The majority of female participants were between the ages of 20-24 (n=14; 50,0%) while the majority of male participants were evenly spread between the ages of 20-24 and 25-29 (n=6; 66,6%). It would appear that the youngest 16-19 (n=10; 27,0%) participants were mainly female (n=9; 32.1%) and the oldest 35-49 (n=2; 5,4%) participants were male (n=2; 22,2%). This is borne out by the correlation between age and gender in Table 8 (r= -0,45; p= 0,005).

Table 5: **Age and gender distribution of the sample (n=37)**

Age Group	Male*	Female*	Total*
16 - 19	1 (11,1)	9 (32,1)	10 (27,0)
20 - 24	3 (33,3)	14 (50,0)	17 (45,9)
25 - 29	3 (33,3)	5 (17,8)	8 (21,6)
30 - 34	-	-	-
35 - 49	2 (22,2)	-	2 (5,4)
Total	**9 (24,3)**	**28 (75,6)**	**37 (100)**

*percentages are shown in brackets

Table 6 indicates other forms of physical training that the participants were involved in, in addition to dance training. The most popular physical training (usually taken as part of required/compulsory daily class) was found to be stretch training (n=34; 91,9%). Body conditioning (n=26; 70,3%) and strength training (n=22; 59,5%) were less popular (usually taken in addition to required/compulsory daily classes).

Table 6: **Type of training (n=37)**

Type of training	Frequency*	Percentage**
Body conditioning	26	70,3
Strength training	22	59,5
Stretch training	34	91,9

* number of sample participants.

** percentages do not add up to 100 because participants could have given more than one answer.

The mean number of years spent in formal training by the participants (n=37) was 14,28 years with a standard deviation of 5,66. The mean for male participants (n=9) differed from the mean for female participants (n=28), with the former having a mean of 11,5 years, and the latter having a mean of 15,5 years spent in formal training.

Table 7 indicates the mean number of classes taken by the participants per week ($\bar{X}c = 5,91$) and the mean number of rehearsal hours per week ($\bar{X}r = 23,16$ hours). Rehearsal times differed

according to the participants level/rank (see table 2) within the ballet company that is the higher the level/rank (with one being the highest) the more hours of rehearsal were involved per week. This is borne out by the significant negative correlation between level/rank and rehearsal in table 8 where (r= -0,41; p= 0,01).

Table 7: **Mean of number of classes and rehearsal hours per week (n=37)**

Variable	Number	Mean	Std Dev
Class	37	5,91	0,36
Rehearsal	37	23,16	6,51

The relationship between demographic variables that were either dichotomous (e.g., gender) or interval-scaled (e.g., age) was established by comparing Pearson Product Moment Correlations between them. These correlations are reported in table 8.

Table 8: **Pearson Product Moment Correlation Coefficients of the demographic variables (n=37)**

	Gender	Age	Training	Level/rank	Class	Rehearsal	Cross training	Body cond	Strength	Stretch
Gender	1.00 - -									
Age	-0,45149 **(0,005)***	1,00000 - -								
Training	0,29347 (0,0779)	0,42076 **(0,0095)**	1,00000 - -							
level/rank	0,23831 (0,1555)	-0,70371 **(0,0001)**	-0,54994 **(0,0004)**	1,00000 - -						
Class	0,22317 (0,1843)	-0,43635 **(0,0069)**	-0,31200 (0,0601)	0,17320 (0,3053)	1,00000 - -					
Rehearsal	-0,19161 (0,2559)	0,45205 **(0,0050)**	0,19618 (0,2445)	-0,41845 **(0,0100)**	0,05264 (0,7570)	1,00000 - -				
Cross training	0,16129 (0,3402)	0,54475 **(0,0005)**	0,38422 (0,0189)	-0,32287 (0,0513)	-0,24744 (0,1398)	0,72255 **(0,0001)**	1,00000 - -			
Body conditioning	-0,32034 (0,0532)	0,41076 (0,0116)	0,24189 (0,1492)	-0,27340 (0,1016)	-0,34766 (0,0350)	0,42539 **(0,0087)**	0,66385 **(0,0001)**	1,00000 --		
Strength	-0,17339 (0,3048)	0,24583 (0,1425)	0,18941 (0,2615)	-0,11878 (0,4838)	-0,12033 (0,4781)	0,25336 (0,1303)	0,50236 **(0,0015)**	0,18554 (0,2716)	1,00000 --	
Stretch	-0,29316 (0,0783)	0,27021 (0,1058)	0,21509 (0,2011)	-0,07353 (0,6654)	-0,48513 **(0,0023)**	0,02333 (0,8910)	0,08451 (0,6190)	0,24005 (0,1524)	-0,04360 (0,7978)	1,00000 --

* The figures in bold indicate p values equal to or smaller than 0,01

In table 8 the following correlations appear to be noteworthy as they were found to be significant at the 0,01 level of significance.

- A negative correlation of -0,45 was found between the variables age and gender (coded as: male =1 and female =2). This correlation was found to be significant at the 0,01 level of significance (p= 0,005) indicating that male dancers tended to be older than female dancers with the youngest dancers being female and the oldest dancers being male (see table 5).

- A positive correlation of 0,42 was found between the variables training and age (coded as: years training). This correlation was found to be significant at the 0,01 level of significance (p= 0,009) indicating that older dancers have had more years of formal training than younger dancers, this relationship is as one would expect.

- A negative correlation of -0,54 was found between the variables level/rank and age (coded as: highest level/rank =1 and lowest level/rank =8). This correlation was found to be significant at the 0,01 level of significance (p= 0,000) implying that older dancers held the highest ranks within the ballet company. This is borne out by the known selection mechanism that operates within ballet companies, whereby dancers are assessed and promoted over a period of time. In order to progress from level/rank eight to level/rank two can take a minimum of six years.

- A negative correlation of -0,54 was found between the variables level/rank and training (coded as: highest level/rank =1 and lowest level/rank =8).This correlation was found to be significant at the 0,01 level of significance (p= 0,000) indicating that the more years of formal training a dancer has the higher the dancers rank within the ballet company. This relationship is as one would expect.

- A negative correlation of -0,43 was found between the variables class and age (coded as: class time in hours). This correlation was found to be significant at the 0,01 level of significance (p=0,006) indicating that younger dancers spend more time in class each week.

- A positive correlation of 0,45 was found between the variables rehearsal and age (coded as: rehearsal time in hours). This correlation was found to be significant at the 0,01 level of significance (p= 0,005) indicating that older dancers rehearse for the longer hours. This result is as one would expect as older dancers have the more difficult repertoires and longer rehearsal hours would therefore be needed.

- A negative correlation of -0,41 was found between the variables rehearsal and level/rank (coded as: rehearsal time in hours and highest level/rank =1 and lowest level/rank =8). This correlation was found to be significant at the 0,01 level of significance (p= 0,01) evidencing what one would expect as more difficult repertoires are associated with higher levels/ranks within the ballet company and require longer rehearsal hours.

- A positive correlation of 0,54 was found between the variables cross training and age (coded as: cross training yes=1 and no =2). This correlation was found to be significant at the 0,01 level of significance (p= 0,000) showing that older dancers tended to cross train less than younger dancers.

- A positive correlation of 0,722 was found between the variables cross training and rehearsal (coded as: cross training yes=1 and no=2; rehearsal is time in hours).This correlation was found to be significant at the 0,01 level of significance (p=0,000) indicating a correlation that one might expect in that those dancers who rehearsed more cross trained less possibly due to time constraints.

- A positive correlation of 0,42 was found between the variables body conditioning and rehearsal (coded as: body conditioning yes=1 and no=2; rehearsal is time in hours). This correlation was found to be significant at the 0,01 level of significance (p= 0,008) evidencing a relationship that one might expect, as with cross training body conditioning was more popular amongst those dancers who rehearsed less, this could be due to time constraints.

- A positive correlation of 0,66 was found between the variables body conditioning and cross

training (coded as: body conditioning yes=1 and no=2; cross training yes=1 and no=2).This correlation was found to be significant at the 0,01 level of significance (p= 0,000) evidencing that those dancers who participate in cross training also participate in body conditioning classes.

- A positive correlation of 0,50 was found between the variables strength training and cross training (coded as: strength training yes=1 and no=2; cross training yes=1 and no=2).This correlation was found to be significant at the 0,01 level of significance (p= 0,001) indicating that those dancers who participate in cross training also participate in strength training classes.

- A negative correlation of -0,48 was found between the variables stretch training and the amount of classes attended (coded as: stretch training yes=1 and no=2; cross training yes=1 and no=2). This correlation was found to be significant at the 0,01 level of significance (p= 0,002) showing that those dancers who stretch train the most are those that participate in more classes per week. Stretch training is usually a required/compulsory part of daily classes, therefore this result is as one would expect.

Given the obtained correlations it would appear that the older dancers have spent more years in formal training and held a higher level/rank within the ballet companies. These same older dancers devoted more time to rehearsal and did not cross train as much as younger dancers. Of those dancers who did cross trained it would appear that body conditioning and strength training were part of their cross training programme.

Injury and External Variables

The incidence of injury in the sample was found to be high (n=26; 70,3%). The severity of the injury that the dancer had incurred was measured in terms of time loss.

Table 9: **The number of days that the dancers (n=26) were unable to participate in a customary manner in the past 12 months due to injury**

Days away	number of dancers	Percent	Cumulative no. of dancers	Percent
1-3 days	9	34,6	9	34,6
4-6 days	3	11,5	12	46,2
7-14 days	6	23,1	18	69,2
15-21days	1	3,8	19	73,1
> 21 days	7	26,9	26	100,0

Table 9 indicates time loss due to injury. The categories of injury severity according to NAIRS are based on the number of days lost where a dancer is unable to participate in a customary manner. Therefore from Table 9 it is apparent that 12 (46,1%) of the dancers in the sample sustained a minor injury in the past 12 months (missing 1-7 days due to injury), while 7 (27,0%) sustained a moderate injury (missing 8-21 days due to injury) and a further 7 (27,0%) sustained a severe injury (missing more than 21 days due to injury).

The type of injury and the site of the injury have been reported on but not included in the analysis. The specific nature and range of the injuries were considered to fall outside of the scope of the present study. Nevertheless, this data is likely to contain substantially interesting and useful information and should be included in follow up studies. The data is reported in appendix A

The incidence of injury as well as the reported intensity of the injury was correlated with each of the other variables contained in the Healthier Dancer Questionnaire as well as the frequency and intensity scores for the hassles and uplifts sub scales of the Daily Hassles and Uplifts Scale (see appendix B and C). The inter correlations are given in Table 10. The variables in the correlation matrix are either dichotomous (eg. gender) or interval-scaled (eg. age) therefore it was possible to calculate the relationships as Pearson Product Moment Correlations coefficients.

Table 10: Pearson Correlation Coefficients of the correlation between injury and severity of injury with external variables

Variable	Injury (n=37)*	Days away (n=26)*
Gender***	0,09312	0,07501
	(0,5836)	(0,7157)
Age	0,19234	0,34067
	(0,2541)	(0,0886)
Training	-0,12816	0,18701
	(0,4497)	(0,3603)
Level/rank	0,21706	0,10043
	(0,1969)	(0,6255)
Classes per week	-0,01783	-0,27873
	(0,9166)	(0,1679)
Rehearsals hours per week	-0,23732	0,35971
	(0,1573)	(0,0711)
Do you do cross training?	-0,19799	0,35837
	(0,2401)	(0,0722)
Point work hours per week (N=26)	-0,06700	-0,07683
	(0,7450)	(0,7619)
Do you do body conditioning?	-0,03497	0,04405
	(0,8372)	(0,8308)
Do you do strength training?	-0,17577	0,37447
	(0,2981)	(0,0595)
Do you have a stretch class/regime?	-0,19321	0,20249
	(0,2519)	(0,3212)
Do you have a support system?	0,15440	0,04162
	(0,3615)	(0,8400)
Do you cool down?	-0,05435	-0,14916
	(0,7494)	(0,4671)
Do you warm up?	-0,10841	-0,22106
	(0,5230)	(0,2778)
Injury	1,00000	.
	--	--
Days away (N=26)	.	1,00000
	--	--
Hassles Frequency	-0,12960	-0,23067
	(0,4446)	(0,2569)
Hassles Intensity	0,03865	-0,21770
	(0,8203)	(0,2854)
Uplifts Frequency	0,11024	-0,05177
	(0,5160)	(0,8017)
Uplifts Intensity	0,21587	-0,22539
	(0,1994)	(0,2683)
Do you use an orthopaedic surg?	-0,36877	0,30693
	(0,0247)	(0,1272)
Do you use a Physiotherapist?	-0,70551	0,49134
	(0,0001)**	**(0,0108)**
Do you use a general Practioner?	-0,19321	0,05207
	(0,2519)	(0,8006)
Do you use a specialist?	-0,19321	0,27770
	(0,2519)	(0,1696)
Do you use a masseur?	-0,15549	-0,13873
	(0,3581)	(0,4991)

* p values are given in brackets

** The figures in bold indicate p values equal to or smaller than 0,01

*** All variables that are not underlined such as gender are dichotomous

Table 10 continued: **Pearson Correlation Coefficients of the correlation between injury and severity of injury with external variables.**

Variable	Injury (n=37)*	Days away (n=26)*
Do you use an acupuncturist?***	. - -	. - -
Do you use an Osteopath?	-0.39585 (0.0153)	0.16337 (0.4252)
Do you use a chiropractor?	-0.22646 (0.1777)	0.06147 (0.7655)
Do you use counselling services?	-0.10841 (0.5230)	-0.22106 (0.2778)
Do you use a massage therapist?	-0.10841 (0.5230)	0.15378 (0.4532)
Tell someone about the injury?	-0.31419 (0.0582)	-0.02084 (0.9195)
Seek professional treatment?	-0.35485 (0.0312)	-0.15572 (0.4475)
Take own preventative steps?	-0.56775 **(0.0002)****	0.03419 (0.8683)
Soldier on?	-0.29371 (0.0777)	0.36093 (0.0701)
Causes of injury Fatigue/overwork?	-0.47871 **(0.0027)**	0.33640 (0.0929)
Unsuitable floors?	-0.22646 (0.1777)	0.26127 (0.1973)
Cold environment?	-0.36877 (0.0247)	-0.09713 (0.6369)
Insufficient warm up?	-0.39585 (0.0153)	-0.33053 (0.0991)
Difficult repertoire?	-0.19321 (0.2519)	0.05207 (0.8006)
Difficult ballet mistress/master?	-0.10841 (0.5230)	-0.22106 (0.2778)
Repetitive movements?	-0.39585 (0.0153)	0.11398 (0.5793)
Partnering work?	-0.15549 (0.3581)	0.22197 (0.2758)
Inadequate Diet?	-0.10841 (0.5230)	0.27873 (0.1679)
Psychological reasons e.g stress?	-0.22646 (0.1777)	-0.07172 (0.7277)
Ignoring warning signs?	-0.36877 (0.0247)	0.10490 (0.6101)

* p values are given in brackets

** the figures in bold indicate p values equal to or smaller than 0,01

*** all variables that are not underlined such as gender are dichotomous

In table 10 the following correlations concerning injury appear to be noteworthy as they were found to be significant at the 0,01 level of significance.

The dancers were given a list of possibilities of how they would react to the warning signs of injury (see question 12 in the Healthier Dancer Questionnaire in appendix B). Each reaction had a maximum score of 1(coded as: no=0, yes=1).

- A negative correlation of -0,56 was found between the variables taking one's own preventative steps and injury (coded as no=0 and yes=1; injury =1 and no injury=2).This correlation was significant at the 0,01 level of significance (p= 0,000).This correlation indicates that injured dancers in response to the warning signs of injury were pro active and took their own preventative steps. A negative correlation (r= -0,35; p=0,031) was found between the variables seeking professional treatment in reaction to the warning signs of injury and injury (coded as no=0 and yes=1; injury=1 and no injury=2) indicating that professional treatment was sought by injured dancers when an injury was suspected. A negative correlation (r= -0,36; p=0,024) was found between the variables ignoring the early warning signs of injury and injury (coded as no=0 and yes=1; injury=1 and no injury=2) indicating that ignoring the early warning signs of injury is associated with injury.

The dancers were given a list of possible reasons that they could attribute their injury to (see question 13(b) in the Healthier Dancer Questionnaire in appendix B). Each reason had a maximum score of 1(coded as no=0; yes=1).

- A negative correlation of -0,47 was found between the variables fatigue and overwork and injury (coded as no=1 and yes=2; injury=1 and no injury=2). This correlation was significant at the 0,01 level of significance (p=0,002) indicating that injured dancers attributed injury mainly to fatigue and overwork. A negative correlation of -0,39 was found between repetitive movements and injury (p= 0,015) indicating that the second most important reason injury was attributed to, was repetitive movement.

The dancers were given a list of possible professional help that they could have sought for

their injury (see question 10 in the Healthier Dancer Questionnaire in appendix B and C).Each type of professional help sought had a maximum score of 1(coded as no=0; yes=1).

- A negative correlation of -0,70 was found between the variables physiotherapy and injury (coded as no=0 and yes=1; injury=1 and no injury=2). This correlation was significant at the 0,01 level of significance (p= 0,000) and indicates that the dancer's choice of assistance when injured was a physiotherapist. Also understandably the more severe an injury, the more use was made of physiotherapeutic services (r=0,49; p= 0,0108).

Apart from the above, no variables were found to significantly correlate with injury severity at the 0,01 level of significance. The most common unprompted reasons given by injured male and female participants as to the causes of their injury were: overwork and the resultant fatigue (19,2%), overextending and over stretching without sufficient warm up (15,3%), bad technique (11,5%) and a lack of concentration (11,5%) that resulted in falls. Only female participants (7,7%) mentioned the many years of dance and the resultant continued pressure on joints and tendons as a possible cause of injury.Only male participants (7,7%) mentioned carelessness and "messing around" as a possible cause of injury.

Hassles and Uplifts and External Variables

Emerging from the results of the Healthier Dancer Questionnaire it is evident that over the past 12 months the dancers in the present study have indeed experienced psychological stress. Table 11 indicates the self reported psychological stress experienced by the dancers in the present study and in the study by Brinson and Dick (1996).

Table 11: **The psychological symptoms experienced in the present study (n=37) compared to the study by Brinson and Dick (1996) (n=658)**

Symptom	Present Study	Brinson and Dick (1996)
General anxiety	46,0*	54,0
Tension with people	60,0	57,0
Performance anxiety	51,0	36,0**
Depression	41,0	45,0
Stress due to external factors	49,0	35,0**
Eating problems	11,0	19,0
Over-use of alcohol/drugs	8,0	8,0
General low self confidence	43,0	46,0
Sudden drop in self confidence	35,0	38,0
Consistent difficulty in concentrating in class or rehearsal	16,0	13,0

* the results are recorded in percentages

** the noted larger differences between the two studies

The findings for the present sample were similar to the findings of Brinson and Dick (1996) particularly in terms of tension, general anxiety, and low self confidence, these were cited as the most common psychological symptoms experienced by the dancers in both the samples. A larger difference was recorded between the two samples in terms of performance anxiety, and anxiety due to external factors (see section 2.3).

Daily psychological stress was measured by the Daily Hassles and Uplifts Scale. The daily hassles frequency, hassles intensity, uplifts frequency and uplifts intensity sub scales were correlated with each of the other variables contained in the Healthier Dancer Questionnaire (appendix B and C). The inter correlations are given in Table 12. The variables were either dichotomous (eg. gender) or interval-scaled (eg. age) and relationships were established by computing Pearson product correlations between them.

Table 12: Pearson Correlation Coefficients between hassles frequency, hassles intensity, uplifts frequency, and uplifts intensity with external variables (n=37)

Variable	Hassles F	Hassles I	Uplifts F	Uplifts I
Gender***	-0,47917	0,04038	-0,59129	-0,48947
	(0,0027)**	(0,8124)*	**(0,0001)**	**(0,0021)**
Age	0,00089	0,07751	0,25617	0,03614
	(0,9958)	(0,6484)	(0,1259)	(0,8318)
Training	-0,40957	-0,19646	-0,16187	-0,17138
	(0,0118)	(0,2439)	(0,3385)	(0,3105)
Level/rank	-0,12509	0,13454	-0,30496	-0,05163
	(0,4607)	(0,4273)	(0,0665)	(0,7615)
Classes per week	0,08503	0,05161	-0,06567	-0,06806
	(0,6168)	(0,7616)	(0,6994)	(0,6890)
Rehearsals hours per week	0,08258	0,12318	0,12658	0,03265
	(0,6270)	(0,4676)	(0,4553)	(0,8479)
Do you do cross training?	-0,13120	0,16850	-0,02932	0,05509
	(0,4389)	(0,3188)	(0,8632)	(0,7460)
Point work hours per week (N=26)	-0,32564	-0,07569	-0,48188	0,03076
	(0,1045)	(0,7133)	(0,0127)	(0,8814)
Do you do body conditioning?	0,06289	0,08237	0,16602	0,27877
	(0,7115)	(0,6279)	(0,3261)	(0,0948)
Do you do strength training?	-0,04968	-0,01106	0,03266	0,03081
	(0,7703)	(0,9482)	(0,8478)	(0,8564)
Do you have a stretch regime?	0,05425	-0,12347	0,21666	-0,01849
	(0,7498)	(0,4666)	(0,1977)	(0,9135)
Do you have a support system?	0,08416	0,33535	-0,28007	-0,23480
	(0,6204)	(0,0425)	(0,0932)	(0,1619)
Do you cool down?	-0,01058	-0,01216	0,04685	-0,11226
	(0,9504)	(0,9431)	(0,7831)	(0,5083)
Do you warm up?	0,38678 -	-0,03437	0,29576	0,34273
	(0,0180)	(0,8400)	(0,0755)	(0,0378)
Injury	-0,12960	0,03865	-0,11024	0,21587
	(0,4446)	(0,8203)	(0,5160)	(0,1994)
Days away (N=26)	-0,23067	-0,21770	-0,05177	-0,2539
	(0,2569)	(0,2854)	(0,8017)	(0,2683)
Hassles Frequency	1,00000	0,24628	0,59439	0,20059
	- -	(0,1417)	**(0,0001)**	(0,2339)
Hassles Intensity	0,24628	1,00000	-0,13466	-0,15674
	(0,1417)	- -	(0,4268)	(0,3542)
Uplifts Frequency	0,59439	-0,13466	1,00000	0,49976
	(0,0001)	(0,4268)	- -	**(0,0016)**
Uplifts Intensity	0,20059	-0,15674	0,49976	1,00000
	(0,2339)	(0,3542)	**(0,0016)**	- -
Do you use an orthopaedic surg?	0,23959	0,17618	0,02637	-0,06456
	(0,1532)	(0,2969)	(0,8769)	(0,7042)
Do you use a Physiotherapist?	0,05768	-0,13532	0,06273	-0,13727
	(0,7345)	(0,4246)	(0,7122)	(0,4178)
Do you use a general Practioner?	-0,05425	-0,10485	-0,03172	0,24914
	(0,7498)	(0,5368)	(0,8522)	(0,1370)
Do you use a specialist?	-0,17553	-0,12837	-0,00378	-0,5411
	(0,2987)	(0,4489)	(0,9823)	(0,7504)
Do you use a masseur?	0,13869	0,05385	0,04568	-0,15527
	(0,4130)	(0,7516)	(0,7883)	(0,3588)

* p values are given in brackets ** The figures in bold indicate p values equal to or smaller than 0,01

*** all variables that are not underlined such as gender are dichotomous

Table 12 continued: Pearson Correlation Coefficients between hassles frequency, hassles intensity, uplifts frequency and uplifts intensity with external variables (n=37)

Variable	Hassles F	Hassles I	Uplifts F	Uplifts I
Do you use an acupuncturist?	0,11783 (0,4873)	0,01299 (0,9392)	0,06926 (0,6838)	-0,18142 (0,2826)
Do you use an Osteopath?	. --	. --	. --	. --
Do you use a chiropractor?	-0,11181 (0,5100)	-0,11965 (0,4806)	-0,05735 (0,7360)	-0,43505 **(0,0071)**
Do you use counselling services?	0,00537 (0,9748)	0,10148 (0,5501)	0,16511 (0,3288)	0,04739 (0,7806)
Do you use a massage therapist?	-0,13430 (0,4281)	-0,30476 (0,0666)	0,08150 (0,6316)	0,33831 (0,0406)
Tell someone about the injury?	-0,24466 (0,1445)	-0,08385 (0,6217)	-0,20088 (0,2332)	-0,08305 (0,6251)
Seek professional treatment?	-0,02920 (0,8638)	0,13287 (0,4331)	0,04390 (0,7964)	-0,02733 (0,8724)
Take own preventative steps?	0,10023 (0,5550)	-0,33646 (0,0417)	0,02312 (0,8920)	0,20675 (0,2195)
Soldier on?	0,13151 (0,4378)	0,17376 (0,3037)	-0,04720 (0,7814)	-0,15728 (0,3526)
Causes of injury				
Fatigue/overwork?	-0,05109 (0,7639)	-0,11044 (0,5152)	-0,11587 (0,4947)	-0,07140 (0,6745)
Unsuitable floors?	-0,19918 (0,2373)	-0,05966 (0,7258)	-0,05901 (0,7287)	-0,27347 (0,1015)
Cold environment?	0,04873 (0,7746)	-0,00641 (0,9700)	0,09155 (0,5899)	-0,06817 (0,6885)
Insufficient warm up?	0,09023 (0,5953)	0,09874 (0,5610)	0,13729 (0,4178)	-0,10109 (0,5516)
Difficult repertoire?	-0,00638 (0,9701)	0,35323 (0,0320)	-0,11244 (0,5076)	-0,16311 (0,3347)
Difficult ballet mistress/master?	0,29545 (0,0758)	0,01933 (0,9096)	0,16511 (0,3288)	-0,05493 (0,7468)
Repetitive movements?	-0,12946 (0,4451)	-0,20043 (0,2343)	0,00753 (0,9647)	-0,25472 (0,1281)
Partnering work?	-0,06934 (0,6834)	0,06887 (0,6855)	-0,03677 (0,8289)	-0,17243 (0,3075)
Inadequate Diet?	0,05909 (0,7283)	0,18017 (0,2859)	-0,24251 (0,1481)	-0,25632 (0,1257)
Psychological reasons e.g stress?	0,30859 (0,06310)	0,45849 **(0,0043)**	-0,07265 (0,6691)	-0,12908 (0,4464)
Ignoring warning signs	0,03046 (0,8580)	0,14413 (0,3947)	0,02440 (0,8860)	-0,00378 (0,9823)

* p values are given in brackets

** the figures in bold indicate p values equal to or smaller than 0,01

*** all variables that are not underlined such as gender are dichotomous

In Table 12 the following correlations concerning hassles frequency, hassles intensity, uplifts frequency and uplifts intensity appear to be noteworthy as they were found to be significant at the 0,01 level of significance.

- A negative correlation of -0,47 was found between the variables hassles frequency and gender (coded as male=1; female=2). This correlation was significant at the 0,01 level of significance (p= 0,002) and indicates that male dancers experienced more hassles than female dancers as recorded on the hassles sub scale.

- A negative correlation of -0,59 was found between the variables uplifts frequency and gender (coded as male=1; female=2). This correlation was significant at the 0,01 level of significance (p= 0,000) and implies that male dancers experience a higher frequency of uplifts as compared to female dancers as recorded on the uplifts sub scale.

Uplifts frequency and hassles frequency were found to be significantly positively correlated 0,59 at the 0,01 level of significance (p= 0,000)(see section 3.6.2.1).This could indicate as Kanner et al., (1981) suggested a common response style, from the above it can be seen that this possible common response style is evident in male dancers.

- A negative correlation of -0,48 was found between the variables uplifts intensity and gender (coded as male =1; female=2). This correlation was significant at the 0,01 level if significance (p= 0,002) indicating that male dancers experience daily uplifts more intensely than female dancers.

Uplifts frequency and uplifts intensity were found to be significantly positively correlated 0,49 at the 0.01 level of significance (p= 0,001)(see section 3.6.2.1) from the above it can be seen that the male dancers not only experience more uplifts than female dancers they also experience those uplifts more intensely.

- A positive correlation of 0,45 was found between the variables hassles intensity and psychological reasons (such as stress) as the source that dancers attributed injury to (coded as: no=0 and yes =1). This correlation was significant at the 0,01 level of significance where (p= 0,004). This indicated that those dancers who experienced their hassles intensely had connected injury to a possible psychological reason such as stress.

Table 13: **Pearson Correlation Coefficients of the correlations between the hassles and uplifts sub scales injury/non injury and severity of injury scale**

	Hassles F	Uplifts F	Hassles Int	Uplifts Int	Injury	Days away
Injury	-0,12960 (0,4446)* 37**	-0,11024 (0,5160) 37	0,03865 (0,8203) 37	0,21587 (0,1994) 37	1,00000 - - 37	
Days away	-0,23067 (0,2569) 26	-0,05177 (0,8017) 26	-0,21770 (0,2854) 26	-0,22539 (0,2683) 26	. - - 26	1,00000 - - 26

* p values are given in brackets.
** n=37 or n=26

Table 13 represents the correlation between the hassles and uplifts sub scales with the injury/non injury and severity of injury scale. From the above correlation it appears that at the 0,05 level of significance that no significant correlations could be shown between injury/non injury and severity of injury and any of the hassles and uplifts sub scales.

Having found no significant correlations between injury/non injury and severity of injury and any of the hassles and uplifts sub scales, the question arises as to whether the relationships might be more complex. For example is there a joint explanatory effect of hassles and uplifts on injury? Do the hassles and uplifts scales interact to influence injury (both incidence and severity)? To investigate these questions multiple regression analyses were performed. As a first step, product terms for example Hassles frequency x Uplift frequency (called Finter see below for all the product terms created) were calculated as extra terms to be added into the multiple regression equation which, if found to be significant would be evidence of interaction effects (Kerlinger, 1986).Also as all the scales are included in the multiple regression equation one should be able to establish whether hassles and uplifts have a joint explanatory effect. It must be immediately recognised that due to the small sample size (n=37) the results of such a parametric procedure must be approached with circumspect. In the case of "severity of injury" the sample size (n=26) was deemed too small to justify regression analyses. The full set of terms (possible explanatory variables) accommodated in the "best subset" regression analysis are listed below.

A "Best" subset regression analysis (Draper and Smith,1981) was performed to rank

various solutions from best to worst. The following possible predictors were used.

- Hassles frequency
- Uplift frequency
- Hassles intensity
- Uplift intensity
- Hassles frequency X Uplift frequency **(Finter)**
- Hassles intensity X Uplifts intensity **(Iinter)**
- Hassles frequency X Hassles intensity **(Hint)**
- Uplift frequency X Uplift intensity **(Uint)**

Table 14: Results for the "Best" regression equation for predicting injury/non-injury

Cp	0,83	
R-square	0,163	
Adj R-square	0,114	
	Coefficient	P- Value
Intercept	1,619	
Uplift Frequency	-0,0184	(p = 0,0145)
Uint (Uplift frequency x Uplift intensity)	0,00697	(p = 0,0182)

The Cp statistic is a measure of "lack of fit" of a linear regression model (Draper and Smith, pp. 299-300). Ideally the Cp value should be equal to or smaller than p, the number of parameters in the model. In the case of using this criterion for selecting the "best subset" regression solution", the SAS program called "PROC REG" arranges solutions for a particular no of terms, or value of p, from best (smallest Cp value) to worst (largest Cp value). Here, the "best" solution is reported only. R-square refers to the proportion of variance of the dependent variable which is being explained by the terms in the solution. The adj R-square refers to an adjustment to R-square for the increase in degrees of freedom. As more and more terms are included in a solution, R-square will increase but a portion of the increase might be due to chance. The adj R-square compensates for this "chance" effect by making an adjustment based on the number of terms (or degrees of freedom).

The "Best" regression equation showed two significant effects namely uplift frequency and the interaction effect (uplift frequency) x (uplift intensity). Here it is interesting to note that the

predictor "uplift frequency" did not correlate significantly with injury on its own (r = -0,11; p = 0,52 see table 13) at the 0,05 level of significance but becomes a significant predictor when appearing with the interaction effect in the same equation.

The interaction effect (Uint which is the product term for Uplift frequency x Uplift intensity) is significant at the 0,05 level of significance (r=0,00697; p=0,0182) and therefore uplift intensity could be moderating the effect of uplift frequency on the incidence of injury or visa versa. In order to investigate this interaction effect 3 subgroups were formed on the basis of uplift intensity scores as follows:

Group 1: Uplift intensity scores less than or equal to 1,75 where n = 12 (low intensity)

Group 2: Uplift intensity scores greater than 1,75 and less than or equal to 2 where n = 12 (medium intensity)

Group 3: Uplift intensity scores greater than 2 where n = 13 (high intensity)

Uplift F was subsequently correlated to injury/non injury for each of these subgroups.

Table 15: Correlation of uplift frequency to injury/non injury for each of the three subgroups

Group	Correlation of Uplift F to Injury	p - value
1 (n=12)	-0,44	0,1454
2 (n=12)	-0,37	0,2299
3 (n=13)	0,09	0,7731

It is evident from table 15 that no correlations were found to be significant possibly due to small sample sizes. The correlations do however appear to be large and negative for Group 1 (low intensity) and Group 2 (moderate intensity) but not for Group 3 (high intensity). These results would need to be verified on a larger sample where statistical significance may be achieved. Conclusions that are only hinted at in the present study for example uplift frequency increasing the chances of injury provided that the intensity of the uplifts is not too high may be shown.

Strictly speaking in performing the regression analysis above one should have attempted to control for possible nuisance variables for example gender but due to the small sample size it

was deemed wise to limit the number of predictors in the equation. An exception was made of gender because of its high correlations with hassles frequency (r= -0,47; p= 0,002), uplifts frequency (r= -0,59; p= 0,000) and uplifts intensity (r= -0,48; p= 0,002). However the "Best" subset equation according to the Cp Mallows criterion remained the same (Draper and Smith,1981).

When studying dance injury, the findings of Pepper (1983) should be considered i.e. what could be responsible for a dancer's all-encompassing motivation is essentially unshareable and intensely private.

"dancers achieve a state of 'beyond boredom', a transcendental state with its own mysterious inner pleasure. It is the wish to achieve a kind of perfectionism, the desire to do the thing perfectly and to achieve the special momentary bliss accompanying the perfectness, that motivates dancers" (Pepper, 1983, p. 33).

CHAPTER 5

DISCUSSION

The aim of the present study was to show a positive relationship between stress experienced and the injury incurred by the dancers in the past 12 months. No simple direct relationship between stress (hassles and uplifts) and injury could be found. However it would appear that uplift frequency may affect the incidence of injury when low or medium levels of uplift intensity are experienced.

The theoretical concepts underlying the present research study are based on Lazarus (et al., 1980b), Lazarus (1981) and Lazarus and Folkman (1984) operationalised by the Daily Hassles and Uplifts Questionnaire (Kanner, et al.,1981).

Theoretically a situation is only considered to be stressful if it is perceived by individual to be taxing or endangering their resources and well being. Cognitive and behavioural efforts result in an attempt to cope and manage the stressful situation. This attempt may or may not be successful, the failure to cope with the perceived demands results in the physical, psychological and behavioural symptoms of stress (Lazarus & Folkman, 1984). Stress when viewed as a multidimensional process contains both psychological and physiological properties and manifestations and is part of a cycle of changes to the person's perceptions and cognition's, as well as changes to their behavioural and physiological functioning (Cox, 1986). Stress once induced may bring about the physiological (muscle tension) and attentional (self pre-occupation) responses that could result in athletic injury (Bramwell, et al., 1975; Landers (1978) in Hardy & Riehl (1988); Cox, 1986; Nideffer, 1983; May & Sieb, 1987; Anderson & Williams, 1988; Morris & Summers,1995). Stress has been measured using the four summary scores of the Daily Hassles ands Uplifts questionnaire, namely hassles frequency, hassles intensity, uplifts frequency and uplifts intensity (Kanner, et al.,1981).[5]

[5]This is based on Lazarus's (1980b) theory that everyday minor stresses and pleasures have adaptational significance and to view either in isolation would result in a distorted conception of the relationship between stress and illness.

A career in dance is brief and requires near perfection in performance in an environment of extreme competition for professional position and no objective measurement of dance performance (Hamilton, et al., 1989). According to Brinson and Dick (1996) stress is endemic in the life world of the ballet dancer and dancers experience many of the personal and environmental/situational daily stresses that affect athletes as noted by Morris and Summers,(1995) in section 2.3 as well as workplace stress as noted by Sutherland and Cooper, (1990) in section 2.3. The "Professional Stress Syndrome" (Gardner and Hall,1981) in section 2.3 associated with highly skilled employees in the workplace and recognised by physiological, psychological and behavioural symptoms can be associated with dancers. The self-reported psychological symptoms (in section 4.3) of the dancers in the present sample and in the sample of Brinson & Dick (1996) have considerable overlap with the listed symptoms of the "Professional Stress Syndrome."

The self-reported percentage and type of psychological symptoms experienced by the dancers in this sample has been reported in section 4.3 and although the findings for the present sample were similar to the findings of Brinson and Dick (1996) in terms of tension, general anxiety, and low self confidence, larger difference was recorded between the two samples in terms of performance anxiety, and anxiety due to external factors. This could be attributed to the threat of the closure of SBT. It should be noted that at the time of testing most of the present sample was exposed to the very real and extreme threat of the closure of the State Theatre and consequently SBT, both have subsequently been "mothballed". Sutherland and Cooper (1990) note that a relatively stable work environment generates feelings of security and confidence at odds with stress. However the fear of job loss is a potent source of stress and is associated with several health problems, which include muscular and emotional complaints.

Injury and External Variables

Injury for the professional dancer needs to viewed as a serious occupational hazard. Although the main focus was on daily stress as a correlate of injury, the present study also identified other correlates of injury. The significant correlates of injury yield important information for dancers as well as for future research. The injury rate of the sample was (n=26; 70,3%), this was not as

high as the injury rates reported by Brinson and Dick (1996) which all exceeded 80% (see section 1.2).

Injury is serious, with injured dancers showing concern in dealing with injury in a pro active way. The most significant correlate of injury was who to go to when injured with 76,9% of those dancers that were injured choosing a physiotherapist. The second most important correlate of injury was what to do when injured, dancers were found to be pro active mostly taking their own preventative steps (n=16; 61,5%), seeking professional treatment (n=13; 50,0%) or telling someone (n=7; 26,9 %). Most of the dancers were aided through health insurance, and this could account for the high rate of professional treatment sought by the dancers in contrast to the findings of Brinson and Dick (1996). These researchers found that only 36% of their sample sought professional help while 76% took their own preventative steps. Brinson and Dick (1996) attributed the high percentage of dancers who took their own preventative steps as apposed to seeking professional help to the dancers restricted access to professional treatment for financial or other reasons.

In the Brinson and Dick (1996) study the injured dancers as in the present sample agreed that the major cause (prompted) of injury was fatigue and overwork (n=13; 50,0%). This could be as a result of repetitive movements (n=10; 38,4%). Hamilton (et al.,1989) noted that the personality characteristics suggestive of the "overachiever" (common in dancers) when combined with physical stress characterised those dancers who had experienced the greatest number of injuries due to extreme repetition of movements. This would suggest that the connection between fatigue, overwork and injury is not a simple one, instead it appears to be influenced by personality.

The injured dancers in this sample did not significantly attribute injury to psychological reasons such as stress and the tendency was for the injured dancers not to attribute injury to psychological reasons. Only (n=4; 15,3%) of the injured dancers showed an awareness of a link between injury and psychological and/or emotional events. According to Triegaart (1987) this is not surprising as dancers are notorious for their ignorance in matters pertaining to their well-being. No variables were found to correlate significantly with the severity of the injury.

In agreement with Hamilton (et al., 1989) the results of the present study indicate that gender is not part of the injury pattern as no significant differences in injury were found between male and female dancers.

It should be noted that a lack of injury correlates could be due to the small sample size and therefore should not be shown as proof of absence of relationships.

Hassles and Uplifts and External Variables

In the present study a significant positive correlation was found between uplifts frequency and hassles frequency. This is in agreement with the findings of Kanner (et al., 1981) who explained this relationship in terms of a common response style.

Participants with a high frequency in uplifts also experienced a high intensity in uplifts. Gender was found to significantly correlate with hassles frequency, uplifts frequency and uplifts intensity, with male participants recording the higher scores. In addition it was found that those dancers who experienced higher scores for hassles intensity had an awareness of a link between injury and psychological and/or emotional events.

It should be noted that the intensity scores of the hassles sub scale lacked variability and this could be a possible reason why the effects involving hassles could not be shown to be more significant.

Until these findings can be verified in a larger sample it has been considered unwise to speculate psychologically as to why hassles and uplifts correlated significantly with these particular external variables.

Injury and Stress

The aim of the present study was to show a positive relationship between stress experienced and the injury incurred by the dancers in the past 12 months. In order to investigate this aim the

following research hypothesis was generated namely:

The experience of daily stress is positively related to the occurrence of injury in professional ballet dancers.

In the present study, daily stress, that is, daily hassles and uplifts (whether frequency or intensity) could not be shown to correlate significantly with injury at the 0,05 level of significance. Therefore in terms of the main hypothesis it would appear when using Pearson Product Moment correlations that-

- No simple direct correlation between stress (hassles and uplifts) and injury (incidence) exists.

Having found no significant correlations between injury and stress the possibility that the hassles and uplifts (frequency as well as intensity) sub scales could be interacting with one another and that these interactions could be effecting injury, was investigated. Product terms were created to represent these interaction factors in multiple regression analyses, so for example would (hassles frequency) x (uplifts frequency) represent the interaction effect (on injury) of hassles frequency and uplift frequency? In order to investigate the joint explanatory effect of hassles and uplifts sub scales (the frequency as well as intensity sub scales), and the various interaction effects on injury, multiple regression analysis was carried out.

A "Best" sub-set regression analysis with injury as the criterion variable was performed. The "Best" regression equation showed two significant effects namely uplift frequency and the interaction effect (uplift frequency) x (uplift intensity). Here it is interesting to note that the predictor, "uplift frequency" did not correlate significantly with injury on its own (r = -0,11; p = 0,52 see table 13) but becomes a significant predictor when appearing with the interaction effect in the same equation (see table 14).

An attempt was made to investigate the significant interaction effect found further. The group was divided into subgroups in terms of intensity scores and uplift frequency was correlated with injury for each subgroup. Although no significant correlations were found, some correlations were found to be large and negative. This seems to indicate that if sample sizes were larger

significant correlations may have been found and until such time as future research corroborates this the researcher has considered it prudent to refrain from psychological interpretation of the interaction effect that was found.

Conclusion

No simple direct relationship was found between stress and injury using Pearson Product Moment correlations. This could be seen to support Hamilton et al.(1989) who noted that occupational stress and strain were not significantly related to injury in elite dancers and reasoned that it is likely that the few dancers who do reach the level of principal, soloist or ballerina, do so because of their ability to triumph over the stresses and strains inherent in the ballet world. However in spite of the small sample size, when multiple regression analysis was performed allowing for possible interaction effects some evidence of a more complicated relationship between stress indicators and injury was found. It was found namely that uplift frequency and the interaction term "(uplift frequency) x (uplift intensity)" effects injury significantly at the 0.05 level when these terms are both included in a multiple regression equation. However when an attempt was made to investigate the significant interaction effect no significant correlations were found when the group was divided into subgroups in terms of intensity scores and uplift frequency was correlated with injury for each subgroup. However, the correlations were found to be large and negative. Future research would therefore need to verify the present findings using larger samples before serious psychological interpretations could be attempted.

By and large the stress-injury relationship in athletes has been well supported in the literature with the vast majority of the studies using life event scales and reasonably large samples. The researcher can neither agree nor differ in terms of supporting the stress-injury relationship in a group of professional ballet dancers, as some evidence due to multiple regression would contradict a rejection of the null hypothesis as the presence of a more complicated relationship than initially thought has been shown. Due to the small sample size future research is needed to verify this result.

Recommendations

Based on the findings of the present research several recommendations have been provided as suggestions for use in further research.

- Using the Daily Hassles and Uplifts Scale to measure stress interaction effects were found to be significant, further exploration of this effect proved to be dubious because of the small sample size. Therefore it is recommended that this finding be verified in future research especially research using bigger samples. The research conducted by Patterson et al.(1998) using 46 dancers, all affiliated to major ballet companies in the western United States supported the life stress-injury relationship in dancers. Their findings indicated that recently experienced negative life events were significant predictors of subsequent injuries and accounted for nearly 50% of the injury variance in dancers who reported low levels of social support in their lives. Predictive relations were found for totally negative events and for minor negative events. The correlation's for major negative events did not achieve statistical significance. This is consistent with the findings of Kanner et al.(1981) who found that "microstressors" or daily hassles could exhibit stronger relations with measures of well being than major events, which occur less frequently.

- In the present study male dancers differ from female dancers with respect to their stress measurements. However they were not found to differ with regard to injury. When gender was entered into the multiple regression equation the resulting " Best" equation was not affected. However because gender differences were shown for example in the uplifts intensity scores, it is recommended that male and female samples are kept separate in future research.

- Future research should obtain an objective measure of injury from a medical source which will support subjective injury reporting. This was attempted unsuccessfully in the present study.

- Specific questions should be added to the Healthier Dancer Questionnaire, specifically

focusing on, muscle tension and attentional focus in order to add value to the Anderson and Williams model (1988), in varying athletic populations.

- More than half the dancers (n=21; 57%) in the sample indicated that they would like the services of a professional counsellor made available to them. However it is recommended that this service should be part of a wider education programme for dancers in order for the service not be stigmatized as one for an 'unreliable' few. The education programme should include research findings in athletic populations in terms of the link between injury and psychological variables as there generally seems to be very little awareness.

- Many respondents felt that they had been adequately prepared for a career in professional dance (n=20; 55.0%). The reasons given for feeling well prepared were that training was intense and strict from an early age, with shows and performances being part of their education. Dancers were not 'babied' or praised which made them strive harder. Dancers were told how hard their lives would be, and that they had chosen a life of poor pay and total dedication. However some (n=9; 24,3%) of the dancers felt that they were not well prepared at all- they had been prepared physically but not psychologically. Some dancers felt that nothing could prepare a dancer for the 'stress, exhaustion, the weighing and general putting down that is experienced.' It would appear that many hardships are endemic to the profession and therefore it is recommended that debriefing sessions be conducted when needed by 'an arms length' professional counsellor.

- A study that examines the coping strategies of professional ballet dancers is recommended, that is an investigation of the suggestion made by Hamilton et al, (1989) that it is likely that the few dancers who do reach the level of principal, soloist or ballerina do so because of their ability to triumph over the stresses and strains inherent in the ballet world. The Daily Hassles and Uplifts scale does not adequately assess this, save to say that those with high hassles are the most stressed and therefore exhibit the worst coping strategies. A more in depth understanding of the coping skills of dancers is needed.

- Future studies should include a personality inventory in order to enrich the results as

personality was found to be an important variable in the field of dance and injury by Hamilton et al.(1989) and Bakker, (1987, 1990).

- Future researchers should, when studying dance injury, consider the findings of (Pepper, 1983) who suggested that what could be responsible for a dancer's all-encompassing motivation is essentially unshareable and intensely private.

"dancers achieve a state of 'beyond boredom', a transcendental state with its own mysterious inner pleasure. It is the wish to achieve a kind of perfectionism, the desire to do the thing perfectly and to achieve the special momentary bliss accompanying the perfectness, that motivates dancers" (Pepper, 1983, p. 33).

Limitations

Any study has limitations and the present study is no exception. The limitations of the present study centred around the small sample size.Limitations are important to note as all conclusions need to viewed against the limitations of the study.

- The issue of redundancy is always an issue in the life world of the ballet dancer as young, new and talented dancers are arriving all the time (Brinson and Dick, 1996). The dancers are therefore used to coping with the threat of redundancy. The closure of the State Theatre could therefore have been viewed as another redundancy or it could have increased the stress experienced by the STB dancers (see table 15). There are no baseline stress figures for the sample, therefore there is no way of knowing if this was a limitation of the study.

- The small sample size limited the use of some statistical techniques. The sample size could also be responsible for correlations not reaching significance and the apparent absence of a relationship being found between stress and injury in professional ballet dancers. A small sample size undoubtedly limited the power of the tests.

- The data was gathered cross-sectionally, this precludes the possibility of controlling for

baseline levels of stress,(for example if a dancer scores x there is no way of knowing how high or low that score is for her/him at that moment in time).

- Retrospective stress-injury studies are difficult to interpret because the injury itself is a stress. This can bias the results of the stress measure which in this case was the Daily Hassles and Uplifts Scale of Kanner et al.,(1980) (Petrie & Falkenstein, 1998).

- The injury rate was high (n=26; 70,3%) therefore the variable injury was relatively homogeneous. This lack of variability could have limited the findings in the present study.

Dance training has become more scientific and a better understanding of the much neglected area of dance injury has become a necessity (Triegaart,1987) this includes possible psycho social correlates of injury such as stress. The present study did not find a simple direct relationship between stress and injury, however in spite of the small sample size some evidence for a more complicated relationship between stress indicators and injury was found.Future research needs to verify the present findings using larger samples, while taking into account the recommendations and limitations of the present study.

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APPENDICES

A Summary of nature and range of injuries
B The healthier dancer questionnaire*
C The Daily Hassles and Uplifts scale*
D The face validity instructions

* Appendix B and C were attached to each other

Appendix A

Table 1 The type and the frequency of the injury (n= 26)

INJURY TYPE	FREQUENCY	PERCENT
Soft tissue	14	53,8
Skeleton/bones	6	23,1
Joints	6	23,1
Total	26	100

Table 1 indicates that soft tissue injury in dancers is the most common type of injury (n=14; 53,8%) while skeleton and joint injuries are only half as common. Brinson and Dick (1996) in their longitudinal study found that soft tissue injury accounted for 64% of injury, skeleton and bones accounted for 16% and joints accounted for 40% of injuries.

Table 2 The site of the injury (n=26)

Site	Frequency	Percent	Cumulative frequency	Percent
Shoulders/neck	1	3,8	1	3,8
Neck	1	3,8	2	7,7
Upper back	1	3,8	3	11,5
Lower back	5	19,2	8	30,8
Pelvis	1	3,8	9	34,6
Thighs	2	7,7	11	42,3
Lower legs	3	11,5	14	53,8
Knees	2	7,7	16	61,5
Ankles	5	19,2	21	0,8
Feet	2	7,7	23	88,5
Hip	3	11,5	26	100,0

Table 2 illustrates that among the dancers who participated in the present study, the most common sites for injuries were, the lower back (n=5; 19,2%) and the ankles (n=5; 19,2%). The lower legs(n=3; 11,5%) and the hip area (n=3; 11,5%) were also found to be vulnerable to injury while the shoulders, neck and upper back appear to be the least vulnerable. These findings are similar to the findings of Brinson and Dick (1996) who also found the most common injury sites to be the lower back followed by the ankles.

Appendix B and C

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Dear All,

Thank you for the opportunity to watch your classes. I have thoroughly enjoyed the experience.

The questionnaire you find attached to this letter is the one that I would like you all to complete. I am positive that you will agree that psychological research into the "life world" of the South African professional ballet dancer is well overdue. Internationally this type of research is common in the larger ballet companies and is well recognised.

What would assist to make the findings valuable and useful both to you and other dancers is your honesty. The questionnaires will be treated as strictly private and highly confidential. I am the only person that will have direct access to them, and please note they are anonymous. I have requested that you fill in your rank/level within the company as injuries may be associated with age, difficulty of repertoire, years spent dancing etc.

I will bring in the results and final report to share and discuss with you all. This may take some time (a few months) to compile so please bear with me. I am confident that this project will add to the international body of knowledge that exists in relation to professional ballet dancers.

Thank you for your co-operation. I look forward to reading your answers and seeing you all in the near future.

Best personal regards

Ingrid Dennill
Intern Psychologist

Appendix B

THE HEALTHIER DANCER QUESTIONNAIRE

The focus of this measure is to ascertain information on physical injury in professional ballet dancers.

This questionnaire is part of a research project investigating injury amongst professional ballet dancers and will be distributed to all the dancers in the company. The information acquired will be used for research purposes only. The collective results may be published, however every dancer's identity will be protected. Please fill in the questionnaire's as honestly as possible. Please do not enter your name or anyone else's on this questionnaire. Please note that participation is voluntary and if you do not wish to take part in this research please return the questionnaire to the person you received it from.

The questionnaire is concerned with the past 12 month period

SECTION ONE: Demographics.

1. What is your gender? Male ☐
   Female ☐

2. What is your age group? 16-19 ☐
   20-24 ☐
   25-29 ☐
   30-34 ☐
   35-49 ☐

3. What is your home language_____?

4(a). How many years have you been dancing regularly (including school)?

Training_____Performing_____

What is your rank within the company for e.g. soloist _____

5. How many classes do you do a week _____
   How many hours do you spend in rehearsal per week? _____
   Do you cross train? _____
   Do you include body conditioning in your weekly/fortnightly schedule? _____
   Do you include any other strength training in your schedule? _____
   Do you participate in stretch class or a stretching regime? _____
   How many hours do you spend on pointe? _____
   Do you work with a physical dance therapist? _____

6 (a) Do you warm up
   a) before class? ☐
   b) before performance? ☐
   c) before rehearsal? ☐

6 (b) Do you cool down
   a) after class? ☐
   b) After performance? ☐

c) after rehearsal? ☐

A reportable injury will be defined in line with NAIRS as:

Any cessation of customary participation for the day of and at least one day after the injury.

The questions refer to injuries during training, rehearsal and/or in performance, in the past 12 months.

7. Have you had any of the following injuries during training, rehearsal and/or in performance, in the past 12 months. Please state how frequently the said injury occurred. You may have more than one answer:

	past 12 months	number
a) Soft tissue	☐	☐
b) Skeleton /bones	☐	☐
c) Joints	☐	☐
d) None		
e) Other (please state)	----------	

8(a). If you have had any of these injuries in the past month where were the sites of the injuries, and how many times were you injured? You may have more than one answer. Please indicate with an a, b, or c (taken from question 7) as to muscular, skeletal or joint injury.

	Site	Number in the past 12 months
Arms / hands		
Shoulders / neck		
Neck		
Upper back		
Lower back		
Ribs		
Pelvis		
Thighs		
Lower legs		
Elbows		
Knees		
Ankles		
Feet		
Hip		

Injury healing time as an indication of the intensity of the injury.

9) How many days have you been unable to work because of injury in the past 12 months. If there is more than one injury, please use a separate box for each injury, and state the injury referred to in the top left hand corner*.

INJURY*	Past 12 months
1-3 days	
4-6 days	
7-14 days	
15-21 days	
more than 21 days	

INJURY *	Past 12 months
1-3 days	
4-6 days	
7-14 days	
15-21 days	
More than 21 days	

Professional assistance received:

10) What type of professional help did you have for the injuries?

	Past 12 months
Orthopaedic surgeon	
Physiotherapist	
General practitioner	
Specialist / consultant	
Masseur	
Acupuncturist	
Osteopath	
Chiropractor	
Counselling	
Massage therapist	
Podiatrist	
Other	

11) Who paid for the treatment?

12) How do you react to warning signs of injury?

Tell someone else, e.g. a teacher	
Seek professional treatment	
Take own preventative steps	
Soldier on	
Other (specify)	

Sources of injury

13 (a) What do you think the causes of your injury were?

13 (b) Based on this list what do you think was the cause of these injuries? If there is more than one injury please use both columns and stipulate which injury is being referred to.

Fatigue and overwork		
Unsuitable floor		
Cold environment		
Insufficient warm up		
Difficult repertoire		
Difficult ballet mistress/master		
Repetitive movements in rehearsal		
Partnering work caused by self		
Partnering work caused by other		
Inadequate diet		
Psychological e.g. stress		
Ignoring early warning signs		
Other (specify)		

14) Thinking back when did your injury occur?

Rehearsal
a) During
b) Pre-rehearsal
c) After

Performance
a) During
b) Pre- performance
c) After

15) How close to performance were you?

_____

16) Have you experienced any of these in the:

	Past 12 months	
	Yes	No
General anxiety		
Tension with people		
Performance anxiety		
Depression		
Stress due to external factors		
Eating problems		
Over-use of alcohol/drugs		
General low self confidence		
Sudden drop in self confidence		
Consistent difficulty in concentrating in class or rehearsal		

Coping in terms of using psychological services

17) Have you ever made use of a professional counsellor to talk through your professional or personal difficulties?

Yes No

☐ ☐

18) Would you like to have the services of a professional counsellor available to you?

Yes No

☐ ☐

19) How do you deal with the experience of psychological stress?

_____
_____
_____
_____
_____

20) Do you believe that your vocational training prepared you adequately for life as a professional dancer?

Yes	No
☐	☐

Why do you say that?

_____

_____

31) Do you feel that you have an adequate support system i.e people you can turn to in times if need?

_____

_____

_____

_____

_____

Appendix C

THE DAILY HASSLES AND UPLIFTS SCALE

The focus of this measure is to ascertain information on the daily hassles and uplifts experienced by you. Please fill in the questionnaire as honestly as possible. Please note that participation is voluntary and if you do not wish to take part please return the questionnaire to the person you received it from.

The Hassles Scale

Directions: Hassles are irritants that can range from minor annoyances to fairly major pressures, problems or difficulties. They can occur few or many times.

Listed below are a number of ways in which a person can be hassled. First, circle the hassles that have happened in the past 12 months. Then look at the numbers on the right of the items you have circled. Indicate by circling a 1, 2, or 3 how severe each of the circled hassles has been for you in the past 12 months. If the hassle did not occur in the past 12 months do not circle it.

HASSLES	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(1) Misplacing or losing things	1	2	3
(2) Troublesome neighbors	1	2	3
(3) Social obligations	1	2	3
(4) Inconsiderate smokers	1	2	3
(5) Troubling thoughts about your future	1	2	3
(6) Thoughts about death	1	2	3
(7) Health of a family member	1	2	3
(8) Not enough money for clothing	1	2	3
(9) Not enough money for housing	1	2	3
(10) Concerns about owing money	1	2	3
(11) Concerns about getting credit	1	2	3
(12) Concerns about money for emergencies	1	2	3

HASSLES SCALE

HASSLES	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(13) Someone owes you money	1	2	3
(14) Financial responsibility for someone who doesn't live with you	1	2	3
(15) Cutting down on electricity, water, etc.	1	2	3
(16) Smoking too much	1	2	3
(17) Use of alcohol	1	2	3
(18) Personal use of drugs	1	2	3
(19) Too many responsibilities	1	2	3
(20) Decisions about having children	1	2	3
(21) Non-family members living in your house	1	2	3
(22) Care for pet	1	2	3
(23) Planning meals	1	2	3
(24) Concerned about the meaning of life	1	2	3
(25) Trouble relaxing	1	2	3
(26) Trouble making decisions	1	2	3
(27) Problems getting along with fellow workers	1	2	3
(28) Customers or clients give you a hard time	1	2	3
(29) Home maintenance (inside)	1	2	3
(30) Concerns about job security	1	2	3
(31) Concerns about retirement	1	2	3
(32) Laid-off or out of work	1	2	3
(33) Don't like current work duties	1	2	3
(34) Don't like fellow workers	1	2	3
(35) Not enough money for basic necessities	1	2	3

HASSLES	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(36) Not enough money for food	1	2	3
(37) Too many interruptions	1	2	3
(38) Unexpected company	1	2	3
(39) Too much time on hands	1	2	3
(40) Having to wait	1	2	3
(41) Concerns about accidents	1	2	3
(42) Being lonely	1	2	3
(43) Not enough money for health care	1	2	3
(44) Fear of confrontation	1	2	3
(45) Financial security	1	2	3
(46) Silly practical mistakes	1	2	3
(47) Inability to express yourself	1	2	3
(48) Physical illness	1	2	3
(49) Side effects of medication	1	2	3
(50) Concerns about medical treatment	1	2	3
(51) Physical appearance	1	2	3
(52) Fear of rejection	1	2	3
(53) Difficulties with getting pregnant	1	2	3
(54) Sexual problems that result from physical problems	1	2	3
(55) Sexual problems other than those resulting from physical problems	1	2	3
(56) Concerns about health in general	1	2	3

HASSLES	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(57) Not seeing enough people	1	2	3
(58) Friends or relatives too far away	1	2	3
(59) Preparing meals	1	2	3
(60) Wasting time	1	2	3
(61) Auto maintenance	1	2	3
(62) Filling out forms	1	2	3
(63) Neighborhood deterioration	1	2	3
(64) Financing children's education	1	2	3
(65) Problems with employees	1	2	3
(66) Problems on job due to being a woman or man	1	2	3
(67) Declining physical abilities	1	2	3
(68) Being exploited	1	2	3
(69) Concerns about bodily functions	1	2	3
(70) Rising prices of common goods	1	2	3
(71) Not getting enough rest	1	2	3
(72) Not getting enough sleep	1	2	3
(73) Problems with aging parents	1	2	3
(74) Problems with your children	1	2	3
(75) Problems with persons younger than yourself	1	2	3
(76) Problems with your lover	1	2	3
(77) Difficulties seeing or hearing	1	2	3
(78) Overloaded with family responsibilities	1	2	3
(79) Too many things to do	1	2	3

HASSLES	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(80) Unchallenging work	1	2	3
(81) Concerns about meeting high standards	1	2	3
(82) Financial dealings with friends or acquaintances .	1	2	3
(83) Job dissatisfactions	1	2	3
(84) Worries about decisions to change jobs	1	2	3
(85) Trouble with reading, writing, or spelling abilities	1	2	3
(86) Too many meetings	1	2	3
(87) Problems with divorce or separation	1	2	3
(88) Trouble with arithmetic skills	1	2	3
(89) Gossip	1	2	3
(90) Legal problems	1	2	3
(91) Concerns about weight	1	2	3
(92) Not enough time to do the things you need to do ..	1	2	3
(93) Television	1	2	3
(94) Not enough personal energy	1	2	3
(95) Concerns about inner conflicts	1	2	3
(96) Feel conflicted over what to do	1	2	3
(97) Regrets over past decisions	1	2	3
(98) Menstrual (period) problems	1	2	3
(99) The weather .	1	2	3
(100) Nightmares	1	2	3
(101) Concerns about getting ahead	1	2	3

HASSLES	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(102) Hassles from boss or supervisor	1	2	3
(103) Difficulties with friends	1	2	3
(104) Not enough time for family	1	2	3
(105) Transportation problems	1	2	3
(106) Not enough money for transportation	1	2	3
(107) Not enough money for entertainment and recreation	1	2	3
(108) Shopping	1	2	3
(109) Prejudice and discrimination from others	1	2	3
(110) Property, investments or taxes	1	2	3
(111) Not enough time for entertainment and recreation	1	2	3
(112) Yardwork or outside home maintenance	1	2	3
(113) Concerns about news events	1	2	3
(114) Noise	1	2	3
(115) Crime	1	2	3
(116) Traffic	1	2	3
(117) Pollution	1	2	3
HAVE WE MISSED ANY OF YOUR HASSLES? IF SO, WRITE THEM IN overleaf. (118) _____	1	2	3
ONE MORE THING: HAS THERE BEEN A CHANGE IN YOUR LIFE THAT AFFECTED HOW YOU ANSWERED THIS SCALE? IF SO, TELL US WHAT IT WAS: overleaf			

The uplifts Scale

Directions: Uplifts are events that make you feel good. They can be sources of peace, satisfaction, or joy. Some occur often, others are relatively rare.

Circle the events that have made you feel good in the past 12 months. Then look at the numbers on the right of the items you have circled. Indicate by circling a 1, 2, or 3 how often each of the circled uplifts has occurred in the past 12 months. If the uplift did not occur in the past 12 months do not circle it.

UPLIFTS	HOW OFTEN 1. Somewhat often 2. Moderately often 3. Extremely often		
(1) Getting enough sleep	1	2	3
(2) Practicing your hobby	1	2	3
(3) Being lucky	1	2	3
(4) Saving money	1	2	3
(5) Nature	1	2	3
(6) Liking fellow workers	1	2	3
(7) Not working (on vacation, laid-off, etc.)	1	2	3
(8) Gossiping; "shooting the bull"	1	2	3
(9) Successful financial dealings	1	2	3
(10) Being rested	1	2	3
(11) Feeling healthy	1	2	3
(12) Finding something presumed lost	1	2	3
(13) Recovering from illness	1	2	3
(14) Staying or getting in good physical shape	1	2	3
(15) Being with children	1	2	3
(16) "Pulling something off"; getting away with something	1	2	3
(17) Visiting, phoning, or writing someone	1	2	3
(18) Relating well with your spouse or lover	1	2	3
(19) Completing a task	1	2	3
(20) Giving a compliment	1	2	3
(21) Meeting family responsibilities	1	2	3
(22) Relating well with friends	1	2	3
(23) Being efficient	1	2	3
(24) Meeting your responsibilities	1	2	3
(25) Quitting or cutting down on alcohol	1	2	3
(26) Quitting or cutting down on smoking	1	2	3
(27) Solving an ongoing practical problem	1	2	3
(28) Daydreaming	1	2	3
(29) Weight	1	2	3
(30) Financially supporting someone who doesn't live with you	1	2	3
(31) Sex	1	2	3
(32) Friendly neighbors	1	2	3
(33) Having enough time to do what you want	1	2	3
(34) Divorce or separation	1	2	3

UPLIFTS SCALE

UPLIFTS	HOW OFTEN 1. Somewhat often 2. Moderately often 3. Extremely often		
(35) Eating out	1	2	3
(36) Having enough (personal) energy	1	2	3
(37) Resolving inner conflicts	1	2	3
(38) Being with older people	1	2	3
(39) Finding no prejudice or discrimination when you expect it	1	2	3
(40) Cooking	1	2	3
(41) Capitalizing on an unexpected opportunity	1	2	3
(42) Using drugs or alcohol	1	2	3
(43) Life being meaningful	1	2	3
(44) Being well-prepared	1	2	3
(45) Eating	1	2	3
(46) Relaxing	1	2	3
(47) Having the "right" amount of things to do	1	2	3
(48) Being visited, phoned, or sent a letter	1	2	3
(49) The weather .	1	2	3
(50) Thinking about the future	1	2	3
(51) Spending time with family .	1	2	3
(52) Home (inside) pleasing to you	1	2	3
(53) Being with younger people	1	2	3
(54) Buying things for the house	1	2	3
(55) Reading	1	2	3
(56) Shopping	1	2	3

UPLIFTS SCALE

UPLIFTS	HOW OFTEN 1. Somewhat often 2. Moderately often 3. Extremely often		
(57) Smoking	1	2	3
(58) Buying clothes	1	2	3
(59) Giving a present	1	2	3
(60) Getting a present	1	2	3
(61) Becoming pregnant or contributing thereto	1	2	3
(62) Having enough money for health care	1	2	3
(63) Traveling or commuting	1	2	3
(64) Doing yardwork or outside housework	1	2	3
(65) Having enough money for transportation	1	2	3
(66) Health of a family member improving	1	2	3
(67) Resolving conflicts over what to do	1	2	3
(68) Thinking about health	1	2	3
(69) Being a "good" listener	1	2	3
(70) Socializing (parties, being with friends, etc.) .	1	2	3
(71) Making a friend	1	2	3
(72) Sharing something	1	2	3
(73) Having someone listen to you	1	2	3
(74) Your yard or outside of house is pleasing	1	2	3
(75) Looking forward to retirement	1	2	3
(76) Having enough money for entertainment and recreation	1	2	3
(77) Entertainment (movies, concerts, TV, etc.)	1	2	3
(78) Good news on local or world level	1	2	3

UPLIFTS SCALE

UPLIFTS	HOW OFTEN 1. Somewhat often 2. Moderately often 3. Extremely often		
(79) Getting good advice	1	2	3
(80) Recreation (sports, games, hiking, etc.)	1	2	3
(81) Paying off debts	1	2	3
(82) Using skills well at work	1	2	3
(83) Past decisions "panning out"	1	2	3
(84) Growing as a person	1	2	3
(85) Being complimented	1	2	3
(86) Having good ideas at work	1	2	3
(87) Improving or gaining new skills	1	2	3
(88) Job satisfying despite discrimination due to your sex	1	2	3
(89) Free time	1	2	3
(90) Expressing yourself well	1	2	3
(91) Laughing	1	2	3
(92) Vacationing without spouse or children	1	2	3
(93) Liking work duties	1	2	3
(94) Having good credit	1	2	3
(95) Music	1	2	3
(96) Getting unexpected money	1	2	3
(97) Changing jobs	1	2	3
(98) Dreaming	1	2	3
(99) Having fun	1	2	3
(100) Going someplace that's different	1	2	3

UPLIFTS	HOW OFTEN 1. Somewhat often 2. Moderately often 3. Extremely often		
(101) Deciding to have children	1	2	3
(102) Enjoying non-family members living in your house	1	2	3
(103) Pets	1	2	3
(104) Car working/running well	1	2	3
(105) Neighborhood improving	1	2	3
(106) Children's accomplishments	1	2	3
(107) Things going well with employee(s)	1	2	3
(108) Pleasant smells	1	2	3
(109) Getting love	1	2	3
(110) Successfully avoiding or dealing with bureaucracy or institutions	1	2	3
(111) Making decisions	1	2	3
(112) Thinking about the past	1	2	3
(113) Giving good advice	1	2	3
(114) Praying	1	2	3
(115) Meditating	1	2	3
(116) Fresh air	1	2	3
(117) Confronting someone or something	1	2	3
(118) Being accepted	1	2	3
(119) Giving love	1	2	3
(120) Boss pleased with your work	1	2	3
(121) Being alone	1	2	3

UPLIFTS SCALE .

	UPLIFTS	HOW OFTEN 1. Somewhat often 2. Moderately often 3. Extremely often		
(122)	Feeling safe	1	2	3
(123)	Working well with fellow workers	1	2	3
(124)	Knowing your job is secure	1	2	3
(125)	Feeling safe in your neighborhood	1	2	3
(126)	Doing volunteer work	1	2	3
(127)	Contributing to a charity .	1	2	3
(128)	Learning something	1	2	3
(129)	Being "one" with the world	1	2	3
(130)	Fixing/repairing something (besides at your job)	1	2	3
(131)	Making something (besides at your job)	1	2	3
(132)	Exercising .	1	2	3
(133)	Meeting a challenge .	1	2	3
(134)	Hugging and/or kissing	1	2	3
(135)	Flirting	1	2	3
	HAVE WE MISSED ANY OF YOUR UPLIFTS? IF SO, WRITE THEM IN			
(136)	_____	1	2	3
	ONE MORE THING: HAS THERE BEEN A CHANGE IN YOUR LIFE THAT AFFECTED HOW YOU ANSWERED THIS SCALE? IF SO, TELL US WHAT IT WAS: overleaf			

Appendix D

THANK YOU FOR YOUR HELP.

FOLLOWING IS A QUESTIONNAIRE THAT WILL BE GIVEN TO PROFESSIONAL DANCERS. AS YOU HAVE ALL AT ONE STAGE BEEN PROFESSIONAL DANCERS OR HAVE DANCED FOR A BALLET COMPANY YOUR INPUT IS INVALUABLE TO ME.

PLEASE COULD YOU GO THROUGH THE QUESTIONNAIRE (BRINSON & DICK, 1995) AS THOUGH YOU WERE FILLING IT IN AND BEAR IN MIND THE FOLLOWING POINTS.

1) ALL THE INFORMATION THAT WILL BE RECORDED ON THE QUESTIONNAIRE WILL BE CONFIDENTIAL AND SEEN ONLY BY MYSELF. AT NO TIME IN THE PUBLICATION OF THE RESULTS WILL ANY DANCER EVER BE REFERRED TO BY NAME.

2) WHAT IS IT THAT THE QUESTIONNAIRE APPEARS TO BE MEASURING?

IS THE QUESTIONNAIRE CLEAR, SHORT AND SIMPLE?

Are the questions dealing with injury clear, short and simple?
Are the questions dealing with stress clear, short and simple?
Are any of the questions leading?

PLEASE COULD YOU STATE AFTER EACH QUESTION WHETHER IT IS CLEAR OR UNCLEAR, IF IT IS UNCLEAR PLEASE STATE WHY, AND ANY SUGGESTIONS AS TO IMPROVEMENT.

IF YOU FEEL, AS EXPERTS IN YOUR FIELD THAT RELEVANT MATERIAL HAS BEEN OMITTED PLEASE SAY SO.

THANK YOU FOR YOUR TIME AND SUPPORT

KIND REGARDS,

Ingrid Dennill (Intern psychologist)